Explaining the attraction of poker machines: cognition or conditioning?

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Introduction

Poker Machines in New South Wales

The modern poker machine in Australia is a form of electronic slot machine. The defining features of this type of machine are cash in, selection of play lines and bet size, a random array of symbols defining the outcome of a game, and the win or loss to the player. The player may cash out following one, two or however many games are played. Each game is rapidly completed; in New South Wales a new game can be played every 3.5 seconds, provided that bonus and doubling features are not included. Bet size can range from 1c to $10 and the maximum prize is $10,000. This kind of machine is referred to as an "Electronic Gaming Machine" (EGM) and is colloquially known as a poker machine or "pokie". According to the Productivity Commission (1999), New South Wales has approximately 100,000 poker machines available for play, approximately 10% of the EGMs in the world. This is the highest concentration of machines per 10,000 adults anywhere in the world. Throughout Europe, the average density of EGMs is 15/10k of population. The equivalent figure for North America is 45 and in New Zealand is 74. In New South Wales, the density of EGMs exceeds 200/10k. Adult residents of New South Wales and the Australian Capital Territory spend in excess if $500 per person on gaming machines. Kweitel and Allen (1998) argue that poker machines are a major problem for pathological gamblers because they involve the largest losses of money per person. Not only does New South Wales have the highest density of EGMs in the world for any comparably sized jurisdiction, but poker machines in this State are also played to such an extent that they are the major cause of gambling-related problems (Walker et al., 2003).

Description of the Poker Machine Game

Poker machines in New South Wales offer a two stage gamble. The first stage involves betting that a winning combination of symbols will occur on the lines chosen. The second stage occurs only if the player wins on the first stage. In the second stage, the player is offered two bets: double or nothing on the colour of a playing card (red or black) or four times the win or nothing on the suit of a playing card. If the player wins the bet in the second stage of the gamble, the bet can be repeated up to a further four times. However, the total win cannot exceed $10,000.

Stage 1 involves setting the bet size (the number of credits per line) and choosing the number of lines on which the bet will be staked. The expected return on a bet in stage 1 is approximately 90% (actual percentages depend on the setting of the machine and cannot be lower than 85% by law). Wins in stage 1 typically come from four alternative sources: sequences without substitutions, sequences with the substitution of special symbols, non-sequential symbols, and bonus games. Bonus games may involve a game within a game (for example, by selecting one of a set of prizes). Games vary in game structure and may not include one or more of these components. However, independently of game structure, the expected return remains constant (at about 90%).

Stage 2 bets are fair bets. That is, the 90% return rate does not apply. Thus the effect of stage 2 does not alter the average pay-off but does affect the variance of the distribution of pay-offs. For a given win size, and the double or nothing bet, the pay-out is 0 (losing bet) or 2, 4, 8, 16 or 32 times the initial win depending on the number of successful choices made by the player in up to five plays at double or nothing.

Since stage 1 gambles can produce large wins, especially when the bonus feature involves free games, stage 2 gambles have the potential to exceed the $10,000 maximum prize.

Expected use of the gamble button

The 'gamble' button is the means by which the player can engage in stage 2 gambles. The focus of this report is the use made by players of stage 2 gambling opportunities. Concern has been expressed over this aspect of poker machine gambling. The Licensing and Administration Board of the New South Wales Department of Gaming and Racing (LAB) has stated that elimination of the double up feature was one of the aspects of poker machines that might have an impact on responsible gambling (LAB, 2000).

Little is known about the extent to which the gamble button is used by poker machine players. The stage 2 gamble itself is interesting for a number of reasons. First of all, the double or nothing gamble might be considered as the paradigm for all gambling (Walker, 1992). Secondly, it is one of the few 'fair' gambles that are legally available to gamblers. Thus, there is good reason to believe that stage 2 gambling would be attractive to poker machine players. Interestingly, different theories of human behaviour reach different conclusions on whether, in fact, players will be attracted to use of the gamble button. Some of these theories are reviewed next.

Behavioural Learning Theory

Winning on a poker machine is reinforcing. Since the machine provides wins on some occasions but not others, the button pressing behaviour of the player is reinforced on a partial schedule. The schedule of reinforcement is random, but players may not be able to distinguish between a random schedule of reinforcement and a variable ratio schedule. The behavioural equivalence of ratio and random schedules suggests that poker machine play might be very difficult to extinguish since studies with rats and pigeons have demonstrated that variable ratio schedules are some of the most powerful available.

Although it is easy to see how play of a poker machine may be instrumentally conditioned, it is more complex to understand the behavioural consequences in stage two betting. Initially, the player would be expected to continue pressing the button to continue stage 1 play. If it is assumed that the player presses the gamble button through the operation of other factors (for example, curiosity), then there is a fifty percent likelihood that the press of the gamble button will be rewarded by a larger win. Pressing the gamble button would thereby become open to discrimination learning. The stimulus of a win would become the discriminative stimulus for the conditioned response of

pressing the gamble button. Since the schedule of reinforcement for pressing the gamble button is more frequent than that in stage 1 and since the reinforcement is larger, it would be expected that use of the gamble button would become more common as the number of games played increases. Thus, the concept of instrumental conditioning leads to the prediction that use of the gamble button will increase with experience. Individuals who play poker machines for more hours each week would be expected to press the gamble button more frequently. In general, the population of poker machine players should consist of individuals who are at various stages in learning to use the gamble button. Since players who play poker machines more frequently account for the majority of games on poker machines, it follows that gamble button rates for machines would tend to be high rather than low.

Sensation-Seeking and the Impulse to Gamble

According to Zuckerman (1979), the impulse to gamble will be stronger among people who score higher on sensation-seeking. Gambling is assumed to increase arousal and thus would be expected to be attractive to those who seek excitement. Furthermore, increasing bet size in order to increase excitement is one of the criteria for diagnosing pathological gambling (DSM-IV, 1994). These assumptions lead to the expectation that gamblers, on the whole, will be attracted to stage two gambles on poker machines. The maximum bet permitted in stage one play is $10 whereas bets in stage two are essentially unlimited. In particular, the bonus feature on poker machine frequently yields wins in excess of $10, especially when the stage one bet size is relatively large. Thus, the sensation-seeking motive for playing poker machines is the same motive that will prompt use of the gamble button in stage two. Furthermore, in order to satisfy the desire for new and bigger thrills, the gambler can be expected to move towards greater use of the gamble button as machine use increases and to seek the double or nothing option with increasingly large stage one wins.

Similar arguments apply to explanations where arousal is a key factor in the maintenance of gambling (Brown, 1986; Dickerson & Adcock, 1987; Griffiths, 1990; Sharpe & Tarrier, 1993). Measures of heart rate (Leary & Dickerson, 1985; Coventry & Norman, 1999) and skin conductance (Sharpe et al, 1995) have been reported as increasing during poker machine play. Thus, if increased physiological arousal is interpreted as excitement by the player, and if the excitement of the play is a motivational factor as suggested by Sharpe and Tarrier, then the option to double wins by use of the gamble button would be attractive to players. However, one restriction on this account follows from the assumed nonlinear relationship between arousal and motivation. Although motivation to use the gamble button might increase with arousal. very high levels of arousal have been shown to result in decreased motivation. In the context of gamble button use, it would be expected that stage two betting would be attractive in general but would decrease as the win size became sufficiently large to cause high (aversive) arousal. The impact of experience in playing poker machines would be expected to attenuate arousal. Thus, for high-frequency high-session-duration players, use of the gamble button would be expected to be high, independently of the size of the win.

Gambling and the Profit Motive

Various writers have linked the impulse to gamble with the desire to win money. Obtaining something for nothing has been implicated as a key motivation in the personality of the gambler (Maze, 1987; Spanier, 1987). Similarly, gambling has been linked with personality profiles suggesting that some people are predisposed to gamble (Camero & Myers, 1966; Lowenfeld, 1979; Kusyszyn & Rutter, 1985; Slowo, 1998). People who gamble are regarded as motivated to seek winning gambles and presumable perceive the poker machine as a potential source of money. Thus, if an individual is willing to take a gamble that is unfavourable (stage one gambles) because of the potential to make money or because of the attractiveness of the risk, then it follows that the same player will be motivated to take the gamble at better odds offered in stage two. For this reason, all players can be expected to prefer the stage two gamble over the stage one gamble once they have learned the risks and probabilities involved. Arguments from personality and the chance of winning money favour high usage of the gamble button with experience.

Study 1

Introduction

In study 1 the extent to which poker machine players choose the gamble option and make stage 2 bets is investigated. The general method involves observation of play followed by an interview in which the players self-report on their general play. Consistent with theories based on conditioning, arousal and sensation seeking, it is hypothesised that players will be motivated to use the gamble option and that stage 2 bets will be more popular among high frequency players who play for extended periods and prefer high denomination machines. Arguments based on regret and framing suggest an alternative hypothesis that the gamble button will be used infrequently by all players. When used, it is likely that the win sizes gambled will be low rather than high.

Method

The general method used involved approaching an individual who was playing a poker machine and seeking agreement to take part in the study and permission to be observed while playing. The procedures adopted were submitted to the University of Sydney Human Ethics Committee and were approved. The venues in which observations and interviews were conducted were approached for permission to conduct the study and gave permission in writing for the study.

Venues

The observations and interviews were conducted with players in two Sydney clubs and one rural club. The numbers of players recruited from these clubs were: Sydney club 1 (n=50), Sydney club 2 (n=50), and the rural club (n=20).

Participants

Altogether, 120 players gave written consent to take part in the interview-based study. Of the full sample, 50 were female and 70 were male. Table 1.1 shows the sample distribution by age categories.

Table 1.1:
Age distribution of interview respondents

Age range (years)	N
18-29	13
30-39	15
40-49	22
50-59	19
60-69	12
70+	39

Independent Variables

This study addresses the question of which factors determine the likelihood that the gamble button will be used in play. The focus of interest is on the impact of win size and poker machine involvement. The larger the win the more that is at stake with a stage 2 bet. Thus, arousal arguments suggest an increasing likelihood of a stage 2 bet with increasing win size, possibly up to some maximum beyond which the arousal level becomes aversive. The more the involvement of player both in frequency and duration of play, the more opportunities the player will have to learn and discriminate the greater reinforcement offered by stage 2 bets. Thus, according to the principles of learning, the likelihood of stage 2 betting should increase with level of involvement.

Win Size

Win size refers to the win in credits and its cash equivalent in the stage 1 gamble. The size of the win and its relation to use of the gamble option can be determined both by behavioural observation and by the self-report of the player. In study 1, this independent variable will be measured by self-report. In study 2, the results of behavioural measures are reported.

Involvement in Poker Machine Gambling

The second independent variable of interest is involvement in poker machine gambling. Poker machine players vary in the extent to which they play poker machines, ranging from those who play highly infrequently and for small stakes though to those who play daily or for long sessions with significant amount of their available money. Despite the implied continuum of poker machine involvement (Dickerson et al, 1992), poker machine play can be categorised into meaningful classes with more than a purely ad hoc choice of boundaries. In this research a fourfold categorisation scheme has been used based partly on naturally occurring time-related features of play and partly on the choices made by previous researchers in this field.

Poker machine play will be categorised as:

a) occasional; includes all players who play less regularly than once per fortnight. The fortnight is chosen as the boundary since this is a common interval between one pay and the next for many households;
b) regular; includes all players who play either once per week or once per fortnight, but not more frequently than once per week and for not more than four hours in total.
c) high frequency; includes all players who play more than once per week but who play in total, not more than four hours per week.
d) heavy; heavy refers to players who play more than four hours per week in total.

It should be noted that these categories are intended to have an ordinal quality. Assuming that the underlying variable of involvement is unidimensional, then any set of categories that partitions play must have order. In the definitions that follow, this ordinal quality is made salient by pointing out explicitly that each category implies involvement to the level of the previous category (where there is one) and excludes involvement to the level of the next category (if there is one).

Some justification for these categories is provided by analysis of days and hours of play of members of one Sydney club. Data collected in a study of machine modifications aimed at harm minimisation (Blaszczynski et al, 2001) provided accurate measures of the days and time spent per day of a sample of 56 club members. Examination of the frequency and duration of play yields the information shown in table 1.2.

Table 1.2:
Frequency and duration of poker machine play among regular club members

Frequency of play	Hours of play	Number of players	Mean hours/session	Category name
1 day/week	<4 hours/week	17	0.84	regulars
>1 day/week	<4 hours/week	27	0.91	high frequency
>1 day/week	>4 hours/week	12	2.81	heavy players

Comparison of the mean hours per session shows that high frequency players play more sessions per week (by definition) but do not differ significantly in actual average session length ($t_{42} = 0.28$, ns). By contrast, heavy players play for longer in each session than high frequency players ($t_{37} = 3.59$, $p<0.01$), and for significantly more sessions per week (high frequency, 2.5; heavy players, 4.2, $t_{37} = 2.73$, $p<0.01$). The category "occasional player" was not investigated. However, previous research has involved this category (Dickerson et al, 1992; Walker, 1988). It will be noticed immediately that the category of ‘problem gambler’ is missing from this classification scheme. The reason for avoiding this label is that the category of problem gambler involves much more than frequency or intensity of play. It involves, for example, losing money to such an extent that it causes debts that cannot be repaid, relationship and family problems, and loss of control over gambling behaviour (American Psychiatric Association, 1994). It is clear that ‘problem gambling’ is not part of a gambling involvement dimension but much more associated with the consequences of gambling beyond some ‘acceptable’ level. Dickerson et al (1992) cite the assumption that the universe of gamblers is comprised of two distinct groups, the pathological and the infrequent social gambler, as one of the most common and erroneous assumptions found in gambling research. Consistent with this criticism, this study avoids partitioning the underlying dimension of gambling involvement into problem gamblers and non-problem gamblers. However, since problem gamblers do have high levels of involvement it may be assumed that some poker machines with high frequency or heavy play will in fact also qualify as problem gamblers according to the criteria specified for that category.

Involvement in gambling is an independent variable often used in gambling research. Much of this research only uses two categories, such as low and high frequency (Anderson & Brown, 1984; Leary & Dickerson, 1985; Breen & Zuckerman, 1997). Some research uses three categories of gambling involvement (Dickerson et al, 1992; Walker, 1988) but there appear to be few reported studies with four categories as proposed here.

Other Independent Variables

Also examined were variables of age, sex, whether the participant is a club member, whether the participant drinks or smokes while playing.

Framed in terms of the categories defined, the aims of the project can now be restated as one of examining and inferring the differences in likelihood of choosing the gamble option in poker machine play depending on whether the play (and player) is categorised according to one of the above independent variables. For example, is the heavy gambler more likely to press the gamble button than the occasional player; is a younger player more likely to press the gamble button than an older poker machine player.

The Dependent Variable: Likelihood of Choosing the Gamble Option

The dependent variable of interest in the present study is the likelihood of using the gamble option. In this case likelihood is treated as equivalent to probability. Likelihood was assessed by asking the player how often a win is gambled. The answer given by the player allowed categorisation as:
very often (>50% of wins)
quite often (10-50% of wins)
occasionally (1-9% of wins)
rarely (in general never, but has happened)
never (no wins are ever gambled).

An interesting aspect of choosing the gamble option is the explicit willingness to risk money in order to win money. Each time a player chooses to play the gamble option, he or she is risking money already won in order to have a chance at doubling the size of the win. Theoretically, following a big win, the player need not play on at all; the win is certain money and the outcome is the best that the player can reasonable anticipate. Although all gambling conforms to this risk based definition, most poker machine play involves a complex array of probabilities that is beyond the ability of the player to assess. The standard play on a poker machines involves risking a number of credits in order to win on any one of a large number of combinations of symbols. How many credits may be won is unknown: it could be thousands or it could be two. Thus, most poker machine play involves a known bet for an unknown return. By contrast, the gamble option offers a known bet for a known return at known odds.

The 50:50 gamble occurs frequently in many forms of gambling: the coin toss in two-up, doubling down in blackjack, the even money favourite in horse racing, black or red in roulette and so on. A case can be made that this particular bet is central to all gambling.

Thus the gamble option, although specific to poker machine gambling is an example of a very general betting phenomenon. It follow that the gamble button is not a minor bet independent of all other forms of gambling but an example of a core aspect of all forms of gambling.

Hypotheses

The central question addressed in this study concerns whether players learn to use the gamble button with experience. It is assumed that the more that an individual plays poker machines the better the player will discriminate the reward value of stage 2 bets.

(1) The proportion of stage 2 gambles following stage 1 wins will depend upon the level of player involvement with highest to lowest proportions in the order: heavy players, high frequency players, regular players and occasional players.

It follows from (1) that players who report problems caused by excessive gambling would be expected to use the gamble option more frequently than non-problem players.

(2) Gamblers experiencing problems caused by gambling will engage in a higher proportion of stage 2 gambles following stage 1 wins than will players who are not experiencing gambling-related problems.

The denomination of the machine played may be related to the likelihood of stage 2 betting for a number of reasons. Games at higher denominations ($1, $2) do not offer as many choices in stage 1 as games at lower denominations (1c, 2c, 5c). Thus, players interested in stage 2 betting may prefer the more simple stage 1 games on high denomination machines with the greater cash value wins for the purpose of stage 2 bets.

(3) Players who prefer high denomination machines are more likely to make stage 2 bets than players who prefer low denomination machines.

The size of the stage 1 win would be expected to have an impact on the proportion of stage 2 bets. If it is assumed that stage 2 betting is motivated by excitement and arousal, then the larger the stage 1 win the more likely the stage 2 bet. However, it is possible that with very large stage 1 bets, the arousal may be so intense that the stage 2 bet is no longer rewarding. Arguments based on regret lead to the expectation that the likelihood of stage 2 betting will decrease with increasing size of win.

(4) The larger the win in stage 1 play, the greater the proportion of stage 2 bets.

Additionally, the impact of demographic variables (age and gender) and ancillary variables (alcohol consumption, cigarette smoking) on the likelihood of stage 2 betting will also be examined. No specific hypotheses on the direction of effects are entertained.

Results

The independent variable of central interest is the level of involvement of the player as indicated by frequency and duration of play. A fourfold categorisation of players was proposed based on previous research. Ideally, the numbers of players falling into the categories (occasional, regular, high frequency and heavy) would be approximately equal. The actual allocation to categories and means on criterion variable are shown in table 1.3.

Table 1.3:
Sample division by categories based on level of involvement

Category of player	Sample size	Frequency of play	Mean hours/week
Occasional	16	0.24	0.33
Regular	28	0.80	1.07
High frequency	38	2.35	2.46
Heavy	38	4.57	10.55

Level of involvement and frequency of stage 2 betting

Participants were asked how often they used the gamble option following a win. The interviewer categorised the response as: very often, quite often, occasionally, rarely and never. Table 1.4 shows the distribution of responses by level of involvement.

Table 1.4:
Stage 2 betting in relation to level of involvement

Category of player	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
Occasional	3	0	2	1	10
Regular	3	1	2	1	21
High frequency	2	3	3	0	30
Heavy	3	4	1	6	24
TOTAL	11	8	8	8	85

Table 1.4 provides no evidence of an increasing use of the gamble button among more experienced players. The dominant feature of the data is that 71% of the sample (85/120) report never using the gamble button.

Gambling problems in relation to gamble button usage

It is possible that the measure of gambling involvement is not sensitive to the important factor determining gamble button usage. It may be the case that individuals experiencing problems in relation to their gambling are the ones most likely to use the gamble button excessively. Players were asked whether their gambling currently causes any problems,

and whether they thought that they gamble more than they should. Interestingly, 44% (53/120) of participants reported that they gambled more than they should and 13% reported that gambling caused problems (16/120).

Table 1.5:
Level of involvement in relation to perceived problems caused by gambling

Self report:		Frequency of stage 2 betting				
		very often	quite often	occasionally	rarely	never
gamble more than should	Yes	7	4	1	6	35
	No	4	4	7	2	50
gambling causes problems	Yes	2	3	0	3	8
	No	9	5	8	5	77
TOTAL		11	8	8	8	85

Although there is a trend for players who use the gamble button to report gambling more than they should the effect is not significant ($X^2_{(1)} = 1.06$, ns). However the trend for players who use the gamble button, compared to those who claim never doing so, to more often report that gambling causes problems is significant ($X^2_{(1)} = 3.87$, $p<0.05$). The effect size is modest, but the fact that the effect is significant with a relatively small sample makes the relationship worthy of further investigation.

Preference for high denomination machines and use of the gamble button

Given that there is an association between reporting that gambling is causing problems and use of the gamble button, and given that it is widely believed that playing higher denomination machines is also linked with problem gambling, it would be expected that there would be an association between use of the gamble button and denomination of the machine. Table 1.6 shows the data obtained from the 120 participants in this study.

Table 1.6:
Use of the gamble button with machines of different denomination

Preferred machine denomination	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
1c	11	8	8	6	81
2c	0	0	0	0	0
5c	0	0	0	0	1
10c	0	0	0	0	0
$1	0	0	0	2	3
TOTAL	11	8	8	8	85

Table 1.6 shows that the large majority of players (95%) prefer 1c machines over larger

denominations. All of the players who occasionally (n=8), quite often (n=8), or very often (n=11) use the gamble button preferred 1c machines. By contrast, the six players who preferred higher denomination machines rarely (n=2) or never (n=4) use the gamble button. Thus, the anticipated relationship between machine denomination and stage 2 betting was not supported by the data.

The relationship between size of win and likelihood of stage 2 betting

Players were asked the number of credits that they were most likely to gamble and whether or not they would ever gamble a 2000 credit win. Since the large majority of players prefer to play 1c machines, the question of gambling a 2000 credit win refers to the possibility of doubling, at the risk of losing, a single win of value $20. The mean number of credits that players would gamble (excluding the 71% who never gamble) was 88. However, the mean may not be the most informative summary statistic for this aspect of gambling. Only seven out of thirty-five participants preferred to gamble wins greater than 100 credits. When participants were asked whether or not they would ever gamble a 2000 credit win, eight participants agreed that they would. The overall picture of gambling in relation to size of win is that, the majority never gamble wins of any size (71%), and a minority gamble small amounts up to 100 credits (23%). Very few (6%) prefer to gamble sums larger than 100 credits.

Gender and use of the gamble button

If it is assumed that gender differences exist in the willingness to take risks then it might be expected that gender differences underlie use of the gamble button. Male players would be expected to favour the double or nothing opportunities provided by poker machines. Of the sample of 120 players who participated in the research, 70 were male and 50 female. Table 1.7 shows the extent to which males and females reported using the gamble button.

Table 1.7:
Gender differences in stage 2 betting

Gender	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
Male	10	8	5	3	44
Female	1	0	3	5	41
TOTAL	11	8	8	8	85

Table 1.7 shows that eighteen out of the nineteen players are males who report using the gamble button quite often or very often. When gender differences are compared for those who never use the gamble button with the remainder, the effect is significant: males are more likely to report using the gamble button, at least sometimes, than are females ($X^2_{(1)} = 5.17$, $p<0.05$)

Age differences in gamble button use

Based on the assumption that younger players are more risk oriented than older players, it is anticipated that an association will be found between reported use of the gamble button and the age category of the player. Table 1.8 shows the relevant data.

Table 1.8:
Age differences in stage 2 betting

Age range	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
18-29	4	2	2	0	4
30-39	3	2	0	4	7
40-49	3	1	1	2	15
50-59	0	0	3	0	16
60-69	0	1	0	1	10
70+	1	2	2	1	33
TOTAL	11	8	8	8	85

Alcohol consumption and gamble button use

The effect of alcohol on young men has been linked with heavy and problematic gambling (Sharpe et al, 2004). Given that the data reported thus far implicates young males as more likely to engage in stage 2 betting, it might be expected that the third factor (alcohol) would also be implicated. Participants were asked if they ever drink alcohol while playing the machines. Table 1.9 shows the results.

Table 1.9:
Alcohol consumption and stage 2 betting

Ever drink while playing	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
Yes	10	6	4	4	35
No	1	2	4	4	49

Smoking cigarettes and gamble button use

Players were asked whether they smoke cigarettes while playing? Table 1.10 shows the frequency with which smoking was related to category of gamble button use. Use of the gamble button is significantly more common (40%) among those who smoke while playing than among those who do not smoke (20%).

Table 1.10:

Smoking cigarettes and stage 2 betting

Ever smoke while playing	Frequency of stage 2 betting				
	very often	quite often	occasionally	rarely	never
Yes	9	7	2	4	32
No	2	1	6	4	53

Why is use of the gamble button so unpopular?

Players who report never using the gamble button were asked their reasons why. Of the 85 players who reported never using the gamble button 57 (67%) gave answers involving too great a risk of losing. 13% stated that they had "no chance of winning" if they tried to gamble a win. The remainder stated that the risk of losing was too great.

Study 2

Introduction

Study 1 showed that for many players there is reluctance to use the gamble button or take part in stage two betting. However, this conclusion was drawn from self-report data and it is possible that players underestimate their use of the gamble button or even falsely deny using the gamble button. Nevertheless, the self-report data generates the expectation that rates of use of the gamble button are relatively low independently of the experience of the player or the denomination of the machine. The alternative hypothesis, based on the assumption that more risk-oriented players, more experienced players, and players who are chasing their losses are more likely to play higher denomination machines, is that use of the gamble button will be higher on high denomination machines than on low. In general the hypothesis is that percentage use of the gamble button increases with the denomination of the machine.

This hypothesis can be tested with actual machine-based data. All poker machines manufactured by Aristocrat Leisure Industries include machine recording of win size and in stage two, whether or not the gamble button was pressed. Thus, the hypothesis can be accurately tested within a club.

Method

Data was collected from two clubs in New South Wales, one based in Sydney and the other based at a rural township catering to tourists. It is likely that the mix of regular players and occasional players differs between these clubs with the Sydney club having a higher percentage of regulars.

Number of Machines

In the Sydney club, 84 machines out 241 (35%) were Aristocrat machines whereas in the rural club,

Recording of Stage 2 Gambles

Win size was shown in twelve categories of credits: 1-4, 5-9, 10-19, 20-29, 30-49, 50-99, 100-199, 200-499, 500-999, 1000-1999, 2000-4999, 5000+ credits. Machines are programmed to display, on request, the total number of wins taken by players (no stage 2 betting) and the total number of wins subjected to the double or nothing feature, or to the quadruple or nothing feature. The frequencies shown by the machine are for all plays of the machine since it was last set to zero. For most machines, the frequencies recorded are machine lifetime frequencies.

Credits and Cash

Attempting to double a 20 credit win on a 1c machine is quite different in terms of cash from attempting to double 20 credits on a $1 machine. It is not clear whether the cash/credit distinction has a major impact on the player. If it is the case that the

individual chooses to play the denomination of machine with which they feel most comfortable, then the 1c player may experience much the same risk as the $1 player in attempting to double a 20 credit win. Alternatively, if players focus on the cash value of their bets, then the $1 player may experience a greater risk than the 1c player in attempting to double 20 credits. In order to test the hypothesis that players on higher denomination machines are more likely to use the gamble button, machine data was recorded according to the denomination of the machine.

Machine Variations

Not all Aristocrat machines offer payouts in the range 1-4 credits (category 1 wins). In the Sydney club the category 1-4 credit wins was not available on a total of 23 machines out 51 1c machines. In the rural club, 25 1c machines out of a total of 115 machines did not include the 1-4 credit win category.

Although the majority of machines in both clubs were 1c machines, a variety of other denominations were also available to patrons. Table 2.6 shows the number of machines in each club for each denomination.

Table 2.6:
Numbers of machines of different denominations included in the study

Denomination of machine	Sydney club	Rural club
1 cent	51	115
2 cent	15	14
5 cent	6	8
10 cent	6	4
1 dollar	6	11

Results

The data collected from machines in two clubs yielded over 110 million wins, 88 million wins from the rural club and 23 million wins for the Sydney club. Given the volume of data, the conclusions for these two clubs have very high reliability. The analyses focus on three aspects of the data: (1) the overall popularity of stage 2 gambles as indicated by the percentage of wins on which the gamble button was used; (2) the extent to which the likelihood of stage 2 gambling changes from low denomination machines to high denomination machines; and (3) the extent to which the likelihood of stage 2 gambling changes from small wins to large wins. The data on which the conclusions are based are shown in tables 2.1 to 2.5.

Table 2.1:
The percentage of wins on 1c machines that are gambled

1c machines	Sydney Club			Rural Club		
Win size (credits)	Wins N	Gambled N	gamble %	Wins N	Gambled N	gamble %
1-4	826053	48060	5.82	7041146	100803	1.43
5-9	1467642	58027	3.95	11937735	95323	0.8
10-19	2737459	93753	3.42	17977707	117959	0.66
20-29	2193083	71121	3.24	10188075	72316	0.71
30-49	2021552	69954	3.46	11939484	79657	0.67
50-99	2296634	81186	3.53	8075422	70849	0.88
100-199	1716825	61414	3.58	4933401	49655	1.01
200-499	1689303	67080	3.97	4181680	50999	1.22
500-999	494689	19588	3.96	1325904	13648	1.03
1000-1999	308167	10248	3.33	598316	6057	1.01
2000-4999	155806	4747	3.05	284314	2431	0.86
5000+	69558	874	1.26	119239	529	0.44

Table 2.2:
The percentage of wins on 2c machines that are gambled

2c machines	Sydney Club			Rural Club		
Win size (credits)	Wins N	Gambled N	gamble %	Wins N	Gambled N	gamble %
1-4	388149	11281	2.91	638358	7711	1.21
5-9	464792	12071	2.6	881746	6445	0.73
10-19	680318	15079	2.22	1182124	13124	1.11
20-29	608738	12504	2.05	784259	5311	0.68
30-49	619823	12522	2.02	769652	4922	0.64
50-99	723100	14824	2.05	703531	4517	0.64
100-199	406923	9527	2.34	370568	2595	0.7
200-499	398353	10428	2.62	287677	2252	0.78
500-999	97997	2822	2.88	71502	613	0.86
1000-1999	60315	1869	3.1	43392	320	0.74
2000-4999	24571	494	2.01	17382	126	0.72
5000+	10238	59	0.58	4949	20	0.4

Table 2.3:
The percentage of wins on 5c machines that are gambled

5c machines	Sydney Club			Rural Club		
Win size (credits)	Wins N	Gambled N	gamble %	Wins N	Gambled N	gamble %
1-4	58099	1192	2.05	871912	7321	0.84
5-9	166678	1345	0.81	521607	3738	0.72
10-19	149926	1625	1.08	518380	3720	0.72
20-29	42049	840	2	244612	1979	0.81
30-49	38014	735	1.93	157124	1853	1.18
50-99	24190	496	2.05	145768	1344	0.92
100-199	17443	235	1.35	89041	693	0.78
200-499	10878	151	1.39	55323	361	0.65
500-999	3168	47	1.48	16594	83	0.5
1000-1999	1418	27	1.9	8253	12	0.14
2000-4999	662	12	1.81	3614	3	0.08
5000+	142	0	0	731	0	0

Table 2.4:
The percentage of wins on 10c machines that are gambled

10c machines	Sydney Club			Rural Club		
Win size (credits)	Wins N	Gambled N	gamble %	Wins N	Gambled N	gamble %
1-4	241005	6798	2.82	213884	1797	0.84
5-9	258369	3597	1.39	117472	966	0.82
10-19	350787	7254	2.07	113741	901	0.79
20-29	159970	3545	2.22	60794	411	0.68
30-49	159127	5226	3.28	43684	332	0.76
50-99	122368	4750	3.88	42134	240	0.57
100-199	81374	1995	2.45	26491	101	0.38
200-499	57947	787	1.36	14438	38	0.26
500-999	17247	174	1.01	4445	4	0.09
1000-1999	9288	54	0.58	2458	1	0.04
2000-4999	4346	21	0.48	1101	0	0
5000+	1408	6	0.43	118	0	0

Table 2.5:
The percentage of wins on $1 machines that are gambled

$1 machines	**Sydney Club**			**Rural Club**		
Win size (credits)	Wins N	Gambled N	gamble %	Wins N	Gambled N	gamble %
1-4	409353	19864	4.85	226227	10065	4.45
5-9	162360	7549	4.65	172804	3418	1.98
10-19	86078	3769	4.38	89076	1352	1.52
20-29	30999	861	2.78	32733	302	0.92
30-49	14388	646	4.49	13196	146	1.11
50-99	12581	262	2.08	13295	90	0.68
100-199	7194	63	0.88	7541	48	0.63
200-499	3062	26	0.85	2810	11	0.04
500-999	547	0	0	390	1	0.02
1000-1999	104	0	0	77	0	0
2000-4999	15	0	0	11	0	0
5000+	0	0	0	4	0	0

Popularity of Stage 2 Gambles

It is clear from tables 2.1-2.5 that stage 2 gambles are unpopular. The highest percentage of wins gambled occurred for small wins on the lowest denomination machines. Even with such a low risk (1-4 cents, double or nothing), less than six percent of wins were gambled. On average, only 3.3% of wins in the Sydney club and 0.8% of wins in the rural club were gambled. Although the results were obtained from only two clubs out of approximately 1500 clubs in New South Wales, the wide geographic and social differences between the two clubs suggests that the low popularity of stage 2 gambles on poker machines is a generalisation that holds true for all clubs and possibly all hotels.

The Gamble Option on Machines of Different Denominations

In general, use of the gamble button is more frequent on 1c machines than on higher denominations ($F_{4,48} = 9.83$, $p<0.001$). However, use of the gamble button also depends jointly on both the denomination of the machine and the size of the win ($F_{4,48} = 9.83$, $p<0.05$); use of the gamble button is uniformly higher on 1c machines across win size than 2c, 5c and 10c machines. However, on $1 machines stage 2 bets are relatively more frequent for small wins and less frequent for larger wins.

The anomaly involved in these effects can be best demonstrated by examining the likelihood of using double or nothing for similar cash value wins. When cash value is

considered, the win category 1-4 credits on a $1 machine corresponds to the win category 10-49 on a 10c machine, 20-99 on a 5c machine, 50-199 on a 2c machine, and 100-499 on a 1c machine. In principle, the likelihood of a stage 2 bet should be constant, other factors held constant. Table 2.6 shows the percentage of wins of credits equivalent to $1 to $4 cash that are subjected to a stage 2 bet.

Table 2.6:
The likelihood of a stage 2 bet (double or nothing) on different denomination machines when $1 to $4 has been won

Denomination of machine	Credit win range	% gamble Sydney	% gamble Rural
1c	100-499	3.77	1.10
2c	50-199	2.15	0.66
5c	20-99	1.99	0.95
10c	10-49	2.39	0.75
$1	1-4	4.85	4.45

It is clear from table 2.6, that players are more likely to try the double or nothing option for a win of between $1 and $4, if the machine denomination is $1 than if the same cash size of win is obtained on a lower denomination of machine. Interestingly, this effect has little to do with maximum bet size: the maximum bet size is $10 independently of the denomination of the machine (with the exception of some 1c machines that have a maximum bet of $5). The likely explanation lies in the interpretation of wins when credits are examined rather than cash value as discussed in the next section.

In support of the increased likelihood of stage 2 bets on higher denomination machines, there are the results of one $2 machine in the Sydney club (Table 2.7).

Table 2.7:
The frequency of gamble button use on a $2 poker machine

Size of win	Number of wins	Number of gambles	$ gambles
1-4	259	37	14.29
5-9	195	18	9.23
10-19	223	22	9.87
20-29	87	12	13.79
30-49	39	7	17.95
50-99	23	5	21.74
100-199	25	1	4.00
200-499	4	0	0
500-999	2	0	0
1000-1999	0	0	0
2000-4999	0	0	0
5000+	0	0	0

Table 2.7 reveals that stage 2 bets are much more frequent on the $2 machines than on lower denomination machines for credit wins in the range from 1 to 100. Although these results are based on less than 1000 wins and are drawn from only one machine in one Sydney club, they continue the increased likelihood of stage 2 gambles observed over a larger number of $1 machines.

Use of the Gamble Option for Different Sizes of Wins

Although the overall likelihood of stage 2 gambles is low, there is a clear trend for use of the gamble button to decrease for large wins. What constitutes a large win depends on the denomination of the machines. Table 2.8 shows the credits and cash equivalent where use of the gamble button drops away.

Table 2.9:
Point of decrease in the likelihood of stage 2 bets

Denomination	Credit win	Cash win	% gamble
1c	5000+	$50	0.44
2c	5000+	$100	0.40
5c	1000-1999	$50	0.14
10c	500-999	$50	0.09
$1	200-499	$200	0.04
$2	100-199	$200	0.40

Table 2.9 shows that a large win tends to be a win of at least $50 for players of 1c to 10c denomination machines, and at least $200 for players of $1 and $2 machines. Thus, among the minority of players who make stage 2 bets, there is a threshold of win size beyond which the double or nothing option is no longer attractive.

American Psychiatric Association (1994). Diagnostic and Statistical Manual of Mental Disorders, DSMIV. Washington: American Psychiatric Association).

Brown, R.I.F. (1986). Arousal and sensation-seeking components in the general explanation of gambling and gambling addictions. International Journal of the Addictions, 21, 1001-1016.

Cameron, B. & Myers, J. L. (1966). Some personality correlates of risk taking. The Journal of General Psychology, 74, 51-60.

Dickerson, M.G. & Adcock, S.G. (1987). Mood, arousal and cognitions in persistent gambling: preliminary investigation of a theoretical model. Journal of Gambling Behavior, 82, 673-680.

Griffiths, M.D. (1990). The acquisition, development and maintenance of fruit machine gambling in adolescents. Journal of Gambling Studies, 6, 193-204.

Kusyszyn, I. & Rutter, R. (1985). Personality characteristics of heavy gamblers, light gamblers, non-gamblers, and lottery players. Journal of Gambling Behavior, 1, 59-63.

L.A.B. (2000). Gambling Harm Minimisation and Responsible Conduct of Gambling Activities Review of the Board's Technical Standards for Gaming Machines and Subsidiary Equipment in New South Wales.

Leary, K. & Dickerson, M.G. (1985). Levels of arousal in high and low frequency gamblers. Behaviour Research and Therapy, 23, 635-690.

Lowenfeld, B. H. (1979). Personality dimensions of the pathological gambler. Dissertation Abstracts, 40, 456.

Sharpe, L. & Tarrier, N. (1993). Towards a cognitive-behavioural theory of problem gambling. British Journal of Psychiatry, 162, 407-412.

Sharpe, L., Tarrier, N., Schotte, D. & Spence, S. H. (1995). The role of autonomic arousal in problem gambling. Addiction, 90, 1529-1540.

Slowo, D. (1998). Are all gamblers the same? An exploration of personality and motivational characteristics of individuals with different gambling preferences. In Coman, G., Evans, B., and Wootton, R., (Eds.), Responsible Gambling: A Future Winner (pp.339-351), Adelaide, S.A.: National Association for Gambling Studies.

Spanier, D. (1987). Easy Money: Inside the Gambler's Mind. London : Secker & Warburg.

Zuckerman, M. (1979). Sensation Seeking: beyond the optimal level of arousal.

Hillsdale, NJ: Erlbaum.