Better off alone? An analysis of behavioral characteristics of electronic gaming machine players

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Abstract

Which is the effect of social interactions on individuals' gambling behavior? The answer research provides is contradictory: form one side it is suggested that gamblers playing alone are more likely to increase their gambling frequency and betting risk when compared to players who gamble in group, often paired with a rise in aggressive behavior. On the other hand, studies showed that the mere presence of other players might encourage gambling, increasing stakes and shortening betting intervals. This work explores the behavioral characteristics of electronic gaming machines players along different game events and analyses the influence of social interactions on their gambling behavior. The study, conducted in slot halls, involves ethnographic observation and the analysis of gamblers' facial micro-expressions through a face recognition technology. Results reveal that only certain game events elicit manifest behavioral responses in players. Further, findings show that the presence of other players might positively influence the gambling conduct, constituting an element of prevention in the onset of negative valence behavioral responses. The discussion focuses on the mechanisms aimed at favoring social interactions during gambling.

Introduction

Although gambling on electronic gaming machines (EGMs) is often accounted as a solitary activity with very limited peer interaction (Griffiths, 1991; Fisher, 1993; Griffiths & Minton, 1997; Schüll, 2012), recent studies have examined the effects of social dynamics on EGM gambling behaviour (Rockloff & Dyer, 2007; Rockloff, Greer, & Evans, 2012; Molde et al., 2017). Such interest about the manners in which people gamble is sparked by several parties. On one side, the growing emergence of gambling as a societal issue into the public domain, where global gambling losses have nearly doubled from 2003 to 2017 (The Economist, 2017), has fueled arguments on its societal consequences (Markham & Young, 2015). On the other side, behavioral research focusing on the causes of addictive activities such as EGM gambling (James & Tunney, 2017) and the structural features of the EGM game experience, that act as a reinforcement of the gambling activity, has attracted the attention of researchers (Parke & Griffiths, 2006; Griffiths & Auer, 2013). Finally, the recognition of gambling as a rather mainstream recreational activity (e.g. Goffman, 1967), shed interest on the role of social factors.

Research confirms that specific social factors, as the gamblers' groups size, affect the evaluation of gambling strategies (McCauley & Kramer, 1972). The social context as well is linked with gambling motives (Quinlan, Goldstein, & Stewart, 2014) and eventually able to shape the gambler's behavior (Bernhard, Dickens, & Shapiro, 2007). However, although the importance of the social factor in gambling is acknowledged, the body of literature investigating social dynamics in the real environment (such as slot halls) still appears to be limited. One of the reason could reside in the research approach itself, being the systematic observational fieldwork method rarely adopted. The largest majority of studies, indeed, appears to be carried out in controlled laboratory environments, where the possibility to observe social behaviors of gamblers is very limited if not absent. Furthermore, in such environments, subjects are usually invited to gamble either with virtual money or receive monetary incentives to participate (Rockloff & Dyer, 2007; Rockloff, Greer, & Evans, 2012; Sharman, Aitken, & Clark, 2015), and their feelings and judgements are assessed by means of self-reporting (Dixon et al., 2018). These methods may arise concerns involving the activity engrossment[1], social desirability[2], motivational distortion[3], guilt, embarrassment or the infringement of anonymity that may affect their responses, especially in reporting feelings and affective states (Bettiga, Lamberti & Noci, 2017). On the other hand, much of the fieldwork research to date has been descriptive in nature and suffers both from player-specific factors and researcher-specific factors (Parke & Griffiths, 2002). This research approach encompasses concerns regarding observational techniques as blending in[4], subjective sampling and interpretation, and lack of gambling knowledge, limiting again the analysis of gamblers behavioral traits and, in particular, of social behaviors.

The present study seeks to address such research gaps. Specifically, the purpose of this investigation is to explore the behavioral characteristics of EGM players and analyze the influence of social interactions on gambling behavior. The aim of providing insights into the social world of the gamblers is pursued by means of ethnographic observational methods carried out in the real environment where the play occurs. This is integrated with an analysis of players' micro-expressions by recording the players' face, further analyzed through a micro-expressions recognition technology. Such approach enables the observation of the true

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[1] The "tuning out" effect of the player from the surrounding context, potentially limiting researchers to approach and invite players to participate in research studies.

[2] The tendency of respondents to answer questions in a manner perceived favourably the researcher.

[3] The tendency of participants to consciously or unconsciously distort answers driven by participation in a research experiment.

[4] The ability of being unnoticed and unrecognisable among slot machine gamblers in order not to elicit possible feelings of being scrutinised.

behaviors of gamblers, in the real environment. Moreover, it permits to assess the real reactions and feelings, avoiding the biases involved in research employing self-reported methods. To the best of our knowledge, the present study is the first to investigate gamblers behaviors and the dynamics of social influence through fieldwork observations complemented by face micro-expression analysis.

The structure of the present paper is as follows: firstly, the opening section lays out the research delving into the influence of social interactions on gambling behavior. Secondly, the adopted methodology in the study is presented. Results are illustrated in the following, while the conclusive section discusses the findings and draws managerial implications paving the way for further research.

Gamblers behaviors and social dynamics

EGMs embody a popular purely aleatory form of gambling. The fundamental trait of such form of games lies in the passive attitude of the player, who has no influence on the outcome of the game (Caillois, 1961). In essence, EGMs consist of a set of spinning reels with pictured symbols in the forms of fruits, bars, or abstract designs where the winning is given by the combination of certain symbols when the reels stop spinning.

EGMs can be classified in two typologies, namely stand-alone slot machines and video lottery terminals (VLT). The former is represented by a single device, whereas the latter is a terminal connected to a centralized network that allows the lottery jurisdiction to monitor game play and collect its share of revenue. The outcome of each EGM is electronically determined by a random-number generator. Legally, each terminal has to pay out winnings with a percentage of the money that is wagered by players.

The motives for gambling of EGM gamblers are vastly explored in literature (see Cotte, 1997; Platz & Millar, 2001; Neighbors, Lostutter, Cronce, & Larimer, 2002). Behavioral drives of both recreational gamblers to problematic gamblers are explored in different frameworks delving into variables such as economic (Herman, 1976), symbolic (Bloch, 1951), and hedonic motives (Kusyszyn, 1984) or psychological traits contributing to risk for problem gambling such as escape, esteem, excess and excitement (Rockloff & Dyer, 2006). Overall, EGM gambling is described as an activity with an impersonal and solitary nature (Griffiths, 1991; Fisher, 1993), even when people approach slot halls in groups (Griffiths & Minton, 1997). The implications of such asocial trait have been previously observed in literature. Bernhard, Dickens, & Shapiro (2007) noted that gamblers acting alone were more likely to

increase their gambling frequency and betting risk when compared to players who gambled in group. Caldwell (1974) in fieldwork observations involving poker machine players observed a rise in aggressive behavior in solitary players as reactions to losses.

Recent studies have examined the effects of social dynamics on EGM gambling behavior, supported by the theory of social facilitation (Zajonc, 1965). Specifically related to the observation of peers, the theory describes the tendency for individuals to behave differently in presence of other individuals. Also known as the audience effect, the principle posits that the presence or observation of other individuals increases non-specific arousal levels in the observed person. Results of these studies appear to be mixed. On the one hand, some authors demonstrated that the presence of an audience is related to a watchful gambling behavior and reduces risk-taking levels, thus acting as a form of social shield. Lemoine & Roland-Lévy (2017) analyzed the risk-taking behavior of players interacting with a computer roulette game either playing alone, or in the presence of the experimenter, or in the presence of the experimenter while being recorded. Results showed that the size of the audience did not influence the risk-taking behavior, whereas the presence of only one individual appeared to be sufficient to influence the betting behavior towards more cautious bets. Comparable results were achieved by Rockloff & Greer (2011) who studied the average bet amount of players interacting with a laptop simulated 3-reel EGM either alone or watched by a simulated audience or followed by an audience of onlookers. A further variable was investigated by Molde et al. (2017), who delved into the familiarity among peers. Results showed that gambling alone, when compared to gambling with two unfamiliar or two familiar others led to an increase in the average bets and a faster pace of betting.

On the other hand, different results were observed in recent research studies. Supporting social learning theory (Bandura, 1977), they suggest that the mere presence of other gamblers might encourage gambling behavior (for instance, leading to higher stakes or shorter betting intervals). In an investigation of co-action effects on gambling behavior of EGM players, Rockloff & Dyer (2007) analyzed the behavior of gamblers by measuring the final payout, the average bet-size, the number of trials played, and the speed of play and showed that players provided with information about the winning of fake nearby players through both visual and sound information staked higher bets compared to the players without such information. A similar conclusion is advanced by Rockloff, Greer, & Evans (2012) who suggest that the mere presence of other individuals might affect EGM gambling behavior. The authors highlight the potentially arousing effect elicited by the mere presence of an audience through the observation of a higher betting speed in the presence of others when compared with the

solitary condition. Analogously, Rockloff, Greer, & Fay (2011) observed that gambling behavior increased with larger crowd sizes and hence posited that gambling venues hosting larger crowds might influence the gambling persistence. Peer influence is also investigated by Hardoon & derevensky (2001) who observe that children interacting with a computer-simulated roulette displayed lower average wagers than peers in groups of two or three individuals. Cole, Barrett, & Griffiths (2011), exploring the gambling behavior in terms of amount bet in the game of roulette, showed that the presence of other peers had a positive influence on the stake, where players bet higher amounts and made riskier bets in a social situation than in a solitary condition.

Besides the influence of social dynamics, a large body of literature investigates further variables affecting EGM gambling behavior. Firstly, the slot hall design appears to influence the behavior of players depending on the room lighting (Brevers, Noël, & Bechara, 2015), gaming terminal dispositions (Sagoe, Pallesen, Griffiths, Mentzoni, & Leino, 2018), ambient scents (Hirsch, 1995), or venue size (Franco, Maciejewski, & Potenza, 2011). Secondly, EGM design elements are vastly explored. Among these parameters are accounted the influence of sounds effects adopted (Loba, Stewart, Klein, & Blackburn, 2001; Griffiths & Parke, 2005; Bramley, Dibben, & Rowe, 2014), lights and color effects (Griffiths, 1993), structural features of the jackpot (Rockloff & Hing, 2013), the game play speed (Delfabbro, Falzon, & Ingram, 2005), the display of money or credit (Loba, Stewart, Klein, & Blackburn, 2001), or the number of play lines (Delfabbro, Falzon, & Ingram, 2005). Additional analyzed elements include the effect of near misses, as unsuccessful outcomes proximal to the jackpot or a win, and near losses (Reid, 1986; Wohl & Enzle, 2003), or the phenomenon of losses disguised as wins (LDWs), as outcomes where the cashed in amount results lower than the bet amount (Dixon, Harrigan, Sandhu, Collins, & Fugelsang, 2010; Sharman, Aitken, & Clark, 2015).

In this work, by examining the nature of EGM gambling behavior, we aim to explore how slot halls players react to different game outcomes and how social interactions among peers might influence such reactions. More specifically, we believe that gamblers behavioral reactions change according to the game specific outcome. We also assume that social influence among peers may affect the gambler behavioral reactions during the play and should be considered as a moderator factor.

Method

Experimental setting

The study involved three experimental sessions, each lasting four hours. The observations were carried out in three different slot halls located in a major Italian city, with two sites belonging to central districts of the city and one located in a suburban area. To control for bias related to the payroll day, the experimental sessions took place on different monthly dates, namely on the 1st, 19th and 22nd of the months of December, 2017, January and February, 2018. Two sessions were carried out during the night openings (i.e. between 6:30 and 10:30 p.m.), while one round of observations was undertaken during the morning opening hours (i.e. between 9 a.m. and 13 p.m.). All the observations were performed on weekdays.

A single five-reel stand-alone slot machine was chosen in each slot hall as experimental stimulus. The EGM was characterized by five fixed paylines, meaning that winning combinations were computed both on horizontal and diagonal axes. Furthermore, the slot machine included bonus games and free spins as special features activated when specific symbols were lined in a winning combination. The selection of the specific EGM was advised by the slot hall owner on the criterion of the most used five-reel slot machine in the previous month. Each terminal allowed a minimum bet of € 0.25 per spin and a maximum of € 1.00 euro. The maximum payout of the slot machine was €100.00.

Two high frame rate micro-cameras were employed to record the activity of the player. One was attached to the chosen EGM at head high in front of the player. Such device included a mechanism for adjusting the recording angle in order to point to the face of the participant and was employed to gather facial recordings. The second camera was attached to the wall behind the player in order to record the whole body of the participant and his interaction with the slot machine screen.

The study involved 21 adult volunteers, with a male prevalence (91%) and an approximate age range of 19–60, skewed towards and age older than 40 years old (86%). The demographic distribution of the sample is representative of the real distribution of Italian slot machine players and in line with previous research samples (Griffiths & Minton, 1997). 9 volunteers agreed to be recorded both from front and back angles. Each participant was invited to use the designated slot machine. During the game session, the participant was observed at an adequate distance by the research team to avoid interference with the game. Each game session lasted between 3 and 40 minutes. Each volunteer played with own money and did not receive any sort of incentive to participate. During the recruitment phase it was observed how

the player-specific factor of the infringement of anonymity was a major concern expressed by participants.

Observed behavioral traits

Through the experimental observations we analyzed recursive behavioral traits of the player during the interaction with the slot machine and the surrounding environment. The analysis focused on eight traits deemed relevant on the basis of previous ethnographic and behavioral research during game play. The first among such traits was body proxemics, namely the postural patterns adopted from the player during the interaction with the EGM. Posture, which is often recognized as a modality for expressing emotions and engagement during interactions with devices (see Mota & Picard, 2003; Bianchi-berthouze, Cairns, Cox, Jennett, & Kim, 2006), was measured as the physical space between the player and the slot machine. Players were reported with a "leant back" ("leant forward") posture if at the occurrence of specific game events displayed a recurring tendency to distance themselves from (moving closer to) the slot machine.

Secondly, facial micro-expressions were observed as the result of players' appraisal of a given situation. The analysis of facial features investigated the combinations of movements of facial landmarks such as eyes, eyebrows, lips, mouth, nose, and cheeks. The connection between these combinations and emotional states has been widely investigated in the academic field and it is not novel in the behavioral analysis of people involved in gambling task as well (see Gentsch, Grandjean, & Scherer, 2015). Micro-expressions were analyzed through a specific analysis software (i.e. Noldus FaceReader 7) throughout the whole game experience, where conditions in terms of lighting and subjects' head orientation were adequate. Facial micro-expressions were analyzed after a face model calibration for each subject and the seven universal micro-expressions were considered, namely joy, anger, sadness, disgust, contempt, fear, and surprise (Ekman, 1992). Facial states were analyzed employing General face model with smoothen classifications through Noldus FaceReader analysis software. A micro-expression was deemed significant if it displayed, in a latency window of 3 seconds from the specific considered stimulus onset, both a significant rise in amplitude and a fall to base levels in a recovery time of 3 subsequent seconds. The presence of a recursive micro-expression was tallied if a player manifested it at least three times in conjunction to a specific stimulus.

The verbal behavior was a further element of interest. The tendency to attribute humanlike characteristics to an EGM (Kim & Mcgill, 2011) and hence talk (or swear) at it was a recurring trait observed in previous ethnographic studies (see Griffiths, 1991). In the present

study it was measured throughout the whole gaming experiment as the vocal effort adopted in speech and classified moment by moment on a scale ranging from silent (i.e. no words uttered) to very loud (i.e. the adoption of a loud voice tone). Behavioral responses were classified on the basis of the emergence of recurring vocal patterns in conjunction with specific game events.

Further elements of interest included the body extremities movements, the spin button hit frequency, and the spin button pressure strength. Vigor and moving frequency of limbs as well as the time between two consecutive spin button hits and the physical energy employed in pushing the spin button were observed in previous research as expressions of motor excitability during a computer simulated EGM (Wallace, Singer, Wayner, & Cook, 1975) or while playing EGM (Griffiths, 1991; Harrigan & Dixon, 2009; Dixon et al., 2018). The hit frequencies, as an assessment of the speed of play, were tracked from the video recordings and measured as the time interval in seconds between two consecutive spin button clicks. The vigor was measured from the noise made by the pressure of the button recorded through a microphone embedded in the micro-cameras. It was observed that the pressing vigor depended significantly on the pressing style, where players tended to alternate spin button hits either with the hand fingers or with the palm of the hand.

Lastly, the bet-size and the winnings withdrawal frequency were considered as relevant elements of analysis, in line with most of the previous research on gambling (see Rockloff & Dyer, 2007; Rockloff and Greer, 2010; Rockloff, Greer, & Evans, 2012). The bet amount was tracked as the amount of money bet per single spin and noted from video recordings, whereas the withdrawal frequency was calculated as the time between two consecutive hits of the "Withdrawal" button of the EGM. Table 1 describes each observed trait and the assessment range.

Behavioral trait	Description	Assessment range
Body proxemics	Physical space between person and slot machine	Leant back, normal, leant forward
Facial micro-expressions	Swift facial expressions	Joy, Anger, Sadness, Disgust, Contempt, Fear, Surprise
Verbal behavior	Vocal effort adopted in speech	Silent, soft, normal, loud, and very loud
Body extremities movements	Vigor and moving frequency of limbs, hands, and feet	Frigid, composed, calm, discomposed, frenzy
Spin button hit frequency	Time between two consecutive spin button clicks	Extended (over 5 seconds), Normal (between 2 and 5 seconds), swift (below 2 seconds)
Spin button pressure strength	Physical energy employed in pressing the spin button	Firm, normal, light
Bet amount	Amount of money bet per single spin	High (€ 1.00), Medium (between € 0.75 and € 0.25), Low (€ 0.25)
Winnings withdrawal frequency	Time between consecutive winnings withdrawals	High (below 1 minute), Medium (between 1 and 10 minutes), Low (over 10 minutes)

Table 1 – Observed behavioral traits and related indicators

The recurring behavioral traits were scrutinized in conjunction with six game events, namely (i) a simple loss, as the loss of the bet amount in a single spin; (ii) a small win, as the win of an amount lower than €10.00 in a single spin; (iii) a repetitive loss, as the series of at least ten consecutive losses during back-to-back spins; (iv) a near miss, as a negative outcome close to a relevant win; (v) a bonus game activation; and (vi) a bonus game payout. The bonus game feature consisted of a side game, activated if the combination of certain symbols occurred. In such case, the player was presented with five items from which to choose. The selected choice may lead to winning game credit or free spins. The following choice revealed the payout awarded. Between each side game activation and the related payout exposure a variable time elapsed, ranging from three to around ten seconds depending on the player. Even tough observed, no evidence was found of substantial wins (i.e. wins richer than € 10.00 in a single spin) or consecutive wins during back-to-back spins.

Gamers' social interactions

Social interaction, in line with previous studies (Griffiths, 1991; Fisher, 1993) was identified as the propensity of a gambler to play in group or discuss with other peers in the room. Specifically, the present study discriminated between two categories of players, namely "social gambler" and "loner". The former category has encompassed players who displayed the

tendency to speak or interact with one or more people around in the room, either players or onlookers. It was tallied as "social gambler" the player who interacted at least two times with one or more peer player or onlooker in the room. Overall, the subsamples of "social players" and "loners" included respectively 9 and 12 subjects.

Results

Behavioral characteristics of EGM players along different game events

The initial part of the study was aimed at identifying the relevant moments of the gambling experience in terms of significant behavioral responses. Three of the six analyzed game events triggered recursive responses. While in the cases of simple losses, small wins and near misses no significant recurring trait was spotted, repetitive losses, bonus game activations, and bonus game payouts elicited distinct recursive responses across all players.

Deviant behaviors to repetitive losses included a repeated alteration of at least one of the following traits: a change in the player proxemics characterized by a tendency to leaning the body forward towards the slot machine; an increase in movements of the body extremities (e.g. fist clenching or foot swinging); an intensification of the button hit frequency; a heightened button pressure strength; and an increase in negative valence facial micro-expressions such as contempt, anger, and disgust. Furthermore, signs of facial muscular tension (e,g, an uncontrolled and repetitive tightness of the upper lip) and the adoption of compensatory gestures such as taking a drag on a cigarette.

Concurrently with bonus games activations, at least one of the following behavioral pattern was distinguished across all players: a propensity to leaning the upper body forward towards the slot machine, a variation of the verbal behavior towards a louder tone of voice, and an increase in movements of the limbs and extremities (e.g. swift hand tremble). Further engagement indicators such as a rapt gaze (i.e. prolonged stares at the screen) or jaw muscular tensions were spotted.

During bonus game payout exposures, either positive or negative valence reactions were observed depending on the result. Positive responses were elicited both with manifest facial expressions and micro-expressions of joy combined with a louder tone of voice. Negative reactions included both manifest facial expressions and micro-expressions of anger and disgust, abrupt changes in proxemics characterized by distancing the body from the slot machine, a notable increase in movements of the body extremities, and a louder tone of voice.

In addition, compensatory gestures such as taking a drag on a cigarette were noted. Table 2 summarizes the initial listed results.

		Game events			
		Repetitive loss	**Bonus game activation**	**Bonus game payout (positive)**	**Bonus game payout (negative)**
Behavioral traits	**Body proxemics**	Tendency to lean forward	Tendency to lean forward		Tendency to lean backwards
	Facial micro-expressions	Contempt, anger, or disgust		Joy	Anger or disgust
	Verbal behavior	Louder tone of voice	Louder tone of voice	Louder tone of voice	Louder tone of voice
	Body extremities movements	Tendency to discomposed or frenzy movements	Tendency to discomposed or frenzy movements		Tendency to discomposed or frenzy movements
	Spin button hit frequency	Frequency intensification			
	Spin button pressure strength	Pressure firmness intensification			
	Other	Facial muscular tension, rapt gaze or compensatory gestures	Rapt gaze or jaw muscular tensions		Compensatory gestures

Table 2 – Significant recurring behavioural responses in conjunction with behavioural traits and game events

Influence of social interactions on players' gambling behaviors

The second part of the analysis involved the influence of social interaction. Strong evidence was found in the manifestation of different behavioral traits between "social gamblers" and "loners" in conjunction with two significant game events, namely the response to repetitive losses and the appearance of an unsatisfactory bonus game payout.

Players characterized by a low propensity to play in group or discuss with nearby players concurrently with repetitive losses displayed a closed body posture with a tendency to lean towards the slot machine, a significant intensification of the spin button hit frequency and an increase of the physical energy employed in pressing the spin button. An appreciable evidence of a distinct gambling pattern was observed in the spin button hit frequencies, where "loner" gamblers displayed a tendency to a frequency intensification, with mean hit intervals around one second. Figure 1 shows the hit frequencies of an observed player, who faced repetitive losses and subsequently adopted a hastening hitting frequency, with only one second interval between consecutive spin button hits. Manifest facial expressions and micro-expressions of

anger, contempt, and disgust were recorded as well as an increased jaw muscular tension, rapt gaze and compensatory gestures such as taking a drag on a cigarette.

On the other hand, "social gamblers", who were prone to share their game experience with partners or adopt talkative behaviours towards nearby players, in the case of repetitive losses displayed a milder behavior. Such was characterized by a tendency to raise their voice to contest the outcome with their partners and, in few cases, angry facial expressions were connected to abrupt movements. In contrast to "loner" gamblers, no increase in hit frequency or spin button pressure strength was observed. Figure 2 shows an example of a "social gambler" who, despite experiencing repetitive losses, did not manifest any significant variation in the hitting frequency.
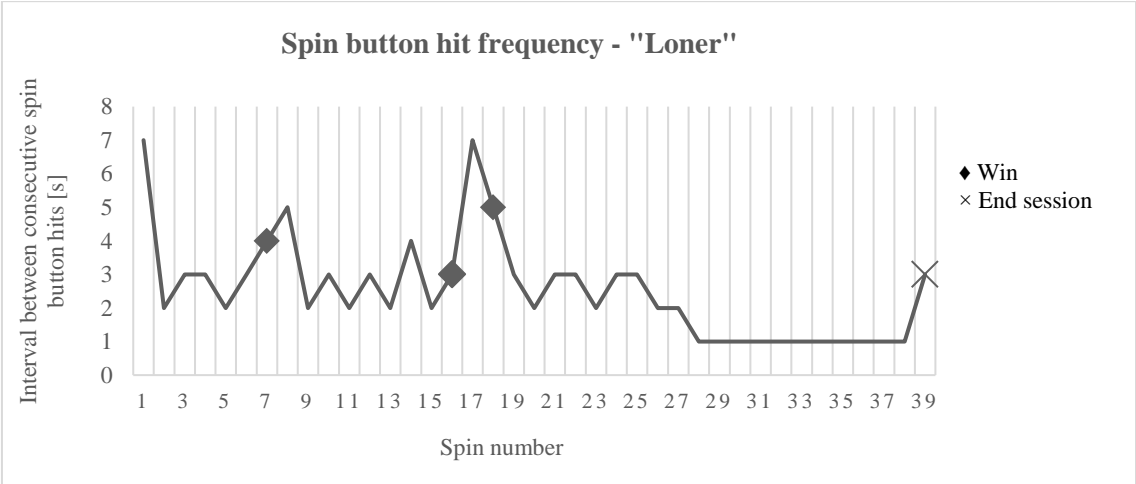

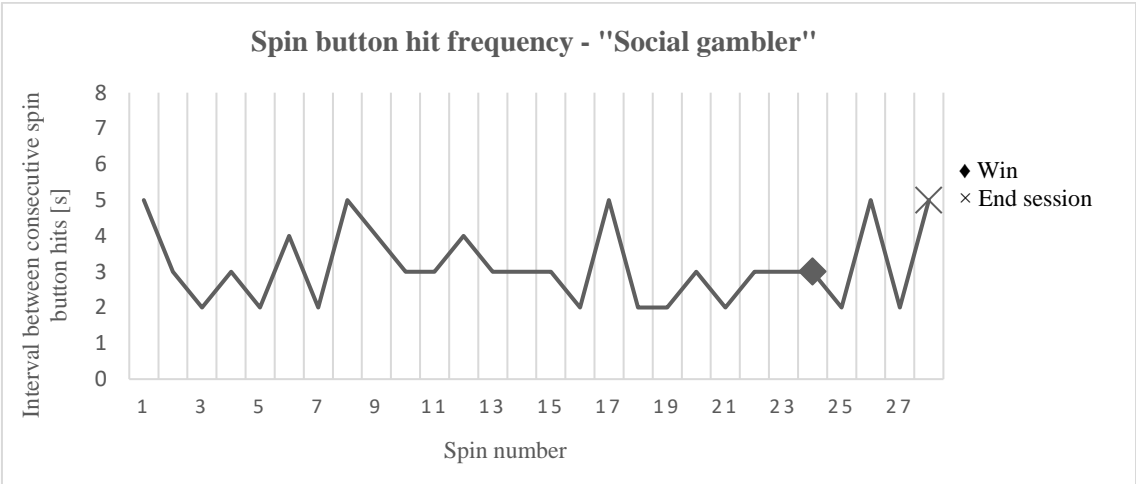Figure 1 – Example of observed spin button hit frequencies for a "Loner" gambler

Figure 2 – Example of observed spin button hit frequencies for a "Social gambler"

A comparable pattern was identified during the occurrence of an unsatisfactory bonus game payout. In such case, loners exhibited stronger evidence of distress through an increased tendency to distance themselves from the slot machine, negative-valence micro-expressions such anger or disgust, a louder voice tone (by speaking or yelling at the slot machine), or

abrupt limbs movements. Whereas sociable players limited their discomfort to a notable exacerbation of the verbal behavior, an inclination towards sudden movements to speak to their partners and swift micro-expressions of anger. Overall, sociable players displayed comparable behavioral responses both to repetitive losses and disappointing bonus game payouts, while loners exhibited restlessness reactions in case of repetitive losses and rash responses concurrently with negative bonus game payouts. Table 3 summarizes the listed results.

		Game events			
		Repetitive loss		**Bonus game payout (negative)**	
		Sociable	**Loner**	**Sociable**	**Loner**
Behavioral traits	**Body proxemics**		Tendency to lean forward		Tendency to lean backwards
	Facial micro-expressions	Anger	Contempt, anger, or disgust	Anger	Anger or disgust
	Verbal behavior	Louder tone of voice		Louder tone of voice	Louder tone of voice
	Body extremities movements	Tendency to discomposed movements	Tendency to frenzy movements	Tendency to discomposed movements	Tendency to frenzy movements
	Spin button hit frequency		Significant frequency intensification		
	Spin button pressure strength		Significant pressure firmness intensification		
	Other		Rapt gaze, jaw muscular tensions, compensatory gestures		Compensatory gestures

Table 3 – Significant recurring behavioural responses in conjunction with behavioural traits and game events for loners and sociable players

General Discussion

The present study has explored the behavioral characteristics of EGM players and analyzed how social interactions could influence gambling behavior. The initial part of the study delved into the significant moments of the gambling experience in terms of behavioral responses. Reactions to six moments deemed relevant were analyzed, namely simple losses, small wins, repetitive losses, near misses, bonus game activations, and bonus game payout. Contrary to initial expectations, only half of such gambling moments proved to elicit manifest behavioral responses and evident engagement across all players. In particular, recurring behavioral

responses, both positive and negative in valence, were observed during repetitive losses and the moments of activation of a bonus game and display of the outcome of a bonus game. These moments of play might therefore be considered key moments of the gaming experience and potentially of greater importance than single winnings, simple losses or, remarkably, near misses.

Secondly, the observations have highlighted how the social factor might constitute a discriminating element in moderating behavioral responses associated to gambling. From the analysis emerged how the presence of the group influences the player towards a more colloquial and expansive form of expression characterized by a lower aggressiveness in the behavior elicited by unsatisfactory game phases. The present research observed the tendency of "social gamblers" to allay manifest stress responses by diverting the attention towards their partners or nearby players. The presence of humor and encouragement from onlookers or peers was observed to play a relevant role in social support. On the contrary, "loners" exhibit a greater propensity towards a passive-aggressive behavior during the same phases of play, where the tendency to increase the pace of play or to the externalization of negative valence responses was a distinctive trait.

Our findings appear consistent with fieldwork observations reporting a rising aggressive behavior in solitary players as reactions to losses (Caldwell, 1974) and a faster pace of betting (Molde et al., 2017), showing how the social interaction might soothe potentially negative valence inducing game events. However, no significant difference between the two groups was found in terms of risk taking or average bet. This outcome is contrary to studies supporting social facilitation theory positing that peer interaction might encourage gambling (Hardoon & Derevensky, 2001; Rockloff, Greer, & Fay, 2011; Rockloff, Greer, & Evans, 2012). Furthermore, our study does not confirm research positing that presence of peers might act as a moderator on gambling behavior in terms of average bets or risk taking (Lemoine & Roland-Lévy, 2017; Rockloff & Greer, 2011).

The observed results support the thesis that the presence of an audience might influence the gambling behavior and act as a form of social shield, potentially constituting an element of prevention in the onset of negative valence behavioral responses. The present results are likely to constitute a way to enrich and expand previous research on behavioral responses to gambling, paving the way for the exploration of social interaction theories in gambling venues. Future studies on the current topic are therefore recommended.

Practical implications of our findings are conceivable. Acknowledged the role of the influence of the game space on the players' behavior (Sagoe, Pallesen, Griffiths, Mentzoni, & Leino,

2018), the present study paves the way to the introduction of slot hall design mechanisms aimed at favoring a greater propensity to social interactions both in terms of environment and in terms of gaming platform. The former redesign concept involves reconsidering environmental elements such as the lighting or the introduction of social spaces in order to create a meeting place. Furthermore, additional actions such as the rearrangement of gaming machines according to geometries more favorable to create social contact or the introduction of specific roles devoted to facilitating social interactions might be of interest. In terms of gaming platforms redesign, the potential introduction of game mechanisms activated by players in contiguous positions might be taken into consideration. A potential redesign of spaces might hence be aimed at changing the player's choice architecture in order to guide their behavior towards the possibility of creating social connections without banning any option or modifying their economic incentives.

The generalizability of the discussed results might be subject to certain limitations. In particular, two sources of weakness could have affected the results: on the one hand limitations are related to the sample size of the experimental group and location chosen for the experiments; on the other hand the lack of data about the gambling frequency and sociodemographic variables of players could pose constraints on the result generalization.

As concerns the sample size, the study involved a relatively small sample when compared to similar ethnographic studies in slot halls (see Griffiths, 1991; Griffiths & Minton, 1997) or investigations adopting face micro-expression analysis (Danner, Sidorkina, Joechl, & Duerrschmid, 2014; Lewinski, den Uyl & Butler, 2014). Even though the size of the subsamples of "social gamblers" and "loners" were comparable, results might be skewed due to the small sample size. Furthermore, the study suffered from a sampling bias due to the slot halls locations that covered a single Italian city. In fact, it cannot be excluded that the behavioral responses of EGM gamblers might be influenced by superstitious beliefs, quite ingrained in some Italian regions. Accordingly, the generalization of the observed results should be carefully considered.

Secondly, the study was designed to prevent any possible interference due to the presence of the research team and, as such, no preliminary or closing interview was carried out. Accordingly, no data was gathered about the gambling frequency, sociodemographic characteristics, or behavioral predispositions of the players. A more complete set of information might have hence provided deeper insights in both the categories of "social gambler" and "loner".

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