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Pause for thought:

Response Perseveration and Personality in Gambling

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Abstract

In a sample of normal volunteers, response perseveration (RP) on a computerised gambling task, the card perseveration (CP) task, was examined under two conditions: No pause (Standard task) and a 5-s pause (Pause task) following feedback from previous bet. Behavioural outcomes comprised number of cards played (and cash won/lost) and latency of response. Individual differences in these outcomes were conceptualised in terms of the Reinforcement Sensitivity Theory (RST) of personality. Results showed that, on the Standard task only, sub-scales of the Carver and White (1994) Behavioural Approach System (BAS) scale positively correlated with number of cards played and amount of money lost (indicative of impaired RP), but these associations were abolished with the imposition of a 5-s pause between feedback and the opportunity to make the next bet -- this pause also had an overall main effect of improving RP and reducing losses. As related research shows that such a pause normalises the RP deficit seen in pathological gamblers, these findings hold potentially valuable implications for informing practice in the prevention and treatment of pathological gambling, and point to the role played by individual differences in approach motivation.

Keywords. Response preservation, pause, personality, behavioural approach system, gambling, internet, reinforcement sensitivity theory

Pause for thought:

Response Perseveration and Personality in Gambling

Many situations in life require a decision either to make a response or withhold one, for example crossing a road with traffic or buying a product online. One area of life where there are tangible costs and benefits is in gambling situations, which in recent years has become increasingly popular in society (Wardle et al., 2011), especially following the liberalisation of gambling laws (e.g., in the UK, Gambling Act, 2005). The majority of people who gamble do so for pleasure and are restrained in their behaviour; that is, they wage only what they can afford to lose and they know, quite literally, when to stop. However, a minority, but numerically significant number, of people encounter problems. There is now an increased level of problematic gambling, especially since the introduction of online casinos and the 'normalisation' of gambling more generally.

Computerised gambling is wide-spread in casinos and in virtual casinos on the internet, and is not thought to be any different to other forms of gambling. For research purposes, computerised gambling affords the opportunity to study the psychological dynamics of waging in a controlled laboratory environment. One such gambling simulation is the card perseveration (CP) task (Newman, Patterson, & Kosson, 1987) which is designed to assess the ability of an individual to adjust a previously rewarded behavioural response to a decreasing rate of reward and increasing rate of punishment. Specifically, the CP task is used to assess response perseveration (RP; i.e., a lack of response inhibition), which is 'the tendency to persist in making previously rewarded responses that have become maladaptive (i.e. punished)' (Vitaro, Arseneault, & Tremblay, 1999, p. 569). To perform well on the CP task requires 'response modulation' (Newman & Lorenz, 2003), described by Newman and Wallace (1993, p. 700) as entailing 'a brief shift of attention from the organization and implementation of goal-directed behavior to stimulus evaluation'. Failure of response modulation results in poor performance on the CP task, resulting from perseveration: Continuing to play when the ratio of wins to losses is clearly no longer positive (Newman et al., 1987).

In a study exploring manipulations that might reduce RP in disinhibited individuals, Newman et al. (1987) administered the task to a group of psychopaths and to a group of non-psychopaths under three different conditions: (1) With immediate feedback only (i.e., 'standard' task); (2) with a display illustrating their cumulative response feedback; and (3) with a display illustrating their cumulative response feedback accompanied by a 5-s waiting period during which participants were prevented from making their next bet – this last manipulation was based on previous research (Patterson, Kosson, & Newman, 1987) which indicated that disinhibited participants, including psychopaths, are less likely than controls to pause after receiving negative feedback and that this failure to pause is related to poorer punishment-related learning.

Newman et al.'s (1987) results showed that the group of psychopaths played significantly more cards and lost more money (i.e., displayed a greater RP) than did the group of non-psychopaths when the task involved immediate feedback only. The addition of a display illustrating participants' cumulative feedback did little to reduce this difference. However, when participants played the task with a cumulative feedback display accompanied by a 5-s waiting period, during which they were prevented from making another bet, no group differences were found. These results also showed that the control group played fewer cards and won more money in this third condition than they did in condition 1 (immediate feedback only), which supports the role played by a pause following feedback on n+1 trial responding. Consistent with claims that dysfunctional gambling is related to 'behavioural disinhibition' (McCormick, 1993), work on the standard version of the CP task has revealed that this class of gamblers perseverate longer (i.e., demonstrate weaker response inhibition) compared to controls (Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2005).

Thompson and Corr (2013) used Newman et al's (1987) card perseveration (CP) task to examine performance in community-based pathological gamblers (n = 42; control group, n = 39). They contrasted two experimental conditions: No pause (Standard task) and a 5-s pause (Pause task). Results revealed that, compared to a control group, problematic gamblers perseverated longer and lost more money on the Standard version of the task, but this deficit was abolished by the imposition of a 5-s pause. Possible personality dispositions to RP, and their relations to the effects a 5-s pause on the CP task, has not been reported.

One promising theory to explain motivational dispositions in gambling is the Reinforcement Sensitivity Theory (RST) of personality (Corr, 2008). At the broadest level, it focuses on two major motivational systems, one related to sensitivity to reward (the Behavioural Approach System, BAS) and one related sensitivity to punishment (comprising two subsystems: Behavioural Inhibition System, BIS; and Fight-Flight-Freeze System, FFFS). (For the purposes of this article, the BIS and FFFS are seen as one general punishment-related system, as measured by the Carver and White, 1994, BIS scale.)

In broad outline, RST postulates that individuals with heightened BAS activity are most sensitive to reward and should, therefore, be most sensitive to wins in gambling situations. In contrast, individuals with heightened BIS activity are most sensitive to punishment (and aversive-related goal conflict) and should, therefore, be most sensitive to losses in gambling situations. As Newman et al. (1987) reduced a control group's response perseveration (RP) using a forced 5-s waiting period accompanied, and Thompson and Corr (2013) found that such a pause abolished response perseveration in pathological gamblers, it is possible these effects are related to individual differences in the BAS – the neuropsychological system that mediates reactions to the prospect and promise of reward and non-punishment.

It was hypothesized that a 5-s forced pause imposed following response feedback would result in greater attention to the features of the previous bet and, by a process of advanced processing and reflection, an increased awareness of the decreasing rate of reward and increasing rate of punishment. Thus, an increased awareness of the changing task contingencies should result in less RP on the task with the forced pause as compared with the standard (no-pause) task, as measured by: (a) fewer cards played, and (b) less money lost. Since previous research has demonstrated normal control groups slow down after drawing a losing card, as compared with drawing a winning card (Goudriaan et al., 2005), it was predicted that this same effect should be observed on the standard task.

In terms of associations with RST personality factors, it was predicted that (a) higher self-reported BAS scores should be associated with greater RP on both tasks, and (b) the introduction of a 5-s forced pause following feedback should reduce RP and either weaken or abolish this association. It was also predicted that higher BAS scores should be associated with faster response latency following losses, reflecting invigorated approach to a source of potential reward (i.e., the next gamble).

Method

Participants

The final sample comprised forty-two participants (21 males, 21 females), aged between 18 and 53 years (mean = 25.02, S.D. = 8.68), drawn from the general public in the City of Swansea, UK. The Gambling Screen (SOGS; Lesieur & Blume, 1987) was used to exclude pathological gamblers, as indexed by a score above 3, from an initial sample. All participants were paid £15, irrespective of their performance on the task.

Materials

Two computer-based card perseveration (CP) tasks, designed in VB.net, were used to measure Response Perseveration (RP): (1) A task with no forced pause between cards drawn (Standard task); and (2) a task with a forced 5-s pause between each card drawn (Pause task).

The standard CP task was similar to that used by Newman et al. (1987) and identical to the one used by Thompson and Corr (2013). It consisted of a deck of 100 playing cards, including picture cards (i.e., Jack, Queen, King or Ace) and number cards (i.e., 2-10) face down, presented on a computer screen. Participants were seated approximately 50-cm in front of the screen. As well as the deck of cards, a ‘Draw’ button and an ‘Exit’ button were displayed on the right-hand side of the computer screen. The amount of cash in dollars ($) was presented on the computer screen, below the deck of cards on the bottom left-hand side of the screen. Unlike Newman et al.’s tasks, the participant was not playing to keep the amount of cash they won; instead, and in order to motivate them, prior to the task they were told that the amount of cash they could win would be decided by comparing their performance with the average of all other participants on the task. They were told that if a picture card was drawn then they would win

$10, but if a number card was drawn they would lose $10. They were informed it was not a normal deck of cards and they could click on the exit button to end the game at any point to exist with their winnings.

The task was programmed to display playing cards face-up, one at a time, each time the participant clicked on the ‘Draw’ button until either (1) the participant clicked on the ‘Exit’ button to end the task, or (2) 100 cards had been played. Each time the participant drew a picture card the computer displayed the message ‘You Win!’ and $10 was added to the participant’s cash balance. Each time the participant drew a number card the message ‘You Lose’ was displayed on the screen and $10 was subtracted from their cash balance.

Participants began the task with a nominal sum of $100. There were 10 blocks of 10 cards and soon after the 5th block was completed they were likely going to lose more than they won. The 100 cards were arranged in a pre-programmed order so that the probability of drawing a winning (picture) card decreased by 10% after every block of 10 cards. The probability of drawing a winning card was set at 90% for the first block of 10 cards and so decreased to 0% for the final block of 10 cards. The order of the picture and number cards was random within each block of 10 cards, and different random orders were administered to each participant. The participant won the greatest amount of cash ($350) if they clicked on the ‘Exit’ button after drawing approximately half of the cards, before the probability of losing became greater than the probability of winning. If the participant drew all 100 of the cards, they lost all of their winnings, including the $100 with which they began the task.

The forced Pause version of the task was introduced in the same manner as the Standard task. It differed only in the fact that it contained a 5-s interval between response feedback (i.e., the card being shown face-up and cash being added/subtracted accordingly) and the presentation of the next opportunity to respond (i.e., the ‘Draw’ button being available to click on). This 5-s interval was accompanied by the text “Please Wait…” displayed on the computer screen below the deck of cards (see Figure 1). This 5-s interval was imposed in an attempt to disrupt participants’ response set and to increase their attention to response feedback on each trial (i.e., whether they won cash or lost cash and how much cash they had remaining).

The two dependent measures of task performance were: (1) Number of cards played; and (2) amount of cash won/lost. A greater number of cards played and a smaller amount of cash won indicated greater RP. Two other dependent measures were also analysed: (1) Response latency following wins; and (2) response latency following losses (i.e., before they drew the next card).

Figure 1 about here

Design

The version of the Task (Standard and Pause) was a within-subjects factor, and Order of tasks a between-subjects factor. These factors were entered in to a multivariate statistical analysis (SPSS), with univariate ANOVAs to inspect individual dependent variables.

Psychometric Measures

The Carver and White (1994) BIS/BAS scales comprise a 20-item self-report questionnaire designed to measure the sensitivity of the BIS and BAS motivational systems. Each item is rated on a four-point Likert scale ranging from ‘very true for me’ to ‘false for me’. The BIS scale consists of 7 items which measures a participant’s anticipation and response to potentially punishing events (BIS). The BAS scale consists of three subscales: Drive (DR; 4 items) assessing goal directed behaviour; Fun-Seeking (FS; 4 items) assessing impulsive behaviour motivated by immediate reward; and Reward Responsiveness (RR; 5 items) measuring motivation in anticipation of future reward. This instrument is widely used in research, has reasonable psychometric properties, and good convergent and discriminant validity (Campbell-Sills, Liverant, & Brown, 2004).

The South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) is a sensitive measure of gambling severity comprising 20 items relevant to the Diagnostic and Statistical Manual of Mental Disorders fourth edition (*DSM-IV*; American Psychiatric Association; APA, 1994) criteria for pathological gambling (score of 5 or greater) and problem gambling (score of 3 or 4). It has been validated by cross-tabulating scores with both family members' assessments and counsellors' individual ratings and has demonstrated satisfactory validity and reliability both in gambling treatment samples and in the general population (e.g., Stinchfield, 2002).

Procedure

On arrival at the laboratory, participants read a detailed explanation of the study and signed a declaration of informed consent. Then they individually completed the BIS/BAS and SOGS questionnaires, followed by the two counter-balanced versions CP tasks. Participants were instructed to follow written instructions provided at the beginning of each task. On completion of the task, they were debriefed, thanked for their time, and paid £15 cash (irrespective of their performance). The use of the USA dollar ($) sign was included as a general reinforcer in our gaming context, and they amount of money 'won' and 'lost' on the game was not related to £15 received at the end of the experiment. Procedures were approved by the Swansea University Department of Psychology Ethics Committee.

Results

Descriptive statistics and intercorrelations for the psychometric measures are shown in Table 1. These intercorrelations were as expected.

Table 1 about here

Task effects

A significant multivariate effect was found for the main effect of Task, $F(2, 39) = 21.98$, $p < .01$; Wilks' Lambda = .47. No other main or interaction effects were significant, $p > .05$. The two Tasks differed both in terms of number of cards played, $F(1, 40) = 45.01$, $p < .01$, and the amount of cash won, $F(1, 40) = 18.72$, $p < .01$. As shown in Table 2, a lower number of cards were played and a greater amount of cash was won (i.e., RP was less) on the Pause task than on the Standard task, pointing to an effect of reduce response perseveration after a 5-s pause.

Table 2 about here

Effects of Outcome (wins/losses) on response latency

As shown in Table 2, a significant main effect of Outcome was revealed on the Standard task, $F(1, 35) = 8.23$, $p < .01$, as well as the Pause task, $F(1, 38) = 7.77$, $p < .01$. Mean response latency was faster following losses than following wins. The Outcome x Order interaction was not significant, $p > .05$.

It should be noted that several participants (five on the Standard task and two on the Pause task) exited very early in play, producing very few reaction times after losses, and so were excluded from further analysis, reducing the sample size to 37 on the Standard task (19 that performed the Standard task first, 18 that performed the Pause task first) and 40 on the Pause task (20 in each Order of task performance).

In addition, as the order of the Standard and Pause tasks were counterbalanced, we examined this factor and found a significant main effect of Order, $F(1, 35) = 11.31$, $p < .01$. This finding suggested that we should present the correlations of task performance and personality separately for the two orders.

Correlations between Personality and Task Performance under the two Orders

We examined the associations between personality and CP performance under the two Orders of the tasks: Standard-Pause, and Pause-Standard (Table 3). We draw attention to the overall pattern of associations which was clear: BAS scales were related to response preservation effects only when the Standard task was performed first. Under the Pause task condition, these associations were either substantially weakened or abolished.

Card played and cash won/lost

In terms of specific associations, for the measures of cards played and cash won, Table 3 shows correlations (one-tailed) for CP task performance with personality measures under the two Orders of presentation of the task versions. The general pattern of findings is that, with the Standard task first, higher BAS Drive, Fun-Seeking and Reward Responsiveness scores were related to a higher number of cards played (i.e., greater RP) on the Standard task, $r(21) = .39$, $p < .05$, $r(21) = .50$, $p < .01$, and, $r(21) = .56$, $p < .01$, respectively, and higher BAS Reward Responsiveness scores were related to a smaller amount of cash won on the same task, $r(21) = -.40$, $p < .05$. In contrast, for the group that performed the Pause task first, no measure of BAS activity was significantly related ($p > .05$) to either measure of RP on the Standard task. Also, no measure of BAS activity was significantly related to either measure of RP on the Pause task for either group, $p > .05$. This confirms the general hypothesis of this study.

Table 3 about here

Response latency following wins/losses

It was noticeable that, when the Standard task was performed first, higher BAS scores were related to faster response latencies following both wins and losses, even in the Pause condition. However, these effects were separate from the number of cards played and amount of cash won/lost. In contrast, when the Pause task was performed first then these associations were either weakened or abolished.

As a final check, when partial correlations were run to control for age, no significant changes to the associations were observed, except for the group that performed the Standard task first: higher BAS Drive scores were related to a smaller amount of cash won, $r(18) = -.45$, $p < .05$, on the Standard task.

Discussion

The aim of this study was to examine the effects of imposing a pause between feedback and response on an experimental task designed to model real-world gambling behaviour, and to explore the associations of personality on the different measures of performance, namely: (1) response preservation (RP; number of cards played and cash won/lost) and (b) latency to respond after winnings and losses. Results confirmed that the imposition of a 5-s pause had a significant ameliorating effect on RP, reducing the total number of cards played and money lost. Thus, such a pause seems to disrupt preservative response set and allows a period of time for reflection and preparation of a more appropriate response for the next bet opportunity. What was noticeable, when the Pause task was performed first, this abolished the RP effects seen in the Standard task when it was performed first. These results are of theoretical significance and, potentially, of practical importance for gambling behaviour especially as they parallel the findings of Thompson and Corr (2013) in a group of pathological gamblers.

Previous research indicates that disinhibited people (and arguably those most prone to developing problematic gambling) are less likely to pause (and hence reflect) following negative feedback. We hypothesized that disinhibition (specifically, higher RP) should be positively related to higher self-reported BAS activity and, indeed, this is what we found on the Standard task, but these associations were either much weaker or abolished on the Pause task. Specifically, with the Standard task performed first, associations between personality scores and RP were not evident on the second Pause task, and this absence of associations was also observed when the Pause task was performed first, which points to a beneficial carry-over effect from Pause to Standard task conditions.

We also reasoned that higher BAS activity should be associated with faster response latency following losses, but this was not found. With the Pause task performed first, there were no associations for either version of the task. But with the Standard task performed first, higher levels of BAS were associated with faster responding following both wins and losses in both versions of the task, and in the Pause condition BAS fun seeking showed an increased strength of association following wins and losses. These findings might reflect a form of frustration: Being required to pause, especially after first performing the Standard task, may have inducted negative affect and induced response invigorating arousal, especially in high fun seeking (impulsive) individuals.

Although not a primary focus of our study, several significant associations were found with BIS scores. Although we observed no significant correlations in the Standard condition when it was performed first, in the following Pause condition higher levels of BIS were significantly positively associated with amount of cash won and slower reactions times. In contrast when the Pause condition was performed first, there were no significant correlations were observed, save a positive one with number of cards played in the Standard condition when performed second. In general, these correlations indicate that BIS-active, punishment sensitive, individuals respond to a change in environmental condition (e.g., from no-pause to pause conditions) with more cautious behaviour. This finding is consistent with BIS active people being better able to risk assess situations that entail approach-avoidance conflict (Corr & McNaughton, 2012).

In general, our results confirm that a forced 5-s waiting period (following immediate response feedback) reduced RP (i.e., strengthened inhibitory control) on n+1 trial performance on the card perseveration (CP) task. These results point to the potential for moderating real world gambling behaviour simply by increasing the (n+1) time period between bet outcome and initiation of another bet. The fact that the imposition of a short (5-s) wait period abolishes RP in pathological gamblers (Thompson & Corr, 2013) adds support to this conclusion. These findings could hold potentially valuable implications for informing practice in the prevention and treatment of problematic gamblers, especially in virtual gambling environment where response speeds can be very fast and are not so constrained by the environment conditions of a real-life casino (e.g., speed of dealer and delay imposed by the actions of other gambling on, for example, the Blackjack table).

Turning to theoretical matters, there are a number of related processes that link inhibitory control processes, arousal and impaired responding in the face of punishment to the typical forms of behaviour seen in pathological gambling (McNaughton & Corr, 2009). First, punishment is arousing and its induction strengthens ongoing dominant responses (e.g., rapid betting). Secondly, and opposing this arousal effect, punishment leads to an inhibition of immediate behaviour. However, when the effect of the induction of arousal is greater than the punishment-induced inhibition of behaviour then there is an actual increase in frequency and strength of immediate behaviour. Therefore, punishment (e.g., losing in gambling) can invigorate responding, not attenuate it. In addition, there is a related process which contributes to response modulation deficit, namely ‘relieving nonpunishment’ (RNP), which relates to the rewarding effects of the omission/termination of expected punishment. In gambling, a win is much more than an isolated outcome as its motivational power comes, in some measure, from the fact that is it also signals the absence of expected punishment (RNP is known to resemble the positively reinforcing effects of reward itself and is, in theoretical terms, related to the BAS). Thus, the positive motivational effects of a win is emotionally super-charged by the omission of a loss, which will be potentiated further by induction of arousal. This outcome is likely to be especially strong in those individual who are motivated by reward, namely high BAS active people.

The imposition of a time delay before the next bet seems to act as some form of neurobehavioural circuit breaker in the motivation systems that instantiate these processes (Thompson & Corr, 2013). We assume that the above processes form part of the behavioural approach system (BAS) which specifically mediates stimuli that have been appraised as either rewarding or non-punishing (Corr & McNaughton, 2012) and, in the case of gambling, both. For these reasons, high BAS individuals are especially prone to developing RP deficits and pathological gambling because it is the BAS that is taking charge of the behavioural decision making and behaviour (and punishment-related activity in the FFFS and BIS contribute to punishment salience which is then relieved by the emotional state induced by omission of punishment resulting from a winning bet).

Results confirmed that even with people who were not problematic gambling theoretically sensible effects and associations were observed, and the task effects resembled those seen in a pathological gambler sample (Thompson & Corr, 2013). These research findings might point to the vulnerability of the general population to developing gambling problems, especially as the associations between reward-related individual differences in the BAS and response preservation were as predicted by the reinforcement sensitivity theory (RST) of personality. They also point to the dimensional nature of gambling behaviour, with similar effects seen in normal and pathological samples – the former afford the opportunity to examine neuropsychological processes without the confounding morbidity of pathological gambling.

The implications of the results of this study are clear: Imposing a pause between feedback and response, to allow a moment of reflection might be a simple but effective means to modulate behaviour that reduces response preservation and, thus, problematic gambling. This simple environmental design feature might be of special significance in internet gambling where speed of response is not limited by constraining factors of the ambient environment (e.g., the natural response delay imposed by the action of other players).

In terms of limitations of this study, the lack of significant monetary rewards/punishments, unlike real commercial gambling games, might be one source of concern. Participants did receive real money (£15), and before the task they were told (falsely) that the amount they would receive would be decided on the basis of their performance compared to the average performance of other participants; therefore, they were motivated to perform to win money. In the British context, the dollar ($) sign is a generic symbol for money and, therefore, served as an effective reinforcer. Participants could not have known how much money they would receive at the end of the task, so there is no reason to assume that they were not motivated by these stimuli of reward and punishment. Results show that participants did respond to the task conditions as expected, and the associations with theoretically-motivated personality factors were largely in conformity with predictions.

In conclusion, our results throw light upon experimental gambling behaviour, confirming the importance of imposing a short pause between feedback and response, and the role played by individual differences in the reward-related individual differences. This delay imposition led to fewer cards played and less cash lost, and it abolished the relationship between BAS scores and response perservation seen on the Standard version of the task. The practical implications of such results yet have to be explored, but they point in a positive direction, namely the modification of one important aspect of the gambling environment to reduce the development of problematic gambling behaviour in reward-sensitive vulnerable people.

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Figure 1. Display of card perseveration (CP) task, illustrating the 5-s forced pause imposed between response feedback and the presentation of the next opportunity to respond (i.e., the ‘Draw’ button becoming available to click on) on the ‘Pause’ version.

Table 1

Means, standard deviations and correlations between personality measures

	1	2	3	4	5
1. BAS Drive	—				
2. BAS Fun-Seeking	.60**	—			
3. BAS Reward Responsiveness	.37*	.32*	—		
4. BIS	-.33*	-.22	.16	—	
Mean	10.71	12.43	17.26	20.62	0.86
SD	2.17	2.55	2.07	3.74	0.90

Note. n = 42.

*p < .05. **p < .01.

Table 2

Mean and standard deviation of card perseveration (CP) task performance

Measure	Task			
	Standard		Pause	
	Mean	SD	Mean	SD
No. of cards played[a]	65.81	27.01	39.62	18.90
Cash won ($)[a]	185	99.71	258	45.72
Mean response latency following wins (sec)[b]	1.81_c	0.40_c	1.03_d	0.51_d
Mean response latency following losses (sec)[b]	1.69_c	0.37_c	0.86_d	0.50_d

[a]n = 42. [b]Presented minus the 5-s forced pause on the Pause task. [c]n = 37. [d]n = 40.

Table 3

Correlations between card perseveration (CP) task performance and personality measures

Task	Measure	BAS-D	BAS-FS	BAS-RR	BIS	Age
Standard 1st	Cards[a]	.39*	.50**	.56**	.29	.16
	Cash[a]	-.31	-.16	-.40*	-.31	-.50*
	MRL-w[b]	-.39*	-.30	-.24	.03	-.01
	MRL-l[b]	-.33	-.28	-.01	-.09	.12
Pause 2nd	Cards[a]	.10	.22	.23	.32	-.26
	Cash[a]	-.12	.13	.26	.45*	-.10
	MRL-w[c]	-.42*	-.67**	-.08	.31	.05
	MRL-l[c]	-.62**	-.72**	-.22	.38*	.37
Standard 2nd	Cards[a]	-.13	-.02	.15	.46*	.08
	Cash[a]	.15	-.19	.05	-.24	-.28
	MRL-w[d]	-.12	-.02	.27	-.32	.47*
	MRL-l[d]	-.14	.07	.09	-.19	-.03
Pause 1st	Cards[a]	.01	-.27	.11	.17	-.13
	Cash[a]	-.33	.17	.11	.09	.23
	MRL-w[c]	.05	.11	.10	-.26	.23
	MRL-l[c]	.27	-.11	.09	-.31	.05

Note. Cards = number of cards played; Cash = amount of ‘cash’ ($) won; MRL-w = mean response latency following wins; MRL-l = mean response latency following losses; BAS-D = Drive; BAS-FS = Fun-Seeking; BAS-RR = Reward Responsiveness; BIS = Behavioural Inhibition System.

[a]n = 21. [b]n = 19. [c]n = 20. [d]n = 18.

*$p < .05$. **$p < .01$.