

The mind of a gambler: Understanding healthy and unhealthy cognitions



Professor
Paul Delfabbro
School of Psychology
University of Adelaide

Acknowledgments

- Collaborators (University of Adelaide)
- Dr. Reza Abdollahnejad
- Dr. Linley Denson
- Ms Emma Burton
- Dr. Ryan Balzan

Overview of presentation

- Role of erroneous beliefs/ information processing biases in pathological gambling
- Methodological and conceptual challenges
- Developments in methodology
- From description to theory
- The role of emotions and clinical pathology: are some people more prone to erroneous beliefs about gambling than others?
- Preliminary evidence and future directions

The cognitive Approach

- Early work: Walker, Ladouceur, Griffiths, Wagenaar: 1980s and 1990s
- Behavioural persistence in the face of negative expected returns to player
- Early studies used 'speaking aloud methods'
- 70-80% of gambling-related cognitions were considered irrational
- Evidence of common decision-making biases: confirmation; gambler's fallacy; hindsight bias, personification of gaming machines

Conceptual challenges

- High rates of irrationality in student/ low risk samples
- Findings very descriptive: heuristics occur, but does not tell us when they occur or why they develop?
- A lot of superstitious behaviour could be behaviourally conditioned and due to experience: habits which are then described linguistically via rule-based learning (Mark Dixon's work)
- It could just be related to experience: studies did not always control for the regularity of gambling vs. problem gambling status
- Ad hoc justifications for behaviour

Methodological challenges

- Some speaking-aloud results could be due to demand effects or situational effects (people don't describe things very well)
- Lack of validated psychometric instruments
- Lack of theoretical frameworks to understand why gamblers might fall victim to erroneous beliefs and if this is more common in pathological gambling

Positive developments

- **Psychometric evidence**
- Gambling-related Cognition Scale (Raylu & Oei, 2004)
- Drake Beliefs about Chance (Wood & Clapham, 2005)
- Information Biases Scale (IBS) (Jefferson & Nicki, 2003)
- Joukhador, Blaszczynski, & Maccallum (2004)
- Gamblers' Belief Questionnaire (Steenbergh, Meyers, May & Whelan, 2002)
- All validations showed that PGs score higher on these measures

Experimental and Clinical Evidence

- Benhsain et al. (2004): Behavioural evidence that gamblers look at previous sequences of coins when making predictions
- Iowa Gambling Task studies indicate possible deficits in working memory, executive function and 'affective control'
- Successful applications of CBT/ Cognitive therapy

Causes of 'irrationality'

- But what is supposed to be wrong with the way problem gamblers process information?
- What are their principal 'deficits'?
- An education model has been assumed: poor knowledge and mathematical ability = poorer knowledge of odds = greater likelihood of interpreting information in a biased way = greater irrationality
- But is this really true?

Evidence for knowledge partitioning

- What is knowledge partitioning?
- Refers to contextual separations of knowledge domains or inconsistencies
- E.g., A person who is scientist but believes in astrology to guide individual choices, High computational ability in race-punters with average IQs
- We see this in gamblers as well

Knowledge Partitions

- Sveigny & Ladouceur (2003): People asked to play a video game: 85% thought it was chance-determined, but 82% produced irrational cognitions
- Delfabbro (1998): Most people rated EGMs as pure chance, but Delfabbro & Winefield (2000) showed that 80% of gambling-related statements were irrational
- Ladouceur has also found that more statistically trained students are no less prone to irrational statements than less trained students
- There are mathematicians who are PGs!

Knowledge Partitions 3

- Lambos & Delfabbro (2008)
- Problem gamblers scored higher on measures of erroneous reasoning, the same on their knowledge of odds and numerical reasoning and non-problem regular gamblers
- Other studies of adolescents (Delfabbro, Lahn, & Grabosky, 2006) found that young PGs tended to be more erroneous, but only when the questions related to gambling.

Hot vs. Cold Cognitions

- **Hot Cognition:**
- Schema = I am a successful gambler, I can win, I always win in the end.
- Input information: Large win occurs
- Interpretation: Reinforcement of existing schema
- **Cold Cognition**
- Information: The odds of winning are 1 in 8 million
- No emotional significance or schema activation
- Information noted

Cognitive Switching

- Robert Ladouceur refers to the term 'cognitive switching'
- People may act rationally when asked to state the odds of gambling or rate whether a task involves chance or skill (although not always)
- But then act against these beliefs when engaged in the task
- They switch their interpretation when faced with emotionally-relevant outcomes
- But why does this occur?

The two processing systems

- **Automatic system**: Refers to low-level, highly evolved feature-detection processes geared to find associations, patterns, causal relations, conditioned responses to allow us to survive
- **Analytical system**: Refers to higher level executive functioning that processes information as a whole to make sense of low-level input

System Differences (Epstein, 1994)

Automatic/ Experiential System	Analytical System
Affective, pleasure-pain oriented	Logical and reason-oriented
Connections by association	Connections by logical assessment
Behaviour mediated by past experiences	Behaviour mediated by conscious appraisal of events
More rapid processing, oriented towards immediate action	Slower processing: oriented towards delayed action
Self-evidently valid: “experiencing is believing”	Requires justification via logic and evidence

Toplak et al. (2007) paper

- Analysed gamblers on a wide range of decision-making tasks
- 107 males (including 24 PGs)
- Found that PGs scored poorer on tests of impulsivity and executive function; lower on Head over Heart scale; higher on superstitious reasoning
- Fewer differences on a probability reasoning task

Extensions

- Need to test objective (cold) vs. gambling-relevant (hot) beliefs separately
- Look at problem gamblers and comparison groups who are similar in IQ, SES and Education
- The study also doesn't explain why certain people display these deficits.

Role of clinical co-morbidity

- Promising areas
- (1) Possible role of emotions (PGs score higher on clinical anxiety and depression)
- Evidence that higher ANX may be associated with susceptibility to illusory control beliefs or correlationd (Friendland et al., 1991; Janis and Mann hypervigilance work)
- (2) Individual differences in other underlying belief systems/ styles?

Delusion proneness

- Peters et al (2004)
- Recognition that psychiatric symptomology exist on a continuum
- “ psychological symptoms are recognized as the ... expression of schizotypal traits that are present in the general population and that manifest themselves as psychological variations observable amongst individuals [who]...would not be considered clinically psychotic.” (Peters et al., 2004, p. 1005)

Common delusions

- **Common beliefs that are included under this category include:**
- Feelings of persecution; conspiracy
- Hidden messages: double meanings; things that are about you, or written for you;
- Feeling of being especially chosen;
- Privy to special information or powers to which others have no access;
- Connection with higher powers;
- Belief that certain things are connected/ related

Psychosis continuum

- Similar ideas are articulated by Balzan, Delfabbro and Woodward (2012, 2013)
- Woodward argues that dysfunctional beliefs arise from a general tendency which he refers to as 'hypervigilance to evidence-based matches'
- Similar in concept to confirmation bias or the illusion of control, it refers to a general tendency to jump to conclusions, infer causal relationships and influences when no such factors exist.
- It is most strongly observed in disorders such as schizophrenia, but may also be present in people with borderline conditions.

Our preliminary research

- In our research, we were interested in clinical orders that have been found to be more common in samples of pathological gamblers
- We took an interest in borderline personality disorder (BPD)
- BPD is a disorder characterised by problems of emotional regulation; persecution and conspiracy complexes; impulsive behaviour; bouts of optimism and pessimism; perfectionism and obsessiveness.
- Why BPD?

Borderline Personality Disorder

- Around 60% of pathological gamblers in the US mental health survey (Petry et al., 2005) had at least one personality disorder
- BPD is one of the most common disorders
- ‘Odd thinking’ has been observed in 60% of BPD sufferers: Chabrol et al., 2001; Zanarini, Gunderson & Frankenburg, 1990
- This has included magical thinking, superstitious beliefs, changes in perception.
- LeGris et al. (2014): BPD linked to lower IGT performance; working memory problems

BPD and cognitive functioning

- Gvirts et al. (2012). Journal of Affective Disorders
- BPD patients tend to have deficient executive functioning in relation to planning, sustained attention and working memory (same deficits observed using the Iowa Gambling Task)
- There is common inability to over-ride short-term impulses or thoughts, i.e., for the voice of reason to over-ride short term cognitive and emotional reactions and exert some perspective or moderating influence.

Study 1: Method

- **Sample:** 140 community recruited regular gamblers (52% were pathological and 24% were problem on the NODS)
- **Measures:** NODS; PAI-BOR; Peters Delusion Inventory; Gambling Related Cognition Scale (Raylu & Oei, 2004)
- **Hypotheses:** BPD would be positively related to delusion proneness and Delusion proneness would be associated with Gambling-related Cognitions
- All measures positively associated with NODS scores

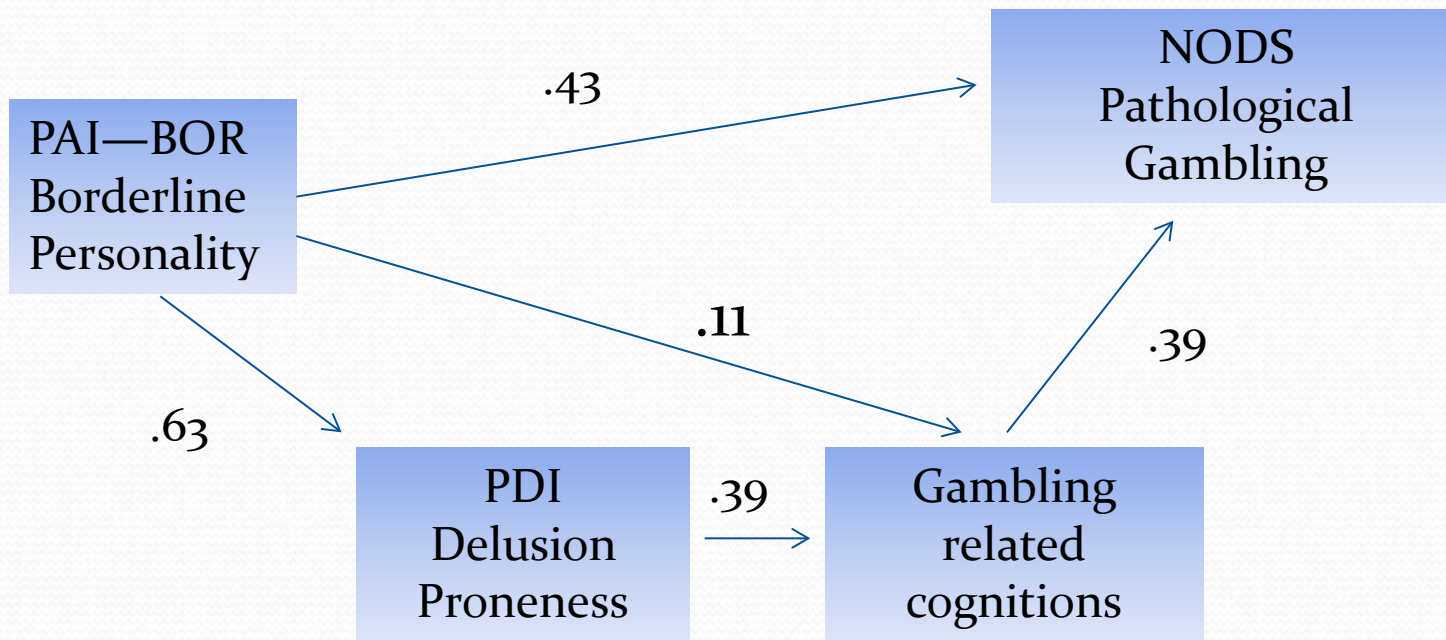
Group comparisons

<i>Variables</i>	Pathological gambling (<i>n</i> =73)		Non-pathological gambling (<i>n</i> =67)		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
GRCS (Cog)	18.52	5.38	13.55	4.48	-5.91***
PDI (delusions)	78.48	50.85	44.59	34.27	-4.67***
PAI-BOR (BP)	38.11	13.23	22.79	11.58	-7.26***

Correlations

	PDI	PAI-BOR	NODS
GRCS (cog)	.46	.36	.54
PDI (delusions)		.63	.39
PAI-BOR (BP)			.57

Path Model



Study 2

- **Sample:** 175 gamblers recruited from both the general community and student populations
- **Measures:**
 - PGSI (scores ranged from 0 to 22)
 - PDI (Delusion inventory)
 - Drake Beliefs About Chance
- **Experimental tasks:**
 - 2 illusion of control tasks: light bulb onset/ offset and Matute's Medical Decision-making task

Experimental tasks

- These tasks were standardised tests of the illusion of control
- Participants had to press / not press the spacebar to make a light bulb come on or administer a medicine / not administer to make cure a disease in patients
- Task was pre-programmed to have 75% positive outcomes/ actual contingency = 0
- $P(\text{Outcome} / \text{response}) = P(\text{outcome} / \text{No response})$
- People gave control ratings at the end

Results

- PGSI positively related to PDI (delusion scores) and Drake Beliefs About Chance
- PDI scores related to Drake scores
- PDI scores only weakly related to % control ratings on the medical decision-making task
- PGSI scores positively ($ES = .20$) related to perceived control level in medical decision-making task
- Overall: Results weaker, but task was not gambling-specific and sample included a lot of lower frequency/low risk gamblers

Under-developed areas

- Further work could look at factual vs. erroneous beliefs and how these relate to individual differences in critical reasoning skills
- Links between gambling-related and gambling-unrelated erroneous beliefs
- Emphasis on 'rationality' vs. knowledge of probability
- Clinical measures such as borderline personality and ADHD symptomology as a source of vulnerability for erroneous beliefs/ cognitive biases
- Behavioural measures to provide evidence of biases vs. just self-report measures