The structure and determinants of the gambler’s illusion of control

An experimental research programme

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Acknowledgements: Daniel King, Nancy Briggs, John Dunn, Serguei Rassomakhine, Alex Blaszczynski, Keis Ohtsuka
The gambler’s illusion of control

• An erroneous gambling-related cognition
The gambler’s illusion of control

- An erroneous gambling-related cognition

Perception that:
- strategic actions taken during play

causally affect

game outcomes
The gambler’s illusion of control

- An erroneous gambling-related cognition

Perception that: strategic actions taken during play causally affect game outcomes.

- Perception that: strategic actions taken during play directly influence machine events or winning odds.

Game outcomes → Causally affect → Game outcomes → Perception that: strategic actions taken during play.
The gambler’s illusion of control

- An erroneous gambling-related cognition

Illusorily perceived primary control

Perception that:
- Strategic actions taken during play
directly influence machine events or winning odds
game outcomes

Perception that:
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directly influence machine events or winning odds

Perception that: causally affect game outcomes

Perception that: game outcomes
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**Illusorily perceived primary control**

Perception that: strategic actions taken during play causally affect game outcomes

Perception that: strategic actions taken during play directly influence machine events or winning odds

Perception that: strategic actions taken during play causally affect game outcomes

Mediating force (e.g., luck, magic)
The gambler’s illusion of control

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**Perception that:**
strategic actions taken during play **causally affect**

game outcomes

- Illusorily perceived primary control

**Perception that:**
strategic actions taken during play **causally affect**

machine events or winning odds

**Perception that:**
strategic actions taken during play **causally affect**

mediating force (e.g., luck, magic) **produces**

game outcomes
The gambler’s illusion of control

- An erroneous gambling-related cognition
  - Perception that: strategic actions taken during play causally affect game outcomes
    - Illusorily perceived primary control
  - Perception that: strategic actions taken during play directly influence machine events or winning odds
  - Perception that: strategic actions taken during play causally affect game outcomes
    - Mediating force (e.g., luck, magic)
    - Produces game outcomes
The gambler’s illusion of control

- An erroneous gambling-related cognition

Illusorily perceived primary control
Perception that: strategic actions taken during play
directly influence machine events or winning odds
causally affect game outcomes

Perception that: strategic actions taken during play
causally affect game outcomes

Illusorily perceived secondary control
Perception that: strategic actions taken during play
causally affect or proceed from an ‘understanding’ of mediating force (e.g., luck, magic)
produces game outcomes
The gambler’s illusion of control

• An erroneous gambling-related cognition
  - Perception of a primary or secondary causal connection between strategic actions and game outcomes
The gambler’s illusion of control

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  - Perception of a primary or secondary causal connection between strategic actions and game outcomes

• Central to the cognitive theory of gambling?
The gambler’s illusion of control

- An erroneous gambling-related cognition
  - Perception of a primary or secondary causal connection between strategic actions and game outcomes
- Central to the cognitive theory of gambling?

Cognitive theory of gambling:
Persistent gambling develops as a result of, and is maintained by, erroneous gambling-related cognitions.
The gambler’s illusion of control

- An erroneous gambling-related cognition
  - Perception of a primary or secondary causal connection between strategic actions and game outcomes
- Central to the cognitive theory of gambling?
  - Yes, given its prevalence

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  - Yes, in light of theories about the nature of human cognition

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Observations of gambling behaviour

- Yes, in light of theories about the nature of human cognition
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Cognitive theory of gambling:
Persistent gambling develops as a result of, and is maintained by, erroneous gambling-related cognitions.
Gambling beliefs surveys: validation studies

Problem gamblers are more likely than non-problem gamblers to agree with statements such as:

A good poker machine gambler is like a sportsperson who knows winning plays and when to use them.

Wood & Clapham (2005): *Drake Beliefs About Chance Survey*
A good poker machine gambler is like a sportsperson who knows winning plays and when to use them.

Problem gamblers are more likely than non-problem gamblers to agree with statements such as:

When I need a little luck I wear lucky clothes or jewellery.
Problem gamblers are more likely than non-problem gamblers to agree with statements such as:

- Illusorily perceived primary control:
  - When I need a little luck I wear lucky clothes or jewellery. (Wood & Clapham, 2005)

- Illusorily perceived secondary control:
  - Wins are more likely to occur on a hot machine (i.e., a machine that has just paid out). (Wood & Clapham, 2005)

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Gambling beliefs surveys: validation studies
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- Illusorily perceived secondary control:
  - Wins are more likely to occur on a hot machine (i.e., a machine that has just paid out).

- The illusion of control:
  - A good poker machine gambler is like a sportsperson who knows winning plays and when to use them.

Wood & Clapham (2005): Drake Beliefs About Chance Survey
Gambling beliefs surveys

A practical illustration of the prevalence of the illusion of control...
Gambling beliefs surveys

A practical illustration of the prevalence of the illusion of control...

We set out to extract a set of mutually exclusive items from 10 validated surveys.
Gambling beliefs surveys

A practical illustration of the prevalence of the illusion of control...

We set out to extract a set of mutually exclusive items from 10 validated surveys.

Of the 49 extracted items, only 9 could not be classified as manifestations of primary, secondary or general illusorily perceived control.
A practical illustration of the prevalence of the illusion of control...

We set out to extract a set of mutually exclusive items from 10 validated surveys.

Of the 49 extracted items, only 9 could not be classified as manifestations of primary, secondary or general illusorily perceived control.

If I continue to gamble it will eventually pay off and I will make money.

Cognitive theory of gambling:
Persistent gambling develops as a result of, and is maintained by, erroneous gambling-related cognitions.

The gambler’s illusion of control

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  - Yes, given its prevalence
  - Yes, in light of theories about the nature of human cognition

Observations of gambling behaviour
Interviews
Surveys
The gambler’s illusion of control

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- Central to the cognitive theory of gambling?
  - Yes, given its prevalence
    Behaviour, interviews, surveys
  - Yes, in light of theories about the nature of human cognition

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    Behaviour, interviews, surveys
  - Yes, in light of theories about the nature of human cognition
    - Intrinsic ‘need for control’ (Langer, 1983)
    - Relevance Theory (Sperber & Wilson, 1986)
The gambler’s illusion of control

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- Central to the cognitive theory of gambling
- Extensive body of research on determinants (trigger factors)
The gambler’s illusion of control

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  1. Exposure to a condition of a task featuring action-independent outcomes
  2. Rating of perceived control
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Increase in the degree of perceived control with:
The gambler’s illusion of control

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Increase in the degree of perceived control with:
- greater ‘action space’ (choice, physical involvement, competition)
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Increase in the degree of perceived control with:
• greater ‘action space’ (choice, physical involvement, competition)
• higher reinforcement frequency
• wins early in the gambling session (descending win trajectory)
The gambler’s illusion of control

• An erroneous gambling-related cognition
  - Perception of a primary or secondary causal connection between strategic actions and game outcomes

• Central to the cognitive theory of gambling

• Extensive body of research on determinants (trigger factors)

By virtue of this, the illusion of control is a very USEFUL concept...

Increase in the degree of perceived control with:
• greater ‘action space’ (choice, physical involvement, competition)
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• wins early in the gambling session (descending win trajectory)
The usefulness of the illusion of control concept

The gambling session
The gambling session

Person enters game with:

- Human cognitive architecture
- Personal history

The usefulness of the illusion of control concept
The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes
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The usefulness of the illusion of control concept
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Person enters game with:
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Play-related thoughts
The gambling session

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Play-related thoughts

Gambling behaviour
The gambling session

Person enters game with:
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Play-related thoughts

Gambling behaviour

Conclusions about the game
The gambling session

Person enters game with:
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- Personal history

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- Action space
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Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back
The usefulness of the illusion of control concept

The gambling session

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Play-related thoughts

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Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back

Survey responses
Determinants of the degree of illusorily perceived control

Increase in the degree of perceived control with:
• greater ‘action space’ (choice, physical involvement, competition)
• higher reinforcement frequency
• wins early in the gambling session (descending win trajectory)
Determinants of the degree of illusorily perceived control

Increase in the degree of perceived control with:
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The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back

General beliefs about the nature of gambling
Survey responses

Survey responses

Gene
ral
beliefs
about
the
nature
of
gambling

The illusion of control
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Survey responses

Genral beliefs about the nature of gambling

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Win trajectory

Conclusions about the game

Decision about whether to come back
The usefulness of the illusion of control concept

The gambling session

Person enters with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Win trajectory
- Ascending

Conclusions about the game

Decision about whether to come back

General beliefs about the nature of gambling
Survey responses

The illusion of control
- Illusory primary control
- Illusory perceived secondary control
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

General beliefs about the nature of gambling
Survey responses

Play-related thoughts

Gambling behaviour

Win trajectory
- Ascending
- LLLLLWLLLLLLLWWW

Conclusions about the game

Decision about whether to come back
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes
- Play-related thoughts

Play-related thoughts:
- Win trajectory (Ascending)
- Manipulated over 30-50 rounds

Gambling behaviour:

Conclusions about the game:
- The illusion of control

Decision about whether to come back:
- General beliefs about the nature of gambling
- Survey responses

Survey responses:

Win trajectory:

LLWWWLLLLWWWWW
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back

General beliefs about the nature of gambling

Survey responses

Win trajectory
- Ascending
- Descending

Manipulated over 30-50 rounds

Ascending

LLLWWWLLLLWWWW
The usefulness of the illusion of control concept

The gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back

- The illusion of control
- Manipulated over 30-50 rounds
- Survey responses

Win trajectory
- Ascending
- Descending
- Flat (even spread)

General beliefs about the nature of gambling

Survey responses

Gene

ral

beliefs
about
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of
gambling

Survey responses

Win trajectory
- Ascending
- Descending
- Flat (even spread)

General beliefs about the nature of gambling

Survey responses

Win trajectory
- Ascending
- Descending
- Flat (even spread)

General beliefs about the nature of gambling

Survey responses

Win trajectory
- Ascending
- Descending
- Flat (even spread)
The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Gambling behaviour

Exposure to:
- Flat (even spread)
- Ascending
- Descending

Degree of perceived control

Decision about whether to come back

The influence of win trajectory:

Freshman & Roth (1975)
Burger (1986)
Coventry & Norman (1998)

Ascending

Descending

LLLLWLLLLWWW

increases

non-existent

moderate

complete

0

3

6

The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts

Degree of perceived control

Exposure to:
- Flat (even spread)
- Ascending
- Descending

The influence of win trajectory:
- Matute (1995, Expt 1)

Decision about whether to come back:
- Non-existent
- Moderate
- Complete

Existing findings
- Langer & Roth (1975)
- Burger (1986)
- Coventry & Norman (1998)
The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Action space

Sequence of outcomes

Play-related thoughts

Degree of perceived control

Decision about whether to come back:
- Non-existent
- Moderate
- Complete

Summary and additional questions
- Two competing findings

Exposure to:
- Flat (even spread)
- Ascending
- Descending

Existing findings
- Langer & Roth (1975)
- Burger (1986)
- Coventry & Norman (1998)
- Matute (1995, Expt 1)

Conclusions about the game
- Completemoderate
- Non-existent

Matute (1995, Expt 1)
Yu, Lagnado & Chater (2008)
The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Experience:
- Action space
- Sequence of outcomes

Play-related thoughts:
- Decision about whether to come back

The influence of win trajectory:

**Existing findings**

**Summary and additional questions**
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Exposure to:
- Flat (even spread)
- Ascending
- Descending

Degree of perceived control:
- Non-existent
- Moderate
- Complete

Conclusions about the game:
- Complete
- Moderate
- Non-existent

Existing findings:
- Burger (1986)
- Coventry & Norman (1998)
- Langer & Roth (1975)
- Matute (1995, Expt 1)

Two competing findings and additional questions:
The influence of win trajectory: Existing findings

Summary and additional questions
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Exposure to:
- Flat (even spread)
- Ascending
- Descending

Degree of perceived control
- Non-existent
- Moderate
- Complete

Play-related thoughts

Gambling behaviour

Conclusions about the game
- Matute (1995, Expt 1)
- Langer & Roth (1975)
- Burger (1986)
- Coventry & Norman (1998)

Decision about whether to come back

Will use a more detailed measure, shown by Ejova, Delfabbro & Navarro (2010) to be bi-factorial

Existing findings
Win trajectory and the illusion of control

Method

**Participants:** 176 University of Adelaide students; must have gambled at a pub, casino or sports betting agency at least once previously.
Win trajectory and the illusion of control

**Method**

**Participants:** 176 University of Adelaide students; must have gambled at a pub, casino or sports betting agency at least once previously

- U-shaped 45
- Descending 42
- Flat (even spread) 45
- Ascending 44
Win trajectory and the illusion of control

Method

Task instructions

• We are interested in your **impressions** of a game that might be used in future research
• Game **works just like a slot machine**

Pre-game questionnaire

Drake **Beliefs About Chance** Survey (DBC)

Gambling is more than just luck.  
Some gamblers are just born lucky.

Soccer-themed gambling task

Win trajectory manipulated over 48 rounds

“Impressions” questionnaire

Bi-factorial measure of **perceived control**
Win trajectory and the illusion of control

Method

Task instructions

• We are interested in your impressions of a game that might be used in future research
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Gambling is more than just luck.

Some gamblers are just born lucky.

strongly disagree

strongly agree

Soccer-themed gambling task

Win trajectory manipulated over 48 rounds

“Impressions” questionnaire

Bi-factorial measure of perceived control
Select a player profile...
The player who will be shown taking the shot at goal in this game will represent one of the superstars below. Which of the four players do you want the player in this game to look like?

- Ronaldinho
- Cristiano Ronaldo
- David Beckham
- Kaka

Kaka

Plays for: AC Milan (2003 to present), Brazilian national team
Age: 32

When eighteen-year-old Ricardo Izecson dos Santos Leite was first spotted by officials from the Brazilian club Sao Paulo FC, his younger brother - in being unable to pronounce "Ricardo" - was calling him "Kaka." In 2001, at the age of 18, Kaka made his senior side debut for Sao Paulo FC and proceeded to score 12 times in the 27 matches he played that season. This remarkable level of performance attracted the attention of European clubs and in 2003 Kaka was invited to play for the Italian club AC Milan, where, after scoring a number of spectacular hat-tricks (series of three goals in one match), he became the focal point of the team's offensive in the 2006-07 season. That season, AC Milan won the UEFA Champions League crown, Kaka being the tournament's top scorer. Kaka went on to win the 2007 World Soccer Player of the Year Award, receiving - at the same time - wide recognition for his impressive sportsmanship. A lifelong of Kaka's esteemed personal qualities cannot end here... After a long history of involvement in charity work, Kaka became the youngest person ever to be appointed a United Nations Ambassador Against World Hunger. Kaka's commitment to charity work stems from his deep religiosity. In fact, Kaka celebrates his goals by pointing to the sky as a token of gratitude to God.
Place a bet by selecting one of the seven available betting options:
(Click on one of the light orange buttons)

Bet on scoring a goal on the NEXT SHOT:
- Bet: 1 credit
  - In the event of a goal, win: 14 credits
- Bet: 2 credits
  - In the event of a goal, win: 30 credits
- Bet: 5 credits
  - In the event of a goal, win: 78 credits
- Bet: 10 credits
  - In the event of a goal, win: 140 credits

OR
Bet on scoring at least ONE GOAL IN THE NEXT TWO SHOTS:
- Bet: 4 credits
  - Win: 32 credits

OR
Bet on scoring at least TWO GOALS IN THE NEXT THREE SHOTS:
- Bet: 30 credits
  - Win: 184 credits

OR
Bet on scoring TWICE IN A ROW during the next two shots
- Bet: 4 credits
  - Win: 992 credits

You are choosing to bet **4** credits on a chance to win **32** credits
by scoring on at least one of the next two shots

OK
Place a bet by selecting one of the seven available betting options:
(Click on one of the light orange buttons)

**NEXT SHOT:**
- Bet: 1 credit
- In the event of a goal, win: 14 credits
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- In the event of a goal, win: 30 credits
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OK
Select the direction for the kick:
Click on one of the five coloured buttons to select the direction, then press "Kick!"
Goal!

You have won: 30 credits

Old credit count: 694

New credit count: 724

Place another bet

Change player profile

1 credit = 1 cent
Goal!
Alternatively, “No goal”...

You have won: 30 credits
1 credit = 1 cent

Old credit count: 694
New credit count: 724

Place another bet
Change player profile
Goal!
Alternatively, “No goal”...

You have won: 30 credits
1 credit = 1 cent
Old credit count: 694
New credit count: 724
Place another bet
Change player profile
Win trajectory and the illusion of control

**Method:** Win trajectory manipulation

48 kicks were made under one of the following outcome sequence conditions (all containing **6 wins/goals**):

- **Ascending**: 
  - LWLLLLWLWLLLLLLLLLLLLLLLLLWLL
  - LLLLLWWLLLLLLWLWLLLLLLLWL

- **Descending**: 
  - LWLWLWLLLWLLLLLWLWLLLLWLLL
  - LLLLLWWLLLLLLLLLLLLLLLLLL

- **Flat (even spread)**: 
  - LWLWLWLLLWLWWLLWLWLLLLWLL
  - LLLLLWWLLLLLLLLLLLLLLLLLL

- **LWWLLLLLLLLLLLLLWLLLLL
  - LLLLLWLLLLLLLLLLLLLLLLLLL
  - LLLWLLLWLWLLLLLLWLLWLWLWL
Win trajectory and the illusion of control

**Method:** Win trajectory manipulation

48 kicks were made under one of the following outcome sequence conditions (all containing **6 wins/goals**):

- **Ascending**
  - LLLLLLLLLLLLLLLLLLLLL
  - LLLLLLLLLLLLLLLLLLLLL
  - LWWLWLWLWLLLLLWLLWLWLWL

- **Descending**
  - LWLWLWLLWLLLLLLWLWLLLLLL
  - LLLLLLLLLLLLLLLLLLLLLLWLL

- **Flat (even spread)**
  - LWLWLWLLWLLLLLLWLWLLLLLL
  - LLLLLWLLLLLLLLLWLWLLLLL

A potential confound – whether the sequence featured a **streak of wins** – was also manipulated.
Win trajectory and the illusion of control

**Method:** Win trajectory manipulation

48 kicks were made under one of the following outcome sequence conditions (all containing **6 wins/goals**):

- **Ascending**
  - LLLLLLLLLLLLLLLLLLWL
  - LLLLLLLLLLLLLLWLWLWLWLWLWLWLWL

- **Flat (even spread)**
  - LWLLLLWLWLLLLLLLLLLLLLWLWLWLWL
  - LLLLLWLLLLLLLLWLWLLLLLLLLWWLW

- **Descending**
  - LWLWLWLWLWLWLWLWLWLWLWLLLWLLL

A potential confound – whether the sequence featured a **streak of wins** – was also manipulated.
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**

When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

0  5  10

- Not informative as an explanation of how wins came about
- Describes an important reason for why wins came about
Win trajectory and the illusion of control

**Method:** Measuring perceived control

### Account for wins question

When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- My skill in playing the game
- I got better with practice
- I developed a logical strategy for playing
- The player(s) I chose
- The kick directions I chose
- Experience at playing computer games
- My knowledge of soccer

0 10

Not informative as an explanation of how wins came about

Describes an important reason for why wins came about

Illusorily perceived primary control
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**
When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- **0** Not informative as an explanation of how wins came about
- **5** Describes an important reason for why wins came about
- **10** Illusorily perceived secondary control
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**

When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- I took advantage of moments when my luck was good
- A certain lucky way of playing just seemed to work for me
- I knew how to make my luck turn good
- I’ve always been a lucky kind of person
- I deserved to win

**Scale:**

- **0** Not informative as an explanation of how wins came about
- **5** Describes an important reason for why wins came about
- **10** Illusorily perceived secondary control
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**
When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- It was all chance

<table>
<thead>
<tr>
<th>0</th>
<th>5</th>
<th>10</th>
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<tbody>
<tr>
<td>Not informative as an explanation of how wins came about</td>
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Acceptance of the role of chance
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**
When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- **0** Not informative as an explanation of how wins came about
- **5** Describes an important reason for why wins came about
- **10**

- Illusorily perceived **primary** control
- Illusorily perceived **secondary** control
- Acceptance of the role of chance
Win trajectory and the illusion of control

**Method:** Measuring perceived control

**Account for wins question**
When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

The three-factor structure emerges consistently:
- Present study (N = 176)
Account for wins question
When thinking about your wins/goals, to what extent would you use each of the following statements to describe how they came about?

- Illusorily perceived primary control
- Illusorily perceived secondary control
- Acceptance of the role of chance

Factor scores (rather than averaged ratings) served as dependent variables.
Win trajectory and the illusion of control

**Method**

**Task instructions**
- We are interested in your **impressions** of a game that might be used in future research.
- Game *works just like a slot machine*

**Pre-game questionnaire**
Drake **Beliefs About Chance** Survey (DBC)

- Gambling is more than just luck.
- Some gamblers are just born lucky.

**Soccer-themed gambling task**
Win trajectory manipulated over 48 rounds

**“Impressions” questionnaire**
Bi-factorial measure of perceived control
The influence of win trajectory: Qs

Research questions
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Degree of perceived control

Win trajectory
- Ascending
- Descending

Exposure to:
- Flat (even spread)

Play-related thoughts

Person experiences:

Sequence of outcomes

Decision about whether to come back

The illusion of control: primary and secondary

Matute (1995, Expt 1)
Yu, Lagnado & Chater (2008)

Langer & Roth (1975)
Burger (1986)
Coventry & Norman (1998)

Matute (1995, Expt 1)
Yu, Lagnado & Chater (2008)
The illusion of control: primary and secondary

Person enters game with:

Person experiences:

Human cognitive architecture

Personal history

Action space

Sequence of outcomes

Play-related thoughts

Gambling behaviour

Conclusions about the game

Decision about whether to come back

Research questions
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Results

The influence of win trajectory:
The influence of win trajectory: **Results**

**Research questions**
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Note: These results were observed over and above the influence of general gambling-related beliefs (DBC scores), which accounted for 34% of the variance in perceived primary control.
The influence of win trajectory: **Results**

**Research questions**
- Two competing findings
- What facet of perceived control is affected:
  - Primary?
  - Secondary?
  - Both?

Note: These results were observed over and above the influence of general gambling-related beliefs (DBC scores), which accounted for 34% of the variance in perceived primary control.
The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Play-related thoughts

Gambling behaviour

The influence of win trajectory:
- Ascending
- Descending
- Flat (even spread)

Conclusions about the game

Decision about whether to come back
The illusion of control: primary and secondary

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Play-related thoughts:
- Descending
- Flat (even spread)

Gambling behaviour:
- Ascending
- Descending
- Flat (even spread)

Exposure to:

The influence of win trajectory:

Illusorily perceived primary control

Conclusions about the game:

Decision about whether to come back

Implied mechanism:

increases
The illusion of control: primary and secondary

Person enters game with:

**Perceived learning**
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

Gambling behaviour

Exposure to:

- Descending
- Flat (even spread)
- Ascending
- Descending

The influence of win trajectory:

**Implied mechanism**

Play-related thoughts

Increasingly increases

Decision about whether to come back

Perceived learning

Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.
The influence of win trajectory:

**Implied mechanism**

**Perceived learning**
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

**Exposure to:**
- Flat (even spread)
- Ascending
- Descending

**Disappointment**
People become disappointed when an initial run of wins is not followed by further wins.

Illusorily perceived primary control
The illusion of control: primary and secondary

Person enters game with:

- Perceived learning
  Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

- Personal history

Action space

Sequence of outcomes

Play-related thoughts

Decision about whether to come back

Gambling behaviour

Exposure to:

- Flat (even spread)
  - Ascending
  - Descending

Disappointment
  People become disappointed when an initial run of wins is not followed by further wins.

Illusorily perceived primary control

Ascending decreases, Descending increases
The influence of win trajectory:

**Implied mechanism**

**Perceived learning**
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

**Disappointment**
People become disappointed when an initial run of wins is not followed by further wins.

**Exposure to:**
- Ascending
- Descending
- Flat (even spread)

**Illusorily perceived primary control**
- Increases
- Decreases
The illusion of control: primary and secondary

Person enters game with:
- Personal history
- Action space
- Sequence of outcomes

Person experiences:
- Play-related thoughts
- Gambling behaviour

Conclusions about the game
- Decision about whether to come back

If learning over time is perceived in the ascending condition:
- The illusion of control increases
- Illusorily perceived primary control

Exposure to:
- Ascending pattern

The influence of win trajectory:
- Examining playing behaviour

Exposure to:
- Action space
- Sequence of outcomes
- Play-related thoughts
- Gambling behaviour
- Conclusions about whether to come back

If learning over time is perceived in the ascending condition:
- Illusorily perceived primary control
The influence of win trajectory: Examining playing behaviour

If learning over time is perceived in the ascending condition:

- Illusorily perceived primary control
- The ascending condition should be distinct with respect to playing behaviour: second half of the session should feature less variability in responding.

Exposure to:

Ascending

- Increases
- Play-related thoughts
- Gambling behaviour
- Conclusions about whether to come back
The influence of win trajectory: Examining playing behaviour

If learning over time is perceived in the ascending condition:

Exposure to:

Ascending

LLLLWLLLLWWW

Illusorily perceived primary control

The ascending condition should be distinct with respect to playing behaviour: second half of the session should feature less variability in responding.

i.e.

Rounds 25-48 in the ascending condition only should feature:
• Fewer player profile changes than rounds 1-24
• Less variability (less entropy) in direction choices than rounds 1-24

If learning over time is perceived in the ascending condition:

Exposure to:

Ascending

LLLLWLLLLWWW

Illusorily perceived primary control

The ascending condition should be distinct with respect to playing behaviour: second half of the session should feature less variability in responding.

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The influence of win trajectory: Examining playing behaviour

If learning over time is perceived in the ascending condition:

Exposure to:

- Ascending

Illusorily perceived primary control increases

The ascending condition should be distinct with respect to playing behaviour: second half of the session should feature less variability in responding.

i.e.

Rounds 25-48 in the ascending condition only should feature:

- Fewer player profile changes than rounds 1-24
- Less variability (less entropy) in direction choices than rounds 1-24)

This is precisely what we observed in relation to player profile changes and kick directions.
The illusion of control: primary and secondary

Person enters game with:

- Personal history
- Action space
- Sequence of outcomes
- Play-related thoughts

Person experiences:

- Human cognitive architecture
- Decision about whether to come back
- Gambling behaviour
- Conclusions about the game

If learning over time is perceived in the ascending condition:

- Illusorily perceived primary control

The influence of win trajectory:

Examining playing behaviour

Exposure to:

- The ascending condition should be distinct with respect to playing behaviour: second half of the session should feature less variability in responding.

Ascending condition:

- The ascending condition should feature:
  - Fewer player profile changes than rounds 1-24
  - Less variability (less entropy) in direction choices than rounds 1-24

This is precisely what we observed in relation to player profile changes and kick directions. E.g., Player profile changes and kick directions observed in relation to player profile changes and kick directions.
Number of player profile changes in Rounds 1-24 as compared to Rounds 25-48

**Mean number of player profile changes**

- **Flat (evenly spaced)**
- **U-shaped**
- **Ascending**
- **Descending**

Rounds 1-24 vs. Rounds 25-48
Number of player profile changes in Rounds 1-24 as compared to Rounds 25-48

- Decline in response variability over time in the Ascending condition (* across time)
Number of player profile changes in Rounds 1-24 as compared to Rounds 25-48

- Higher overall variability in the flat condition relative to the other conditions
- Decline in response variability over time in the Ascending condition (* across time)
The influence of win trajectory:

**Implied mechanism**

- Person enters game with:
  - Human cognitive architecture
  - Personal history

- Person experiences:
  - Flat (even spread)
  - Ascending
  - Descending

- Exposure to:
  - Flat (even spread)
  - Ascending
  - Descending

- Play-related thoughts:

- Gambling behaviour:
  - LLLLLLLLLLWWW

- Conclusions about the game:

- The influence of win trajectory:
  - Illusorily perceived primary control

- Mean number of player profile changes:
  - Rounds 1-24
  - Rounds 25-48
  - Descending
  - Ascending

- To come back
The influence of win trajectory: 

**Implied mechanism**

**Perceived learning**
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

Exposure to:
- *Ascending*
- *Descending*
- *Flat (even spread)*

**Illusorily perceived primary control**

Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy. Exposure to: *Ascending*, *Descending*, *Flat (even spread)*

*Mean number of player profile changes*

*Rounds 1-24*  *Rounds 25-48*
The influence of win trajectory: Implied mechanism

Perceived learning
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

Exposure to:
- Flat (even spread)
- Ascending
- Descending

Illusorily perceived primary control

Ascending

Descending

Mean number of player profile changes

Rounds 1-24  Rounds 25-48
The influence of win trajectory: **Implied mechanism**

**Perceived learning**
Upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

**Exposure to:**
- Flat (even spread)
- Ascending
- Descending

**Illusorily perceived primary control**
But by what mechanism? increases

**Mean number of player profile changes**
- Descending
- Ascending
- Flat (evenly spaced)

**Gambling behaviour**
- Play-related thoughts

**Conclusions about the game**
- Perceived learning upon experiencing a concentration of wins at the end of the sequence, people develop the perception that they have found an effective strategy.

**Ascending**
- Imagine a sequence of outcomes with an ascending pattern.

**Descending**
- Imagine a sequence of outcomes with a descending pattern.

**Flat (even spread)**
- Imagine a sequence of outcomes with a flat, evenly spread pattern.

**Play-related thoughts**
- Think about the implications of each pattern on play-related thoughts and behaviour.
An uncovered pathway

General beliefs about gambling (Score on the DBC)

Level of behavioural variability during the first half of session
An uncovered pathway

General beliefs about gambling (Score on the DBC)

The greater the degree of agreement with erroneous beliefs, the greater the...

Level of behavioural variability during the first half of session
An uncovered pathway

- General beliefs about gambling (Score on the DBC)

The greater the degree of agreement with erroneous beliefs, the greater the...

- Level of behavioural variability during the first half of session

- Illusorily perceived primary control

Win trajectory

Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...
Consider the case of a person who enters the game with a low level of agreement with erroneous beliefs – no expectations that the game might be controllable.

The greater the degree of agreement with erroneous beliefs, the greater the... Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...
An uncovered pathway

Consider the case of a person who enters the game with a low level of agreement with erroneous beliefs – no expectations that the game might be controllable.

The greater the degree of agreement with erroneous beliefs, the greater the...

Level of behavioural variability during the first half of session

Such a person is likely to make few player profile changes and be unsystematic in choosing kick directions.

Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...

Illusorily perceived primary control

General beliefs about gambling (Score on the DBC)
Consider the case of a person who enters the game with a low level of agreement with erroneous beliefs – no expectations that the game might be controllable.

Such a person is likely to make few player profile changes and be unsystematic in choosing kick directions.

Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...
In the context of the gambling session

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

General beliefs about gambling (Score on the DBC)

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Win trajectory
The next step: Other pathways

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Illusorily perceived primary control

Level of behavioural variability during the first half of session

Gambling behaviour

Win trajectory
The next step: Other pathways

Person enters game with:

- Human cognitive architecture

Beliefs have sub-categories:

- General beliefs about gambling

Person experiences:

- Action space
- Sequence of outcomes

Win trajectory

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control
The next step: Other pathways

Person enters game with:

- Human cognitive architecture
- Personal history

Beliefs have sub-categories:

- General beliefs about gambling

Person experiences:

- Action space
- Sequence of outcomes

Win trajectory

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Beliefs have sub-categories:

- The illusion of control
- Hysterically perceived primary control
- Illusorily perceived secondary control

Other pathways

Win trajectory
The next step: Other pathways

General beliefs about gambling

Beliefs have sub-categories

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Win trajectory

Action space

Sequence of outcomes

The illusion of control

My choices or actions affect the game on which I am betting.

My actions are more likely to affect the outcome than they are to change the outcome itself.

What an event is likely to happen, given what has happened so far.

What an event is likely to happen, given what has happened so far.

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Win trajectory

Action space

Sequence of outcomes

The illusion of control

My choices or actions affect the game on which I am betting.

My actions are more likely to affect the outcome than they are to change the outcome itself.

What an event is likely to happen, given what has happened so far.

What an event is likely to happen, given what has happened so far.

Level of behavioural variability during the first half of session
The next step: Other pathways

Beliefs have sub-categories

Action space
Sequence of outcomes

Win trajectory
Outcome sequences have other features

Gambling behaviour
Level of behavioural variability during the first half of session

Illusorily perceived primary control

General beliefs about gambling

Person enters game with:

Human cognitive architecture

Person experiences:

My choices or actions affect the game so I'm not just luck
It's my choice or action that change the outcome
Win more likely to occur in machines that have just paid out
Hence my more likely to occur in a machine that has just paid out
Illegally perceived primary control
Illegally perceived secondary control
Sanctioning is more than just luck

Gambling behaviour

The next step: Other pathways

Person enters game with:

- Personal history

Beliefs have sub-categories:

- General beliefs about gambling

Person experiences:

- Action space
- Sequence of outcomes

Win trajectory

Outcome sequences have other features

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control
The next step: Other pathways

Person enters game with:

Human cognitive architecture

Beliefs have sub-categories

- General beliefs about gambling
  - Level of behavioural variability during the first half of session
  - There are other facets to gambling behaviour

Person experiences:

- Action space
- Sequence of outcomes

Ilusorily perceived primary control

Win trajectory

Outcome sequences have other features

- Winning streaks
- Other pathways
The next step: Other pathways

Beliefs have sub-categories

General beliefs about gambling

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Action space

Sequence of outcomes

Win trajectory

Outcome sequences have other features

Winning streaks
The next step: Other pathways

Study design

Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Beliefs have sub-categories
- General beliefs about gambling
- Level of behavioural variability during the first half of session
- There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Outcome sequences have other features
- Win trajectory
- Winning streaks

Gambling behaviour

Study design

Winning streaks have other features
The next step: Other pathways

Study design

Beliefs have sub-categories

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Win trajectory

Outcome sequences have other features

Winning streaks
The next step: Other pathways

Study design

Beliefs have sub-categories

We created a 100-item slot machine gambling beliefs survey, featuring:

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Outcome sequences have other features

Winning streaks

General beliefs about gambling

Person experiences:

Human cognitive architecture

Personal history

Action space

Sequence of outcomes

The next step: Other pathways

Study design

Beliefs have sub-categories

We created a 100-item slot machine gambling beliefs survey, featuring:

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Outcome sequences have other features

Winning streaks

General beliefs about gambling

Person experiences:

Human cognitive architecture

Personal history

Action space

Sequence of outcomes
The next step: Other pathways

Study design

Beliefs have sub-categories

We created a 100-item slot machine gambling beliefs survey, featuring:

• DBC
The next step: Other pathways

Beliefs have sub-categories

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Outcome sequences have other features

Winning streaks

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:

• DBC, two additional full scales
The next step: Other pathways

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:
- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys.

Beliefs have sub-categories

Level of behavioural variability during the first half of session

Gambling behaviour

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

Illusorily perceived primary control

Illusorily perceived secondary control

Outcome sequences have other features

Winning streaks

General beliefs about gambling

Person enters game with:
- Human cognitive architecture
- Personal history

Action space

Sequence of outcomes

The next step: Other pathways
We created a 100-item **slot machine gambling beliefs survey**, featuring:

- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
- newly-created items

Beliefs have sub-categories

Level of behavioural variability during the first half of session

There are other facets to gambling behaviour

Perceived control is not uni-dimensional

**The next step: Other pathways**

**Study design**
The next step: Other pathways

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:

• DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
• newly-created items

Procedure: People with past (slot machine) gambling experience fill in the survey and two weeks later come in to play the soccer-themed gambling game and rate perceived control.
The next step: Other pathways

Study design

Beliefs have sub-categories

We created a 100-item slot machine gambling beliefs survey, featuring:
- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
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Procedure: People with past (slot machine) gambling experience fill in the survey and two weeks later come in to play the soccer-themed gambling game and rate perceived control. Win trajectory and presence of winning streaks manipulated as previously described.
The next step: Other pathways

Study design

Beliefs have sub-categories

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Planned analyses:
1. Determine the structure of belief sub-categories (SEM)
Study design

**Beliefs have sub-categories**

We created a 100-item slot machine gambling beliefs survey, featuring:
- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
- newly-created items

**Procedure:** People with past (slot machine) gambling experience fill in the survey and two weeks later come in to play the soccer-themed gambling game and rate perceived control. Win trajectory and presence of winning streaks manipulated as previously described.

**Planned analyses:**
1. Determine the structure of belief sub-categories (SEM)
The next step: Other pathways

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:
- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
- newly-created items

Planned analyses:
1. Determine the structure of belief sub-categories (SEM)

The longer I’ve been losing, the more likely I am to win.
The next step: Other pathways

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:
• DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
• newly-created items

Planned analyses:
1. Determine the structure of belief sub-categories (SEM)
The next step: Other pathways

Study design

We created a 100-item **slot machine gambling beliefs survey**, featuring:
- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
- newly-created items

**Planned analyses:**
1. Determine the structure of belief sub-categories (SEM)

- The illusion of control
  - Illusorily perceived primary control
  - Illusorily perceived secondary control

- A series of losses is a sign that good luck is about to set in.

- The longer I’ve been losing, the more likely I am to win.

- A run of losses must come to an end sooner rather than later.

Joukhador, Maccallum & Blaszczynski (2003)
Wood & Clapham (2005)
The next step: Other pathways

Study design

We created a 100-item slot machine gambling beliefs survey, featuring:

- DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
- newly-created items

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Planned analyses:

1. Determine the structure of belief sub-categories (SEM)

Perceived control is not uni-dimensional

Newly-created item

Hierarchical organisation?

Clustering?
The next step: Other pathways

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Since poker machines are a game of chance and chance distributes wins evenly across different possible responses, the only way to win is to keep ‘changing up’ your play pattern.

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Since poker machines are a game of chance and chance distributes wins evenly across different possible responses, the only way to win is to keep ‘changing up’ your play pattern.

A primary control, gambler’s fallacy cluster?

Primary control, primarily perceived

Secondary control, primarily perceived

Hierarchical organisation?

Clustering?
Beliefs have sub-categories

The illusion of control
Illusory perceived primary control
Illusory perceived secondary control
Winning is more than just luck
My choices or actions affect the game on which I am betting
With my more likely to win (i.e., a machine that has just paid out)

We created a 100-item slot machine gambling beliefs survey, featuring:
• DBC, two additional full scales, and individual items borrowed from a range of other validated surveys
• newly-created items

Procedure: People with past (slot machine) gambling experience fill in the survey and two weeks later come in to play the soccer-themed gambling game and rate perceived control. Win trajectory and presence of winning streaks manipulated as previously described.

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1. Determine the structure of belief sub-categories (SEM)
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Planned analyses:
1. Determine the structure of belief sub-categories (SEM)
2. Examine possible pathways: connections between belief categories, playing behaviour and degree of perceived control (regression of interaction terms)
Person enters game with:

- Human cognitive architecture
- Personal history

General beliefs about gambling (Numerous scales)

Person experiences:

- Action space
- Sequence of outcomes

Win trajectory

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Illusorily perceived secondary control
Person enters game with:

- Human cognitive architecture
- Personal history

Person experiences:

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- Sequence of outcomes

Win trajectory

General beliefs about gambling (Numerous scales)

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Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Illusorily perceived secondary control

Numerous scales
Person enters game with:

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Personal history

Action space

Sequence of outcomes

A possible pathway

A run of losses must come to an end sooner rather than later.

Level of behavioural variability during the first half of session

Tendency to bet on options such as 'goal in the next two shots'

Gambling behaviour

General beliefs about gambling (Numerous scales)

The greater the degree of agreement with statements in the associated cluster, the greater the...

Win trajectory

Illusorily perceived primary control

Illusorily perceived secondary control

Gambling behaviour

Win trajectory

Illusorily perceived primary control

Illusorily perceived secondary control

General beliefs about gambling (Numerous scales)

The greater the degree of agreement with statements in the associated cluster, the greater the...
A possible pathway

Person enters game with:

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Personal history

Action space

Sequence of outcomes

A run of losses must come to an end sooner rather than later.

The greater the degree of agreement with statements in the associated cluster, the greater the...

Level of behavioural variability during the first half of session

Tendency to bet on options such as 'goal in the next two shots'

Gambling behaviour

General beliefs about gambling (Numerous scales)

Win trajectory

The greater this tendency amid exposure to an ascending or flat win trajectory, the greater the degree of...

Illusorily perceived primary control

Illusorily perceived secondary control

The greater the degree of illusorily perceived primary control, the greater the degree of...
Person enters game with:
- Human cognitive architecture
- Personal history

Person experiences:
- Action space
- Sequence of outcomes

Another possible pathway

General beliefs about gambling (Numerous scales)

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Illusorily perceived secondary control

Win trajectory
Another possible pathway

Person enters game with:
- Human cognitive architecture
- Personal history

General beliefs about gambling (Numerous scales)

Person experiences:
- Action space
- Sequence of outcomes

Level of behavioural variability during the first half of session

Gambling behaviour

Illusorily perceived primary control

Illusorily perceived secondary control

Win trajectory

Winning streaks
The greater the degree of agreement with statements in the associated cluster amid exposure to an outcome sequence featuring numerous wins in a row, the greater the degree of...
Yet another possible pathway

- General beliefs about gambling (Numerous scales)
- Wins are more likely to occur on a hot machine (i.e., a machine that has just paid out).

The greater the degree of agreement with statements in the associated cluster amid exposure to an outcome **sequence featuring numerous wins in a row**, the greater the degree of...

- Illusorily perceived primary control
- Illusorily perceived secondary control

- Action space
- Sequence of outcomes
- Win trajectory
- Winning streaks
The gambler’s illusion of control involves a perception of primary or secondary control over outcomes that are objectively random.
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This erroneous cognition is central to the cognitive theory of gambling in that it subsumes many of the erroneous thoughts and beliefs captured in observational, interview-based and survey-based studies.
Summary

- The gambler’s illusion of control involves a perception of primary or secondary control over outcomes that are objectively random.

- This erroneous cognition is central to the cognitive theory of gambling in that it subsumes many of the erroneous thoughts and beliefs captured in observational, interview-based and survey-based studies.

- The existing body of research on the illusion’s determinants can thus be used as a starting point for mapping the relationships between various components of the gambling experience. We demonstrated this in relation to the determining variable, win trajectory.
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The existing body of research on the illusion’s determinants can thus be used as a starting point for mapping the relationships between various components of the gambling experience. We demonstrated this in relation to the determining variable, win trajectory.

Further mapping of the pathways that lead to the development of the illusion can commence once more is known about the structure of the gambling-related beliefs with which people enter the gambling session.
The uncovered pathway

The greater the degree of agreement with erroneous beliefs, the greater the... Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...

General beliefs about gambling (Score on the DBC)

Level of behavioural variability during the first half of session

Illusorily perceived primary control

Win trajectory
Upon observing the decrease in behavioural variability over time in the ascending condition, we tested the hypothesis that lower levels of behavioural variability in the second 24 rounds would be associated with higher perceived control – i.e., we expected a negative correlation between the number of player profile changes in the second 24 rounds and the degree of perceived primary control.

However, we observed a positive correlation (between perceived control and the amount of behavioural variability in both halves of the session – not just the second half)... and all of these correlations became non-significant when DBC scores were partialled out.
The uncovered pathway

Formal confirmation with a repeated measures ANOVA followed:

Within-subjects IV: **Time** (first half of session vs second half of session)

Between-subjects IV: **Median split of DBC scores** (high erroneous beliefs vs low erroneous beliefs)

DV: (1) Number of player profile choices; (2) Kick direction entropy

**Main effect of median split DBC scores**: $p < .01$ and effect size of approx 0.05 in both (1) and (2), with high erroneous beliefs subjects recording greater behavioural variability across all time points.
The uncovered pathway

General beliefs about gambling (Score on the DBC)

The greater the degree of agreement with erroneous beliefs, the greater the...

Level of behavioural variability during the first half of session

Win trajectory

Higher initial levels of behavioural variability in the ascending and flat conditions were associated with higher...

A regression analysis showed the interaction between win trajectory and the level of behavioural variability to be a significant predictor of illusorily perceived primary control (R-squared = .04 for both player profile choices and kick directions.)
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This erroneous cognition is central to the cognitive theory of gambling in that it subsumes many of the erroneous thoughts and beliefs captured in observational, interview-based and survey-based studies.

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Relevance Theory

The prevalence of the illusion of control during gambling might reflect the **relevance-oriented nature of human cognition**.
Relevance Theory
Relevance Theory

Smell of gas
Relevance Theory

Smell of gas

Perceptual process

Sperber & Wilson (1986)
Relevance Theory

A computational device applies rules of formal logic in processing related concepts according to **two principles of relevance:**

a) Achieving a large contextual effect maximally facilitating further inferences

b) at small processing cost – i.e., with maximal ease of logical derivation from existing concepts/assumptions
Relevance Theory

Assumption 1: “There is a smell of gas.”

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**Smell of gas**

**Assumption 1:** “There is a smell of gas.”

**Assumption 2:** “There is a gas leak somewhere in the house.”

**Perceptual process**
Relevance Theory

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Perceptual process
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Smell of gas

Perceptual process
Relevance Theory

Assumption 1: “There is a smell of gas.”

Assumption 2: “The gas company is not on strike.”

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Perceptual process
There is money to be won. There is an action space (i.e., opportunity for choice).

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Money can buy so many things... I want it!
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Numerous choice combinations to try... Money can buy so many things... I want it!

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Money can buy so many things... I want it!

Numerous choice combinations to try...

There is money to be won. There is an action space (i.e., opportunity for choice).

These are the only two features of the game.
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The choices and the money might be connected.

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Notably, Relevance Theory predicts only that people will look for strategies.

Other factors determine the strength of any conclusions the player might make regarding the effectiveness of strategies.

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Notably, Relevance Theory predicts only that people will *look for* strategies.

Other factors determine the strength of any conclusions the player might make regarding the *effectiveness* of strategies.