Individual differences in evaluative conditioning and reward responsiveness affect bet-sizes when gambling

Geir Scott Brunborg, Bjørn Helge Johnsen, Ståle Pallesen, Rune A. Mentzoni & Helge Molde

Bergen Group for Treatment Research
Department of Psychosocial Science
University of Bergen
Background

- The process of classical conditioning is viewed as an important factor in the development and maintenance of gambling behavior.¹

Pavlov: Classical conditioning

1. Before conditioning
   - Food (Unconditioned stimulus)
   - Salivation (Unconditioned response)
   - Tuning fork (Neutral stimulus)
   - No salivation (No conditioned response)

2. After conditioning
   - Tuning fork (Conditioned stimulus)
   - Salivation (Conditioned response)
Conditionability

• Individual differences in the acquisition of classical conditioning

Conditionability and gambling

• Individuals who develop gambling problems are characterized among other things by gambling with high risk\(^1\)

• Are individual differences in conditionability related to risk taking in gambling?

Two types of conditioning

• Appetitive conditioning: Conditioning with appetitive stimuli, e.g. winning

• Aversive conditioning: Conditioning with aversive stimuli, e.g. losing
Appetitive conditioning and gambling

Aversive conditioning and gambling

1. Before conditioning
   - Unconditioned stimulus
   - Unconditioned response

2. Before conditioning
   - Neutral stimulus
   - No conditioned response

3. During conditioning
   - Unconditioned stimulus + conditioned stimulus
   - Unconditioned response

4. After conditioning
   - Conditioned stimulus
   - Conditioned response
Appetitive and aversive conditioning and gambling

- Strong appetitive conditionability: More likely to gamble with high risk?
- Weak aversive conditionability: More likely to gamble with high risk?
Research question

• Is there a relationship between conditionability and bet-size preferences when gambling?
Participants

• 100 (51 female, 49 male, mean age 21.01 years [SD = 2.49]) undergraduate students

• All participants SOGS-R\(^1\) score < 5

Evaluative conditioning: The picture-picture paradigm

Pre-evaluation | Conditioning | Post-evaluation

Neutral pictures

Positive pictures
Negative pictures
Groups

No conditioning

N = 13

Conditioning

Only positive
N = 15

Only negative
N = 23

Both positive and negative
N = 32
Bank 3000 kr

Spill 100/100

Du vant 203 kr

Innsats: 90kr

100 kr = €12
3 possible outcomes for each trial

• **Big win:** Bet-size x 4.5, \( p = 10\% \)
  – Bet-size 90kr => big win = 405kr

• **Small win:** Bet-size x 2.25, \( p = 20\% \)
  – Bet-size 90kr => big win = 202.50 kr
  
  – For both big and small win bet was subtracted from bank

• **No win:** Bet subtracted from bank
Results gambling

- For all participants across trials, average bet-size = 31.8 NOK (SD 15.1)

- On average, participants increased their bet-size on the first trial after winning 27.4% of the time.
Conditioning and average bet-size during gambling

- The group that showed conditioning played with significantly larger bet-sizes compared to the group that did not show conditioning, $t(80) = -2.63, p < 0.05$.
  - Conditioning: $M = 33.14$ kr ($SD = 14.43$)
  - No conditioning: $M = 21.91$ kr ($SD = 12.19$)

- They also increased their bet-size significantly more often after winning, $t(80) = -2.20, p < 0.05$.
  - Conditioning: $M = 29.3 \%$, ($SD = 19.2$)
  - No conditioning: $M = 16.9 \%$ ($SD = 14.5$)
Appetitive and aversive conditioning and bet-size during gambling

• No differences in average bet-size, nor in increasing bet-size after winning were found between the three EC sub-groups ("EC only with negative US" vs. "EC only with positive US" vs. "EC with both negative and positive US").
What about individual differences in operant conditionability?

• Punishment sensitivity\(^1\): The degree to which individuals are sensitive to signals of punishment or non-reward

• Reinforcement sensitivity: The degree to which individuals are sensitive to reward stimuli

• Measured by self report scales\(^2\):
  • Includes:
    – Punishment sensitivity
    – Drive: Persistent pursuit of goals
    – Fun seeking: Willingness to approach rewarding events
    – Reward responsiveness: Positive responses to rewards


Correlations: BIS/BAS scales and average bet-size when gambling

<table>
<thead>
<tr>
<th></th>
<th>Average bet-size</th>
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</thead>
<tbody>
<tr>
<td>Punishment sensitivity</td>
<td>.18</td>
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<tr>
<td>Drive</td>
<td>.15</td>
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<tr>
<td>Fun seeking</td>
<td>.08</td>
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<tr>
<td>Reward responsiveness</td>
<td>.24*</td>
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</tbody>
</table>

*p<.05
Are the effects unique?
Hierarchical regression analysis predicting average bet-size when gambling

<table>
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<tr>
<th>Step</th>
<th>Variables</th>
<th>$\beta$</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Conditioning (0 = no, 1 = yes)</td>
<td>.28*</td>
</tr>
<tr>
<td>2</td>
<td>Conditioning (0 = no, 1 = yes)</td>
<td>.25*</td>
</tr>
<tr>
<td></td>
<td>Reward responsiveness</td>
<td>.25*</td>
</tr>
</tbody>
</table>

Final model $R^2 = .14$, *$p<.05$
Discussion: Conditioning and gambling

- Individuals who do not show conditioning may become less influenced by winning during gambling
  - May result in a reduced likelihood of increasing their bet-size after winning
  - …which in turn results in lower average bet-size.
No differences between conditioning groups

• No differences in average bet-sizes nor percentage of increases in bet-size after winning were found between the three conditioning groups

• Differences in average bet-size may be better explained by whether or not individuals become conditioned
Discussion: BAS RR and gambling

- Reward responsivness was positively associated with average bet-size.
- Reward responsiveness concerns the degree to which individuals experience positive emotions as a result of experienced rewards\(^1\).
- Highly reward responsive individuals may prefer large bet-sizes because they yield greater wins, which in turn ensures that the positive emotions are optimal.

Conclusion

• Conditioning is positively associated risk taking when gambling

• Reward responsiveness is also positively associated with risk taking when gambling

• This may have implications for the development of gambling problems
  – Future studies may find that individuals who do not condition easily may be less likely to develop gambling problems.