CENTRE for GAMBLING RESEARCH at UBC

"I shouldn't have taken that bet!": Counterfactual thinking in gambling disorder

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23-25 October 2019
Lisbon Addictions 2019

Disclosure Statement

The Centre for Gambling Research at UBC is supported by the Province of BC government and the British Columbia Lottery Corporation (a Crown Corporation).

This study was funded by the Centre for Gambling Research. LC also holds grants from NSERC and BC Ministry of Finance.

Honoraria (speaker travel / reviewing): National Association for Gambling Studies (Australia), National Center for Responsible Gaming (US), Gambling Research Exchange Ontario (Canada).

Regret and Counterfactual Thinking

Regret: an intense & aversive emotion arising from "what might have been" (e.g. Roese 1997)

Requires 'counterfactual thinking': the process of mentally simulating alternative versions of events

Silver: *upward* counterfactual
"I nearly got the gold" = regret

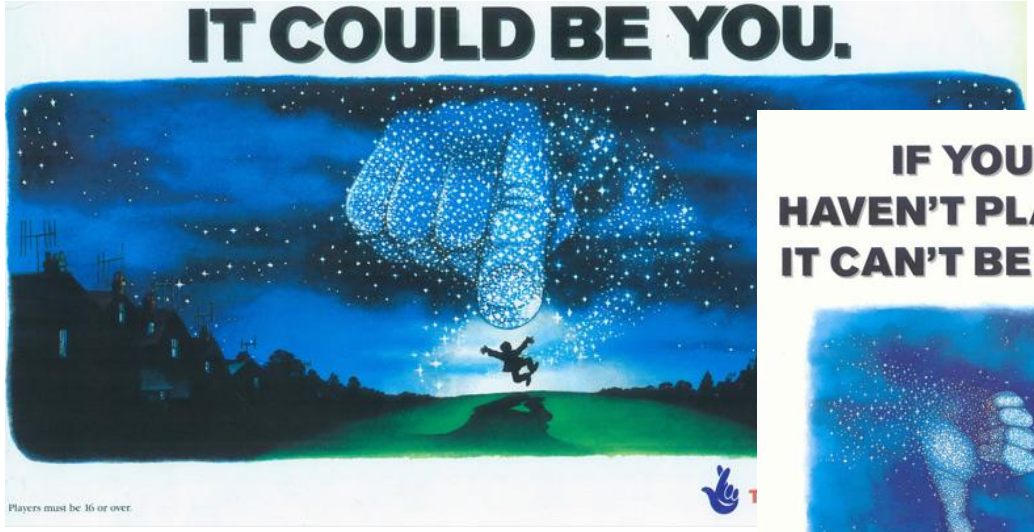
Bronze: *downward* counterfactual
"I nearly didn't get a medal" = relief

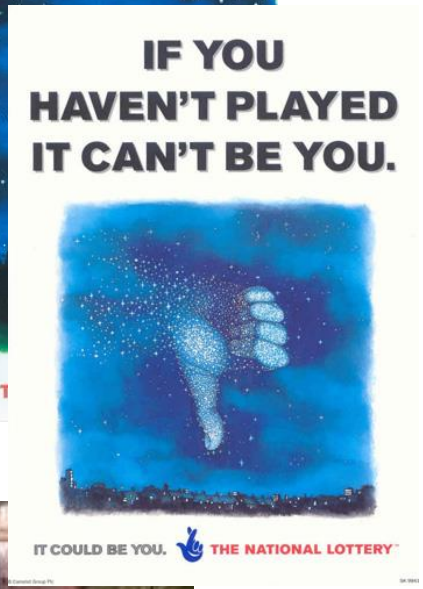
Medvec & Gilovich 1997

Regret and Gambling: Lotteries

- Lottery adverts frequently evoke CF and regret anticipation

- In Dutch postcode lottery, anticipated regret identified as key motive for repeat purchases (Zeelenberg & Pieters 2004)





Opposing Predictions

- Neuropsychological studies in GD point to
  - Impaired decision-making (e.g. IGT, Kovacs et al 2017)
  - Dysregulation of orbitofrontal cortex, a region known to be necessary for regret & regret anticipation (Camille et al 2004)

  → *Hypothesis: Impaired regret in GD*

- Cognitive distortions are increased in GD
  - E.g. GRCS, GBQ
  - Cognitive restructuring as effective treatment
  - Several of these effects involve and require counterfactual thinking…

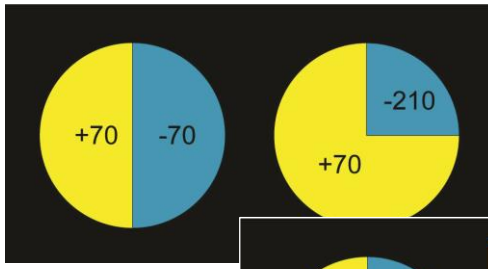
  → *Hypothesis: Enhanced regret in GD*

Methods: Participants

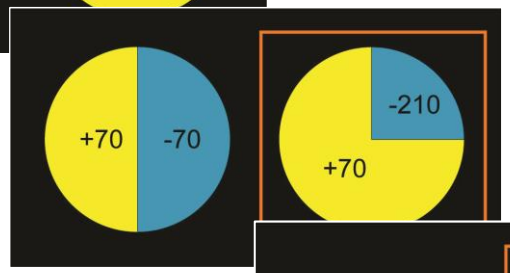
	Gambling Disorder	Healthy Controls	
	46	25	
Gender	25M : 20F : 1 other	14M : 10F : 1 other	ns
Age	42.6 (12.7)	36.2 (13.7)	$p = .051$
PGSI	17.0 (4.9)	0.4 (0.7)	$p < .001$
NART	93.8 (8.3)	91.7 (9.0)	ns
GRCS	84.4 (23.8)	34.1 (10.7)	$p < .001$

- GD recruited via advertising and BC treatment program
- Diagnosis by SCID-IV interview + PGSI > 7
- Preferred form of gambling was slots in 46%
- Controls mostly non-gamblers (8 with PGSI 1-2)
- 2.5hr lab assessment, see also Kennedy et al (2019 *Psychophysiology*, data on interoception and HRV)

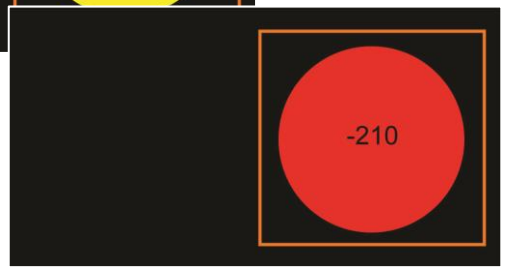
Methods: Regret Task



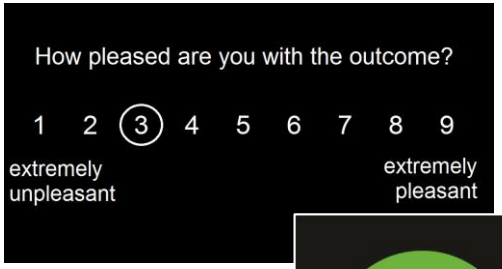
CHOICE



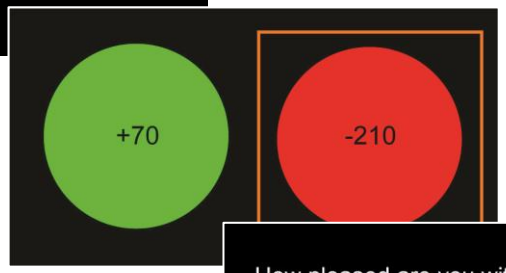
OBTAINED OUTCOME



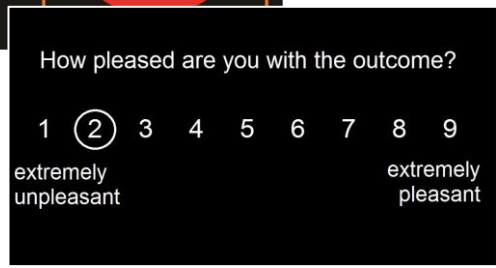
RATING 1



NON-OBTAINED OUTCOME



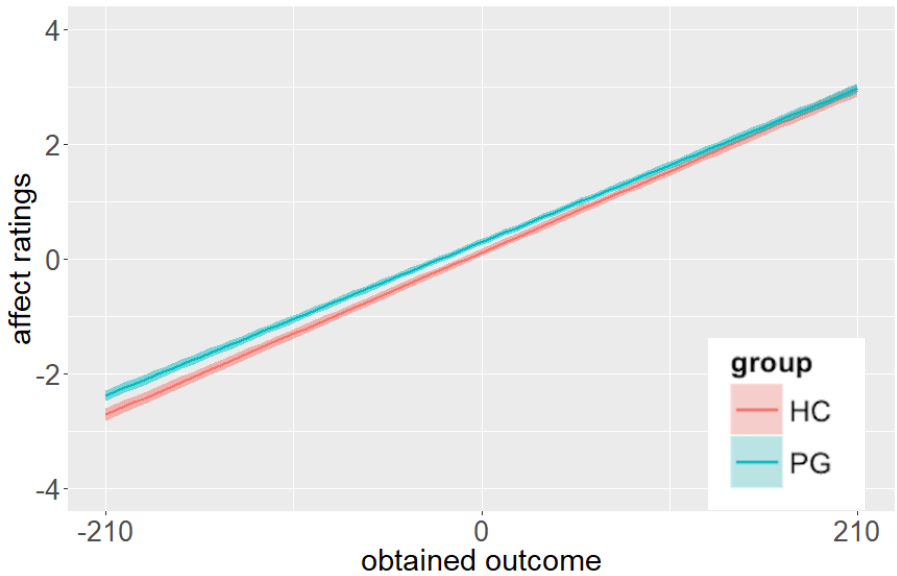
RATING 2



78 trials. Task from Mellers et al 1999, Camille et al 2004, Gillan et al 2014

Results: Ratings

RATING 1: OBTAINED OUTCOME



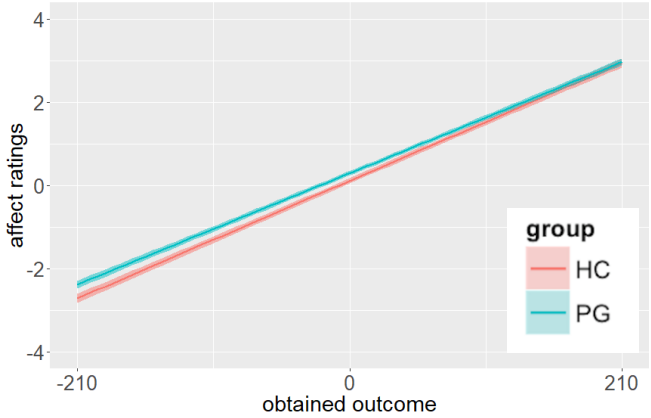
Obtained Outcome b = 0.0135, p < .001,

Group × Obtained Outcome b = -0.000708, p = .009

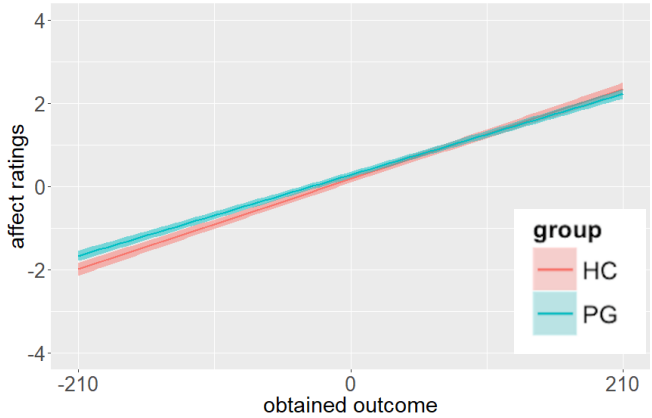
→ GD group less sensitive to obtained outcomes

Results: Ratings

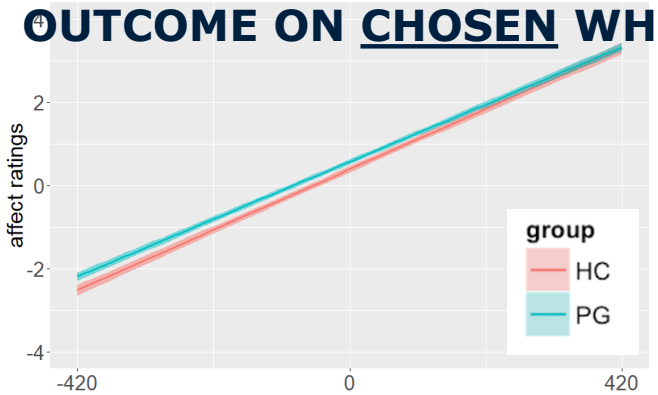
RATING 1: OBTAINED



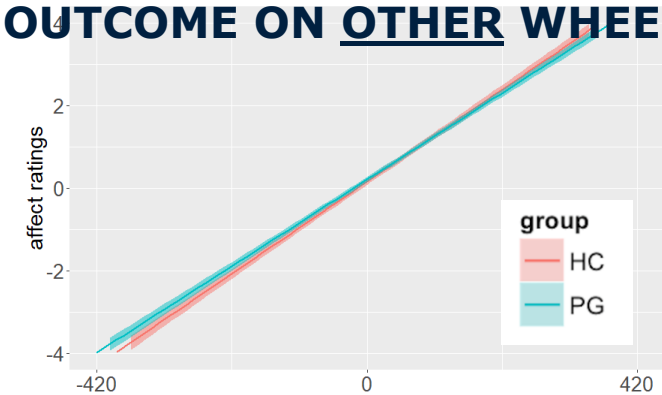
RATING 2: OBTAINED



RATING 1: NON-OBTAINED OUTCOME ON CHOSEN WHEEL



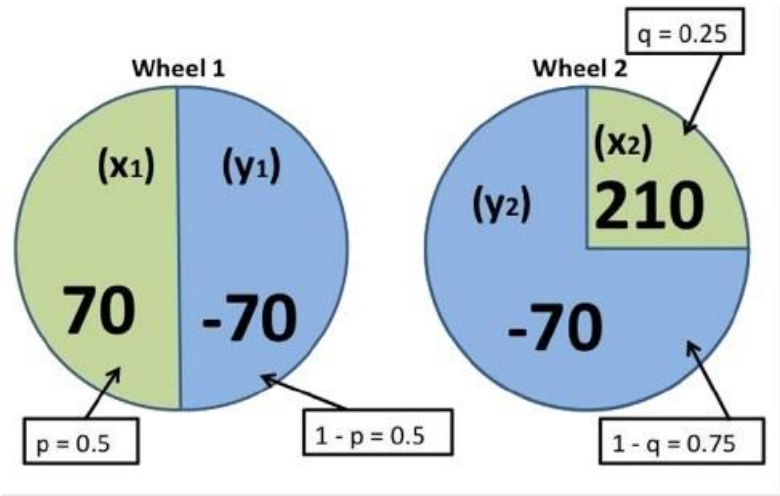
RATING 2: NON-OBTAINED OUTCOME ON OTHER WHEEL



All affect ratings are significantly blunted in GD group

→ *not specific to counterfactual emotions*

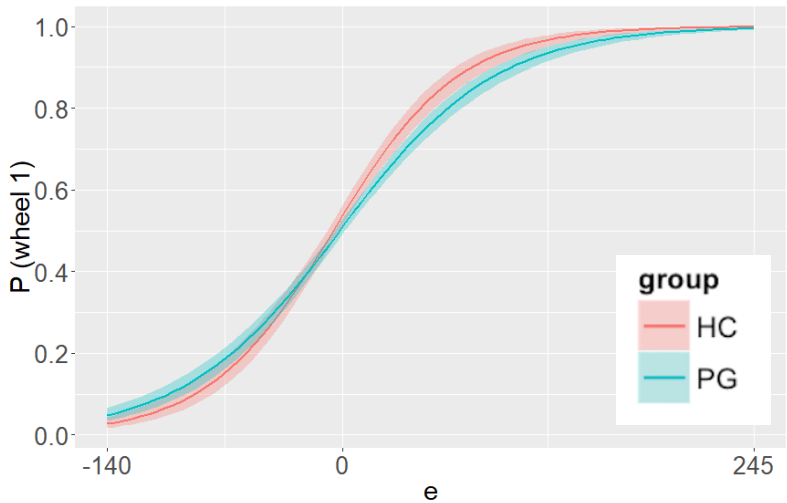
Methods: Choice Parameters



From Gillan et al (2014 Biol Psych) On each wheel, *x* is the better outcome

Parameter	Wheel 1 equation	Wheel 1 value	Wheel 2 value	Comparison
Expected value, *e*	$px_1 + (1-p)y_1$	0	0	$e = EV_{W1} - EV_{W2}$
Risk variance, *v*	$p(x_1 - EV_{W1})^2 + (1-p)(y_1 - EV_{W1})^2$	4900	14700	$v = v_{W2} - v_{W1}$
Regret anticipation, *r*	$y_1 - x_2$	-280	-140	$r = r_{W1} - r_{W2}$

Results: Choice Parameters



1. Expected value sensitivity, *e*

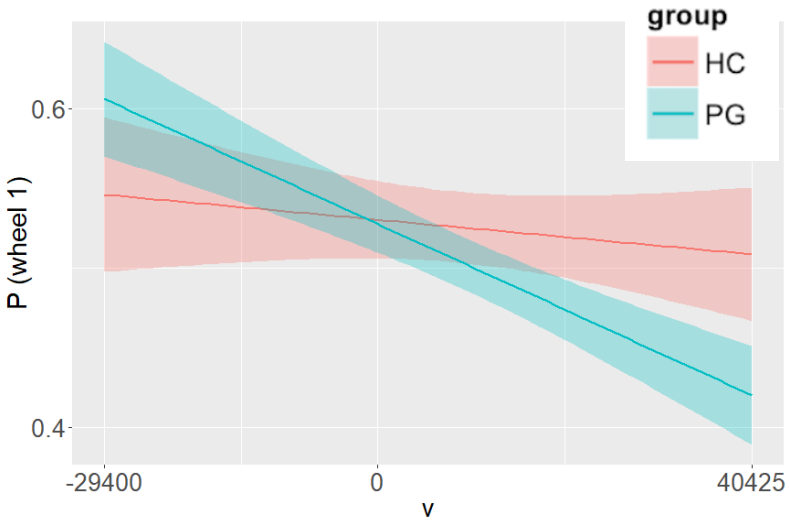
e: b = 0.0231, *p* < .001

Group × *e: b* = -0.00515, *p* = .017

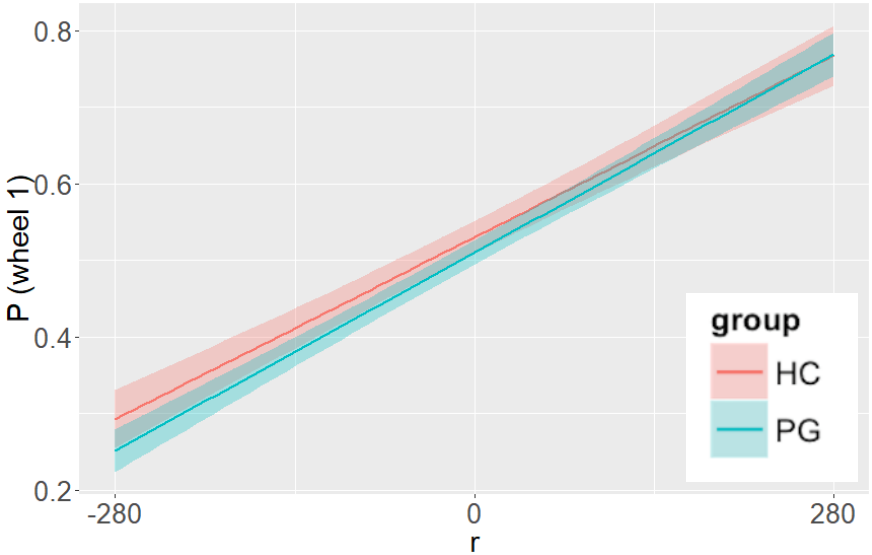
2. Risk variance sensitivity, *v*

v: b = -0.0000511, *p* = .021

Group × *v: b* = -0.0000118, *p* < .001



Results: Choice Parameters



3. Regret anticipation, *r*

r: b = 0.00231, *p* < .001

Group × *r: b* = 0.000761, *p* = .039

→ GD group are: less sensitive to expected value
more risk preferent
greater regret anticipation

Results: Correlations

	PGSI	GRCS	Age	Smoking	e	v	r	Rating: Obtained	Rating: Agent CF
PGSI	--								
GRCS	.173	--							
Age	.056	-.315*	--						
Smoking	.266	-.203	-.034	--					
e	-.168	.177	-.273	-.208	--				
v	.000	-.145	.228	.114	-.030	--			
r	-.256	-.198	.032	-.049	.348*	.085	--		
Rating: Obtained	-.001	.235	-.007	-.177	.309*	.105	.144	--	
Rating: Agent CF	-.132	-.092	-.101	.045	.390*	.161	.326*	.712**	--

- Gambling severity and gambling distortions not significantly related to choice parameters, including *r*
- Regret anticipation r correlated with experienced regret on rating 2 (i.e. agent counterfactual term)

Conclusions

- Individuals with gambling disorder show
  - generalized blunting on affective ratings (not specific to regret)
  - Greater sensitivity to regret anticipation (other with other choice differences)
- Results mirror those reported in OCD by Gillan et al (2014): increased rating sensitivity but reduced regret anticipation
- Links regret to literature on gambling distortions and decision-making
  - Possible use of regret in public messaging of gambling harms

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a place of mind
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Department of Psychology

Regret and Gambling 2: Near Misses

- Gamblers view near-misses as salient events that often encourage further gambling
- Near-wins elicit upward counterfactual thoughts and negative affect (regret)
- Wu et al (2017): individual differences in near-miss susceptibility (both near-wins and near-losses) was correlated with a behavioural economic regret task
- Some evidence that problem gamblers are hyper-sensitive to near-misses (e.g. fMRI: Sescousse et al 2016)

Wu et al, JBDM 2017

Acknowledgements

These studies were conducted in the Department of Psychology, University of Cambridge, U.K.

Yin Wu received a fellowship from the China Scholarship Council, and the Treherne Studentship in Biological Sciences from Downing College, Cambridge.

The Centre for Gambling Research at UBC is funded by the Province of BC government and the British Columbia Lottery Corporation, a Canadian Crown Corporation.

With thanks to Mike Aitken (King's College London), Erik van Dijk (Leiden University, Netherlands), Hong Li (Shenzhen University, China) and Guillaume Sescousse (Donders Institute, Netherlands)