Psychological Factors Associated with Attentional Biases in EGM Players

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Disclosures

- No conflicts to declare

Overview

- Cognitive processes in addiction
- Attentional biases (AB)
- Methods for measuring AB
- Eye-tracking
- Colour vs. Content
- AB and Preferred Gambling
- Current Study

Cognitive Processes

- Cognition plays an important role in gambling disorder (GD)
- *Explicit* Cognition
  - Irrational thoughts
  - Outcome expectancies
  - Motives
- *Implicit* Cognition
  - Below conscious awareness and without introspection
  - Become automatic through repeated use
  - Cues can trigger the process, leading to behavior

Attentional Biases

- Attentional Bias (AB)
  - Preferentially attend to stimuli over time from repeated exposures
  - Drug/gambling stimuli > competing stimuli
  - Automatic process
  - AB could lead to increased conscious awareness of the drug/gambling
  - Well established in alcohol, tobacco, cannabis, and illicit drugs

AB in Gambling

- Honsi et al. (2013) systematic review
  - Mixed results of AB in gambling
  - Most studies (7 of 11) indicated an AB for gambling over neutral stimuli
  - No consistency in methods
    - Stroop tests, reaction time tasks, attentional blink, dual tasks, lexical salience tasks, event-related potentials, and flicker-induced change blindness tests
  - Two studies using eye-gaze tracking

Eye-gaze Tracking

Eye-gaze Tracking

- Eye-gaze Tracking
  - EyeLink 1000 eye-tracking system
  - Infrared camera records pupil and corneal reflection
- Advantages
  - Direct measure of attention (eye-gaze and attention are tightly coupled)
  - Real-time monitoring of attention
  - Numerous possible DVs
  - Initial fixations & maintenance of attention

Prior Study: Colour or Content?

- No standards for choosing eye-tracking stimuli
- Internal validity of AB methods questioned
- Miller & Fillmore (2010)
  - Twenty-five adult drinkers
  - Visual probe task & eye-tracking
  - 20 alcohol images, 20 neutral
  - Half ‘complex’ (i.e., real-life scenes)
  - Half ‘simple’ (i.e., against a bare wall)
  - 80 trials with paired images (1000ms)
  - DV: total fixation times
  - Result: Simple images = AB

Prior Study: Colour or Content?

- Harrison & McCann (2014)
  - Explored ‘low-level’ features of alcohol stimuli
  - Visual probe task
  - Twenty-four regular drinkers
  - Stimuli
    - 8 practice trials; 84 test trials (500ms)
    - 14 image pairs (alcohol + neutral)
    - All pairs had one ‘greyscale alcohol image’
      - 1) greyscale neutral same size
      - 2) greyscale neutral 25% larger
      - 3) colour neutral same size
  - Result: No AB when neutral was colour

Prior Study: Colour or Content?

- McGrath, Sears, & Garlicka
  - Laboratory experiment
  - Research Question:
    - “How important is content vs. colour?”
    - High-level features vs. low-level features
  - Recruited video lottery terminal/slot players (vs. controls)
    - Inclusion: Played a VLT/slot for money past 6 months
    - Control: Never played a VLT/slot

Prior Study: Colour or Content?

- Participants
  - 62 participants (69% female; *M*=21.4 years)
  - 32 VLT/slot players, 30 controls
  - PGSI score (*M*=0.84, *SD*=2.0)
  - Days played VLTs past 6 months (*M*=4.5, *SD*=4.9)
  - Money on VLTs past 6 months (*M*=$97, *SD*=$181)
- Procedure
  - 48 experimental trials, 8 seconds per trial
  - 12 were gambling (25% of the time)
  - Course credit or gift card

Prior Study: Colour or Content?

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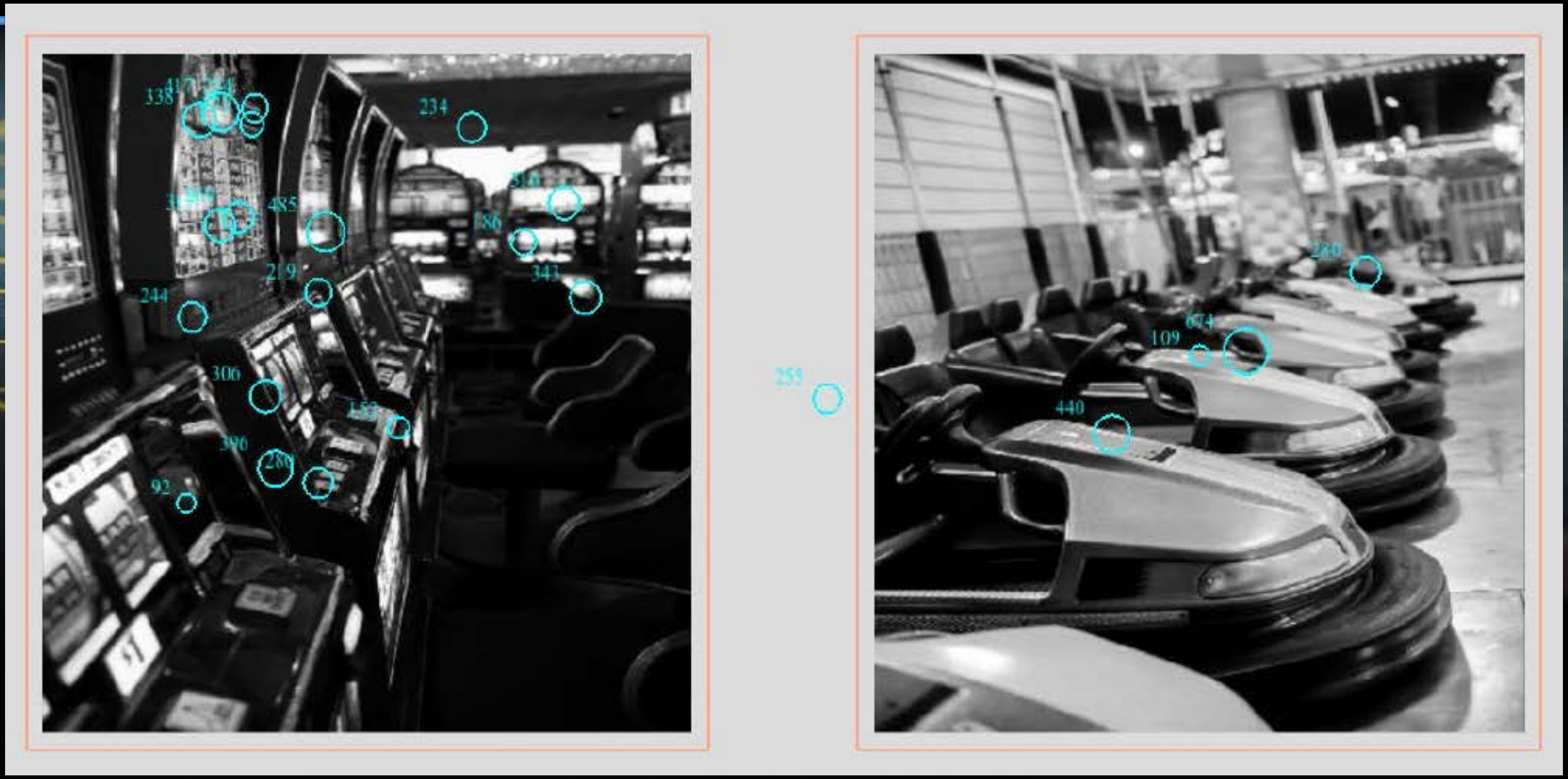
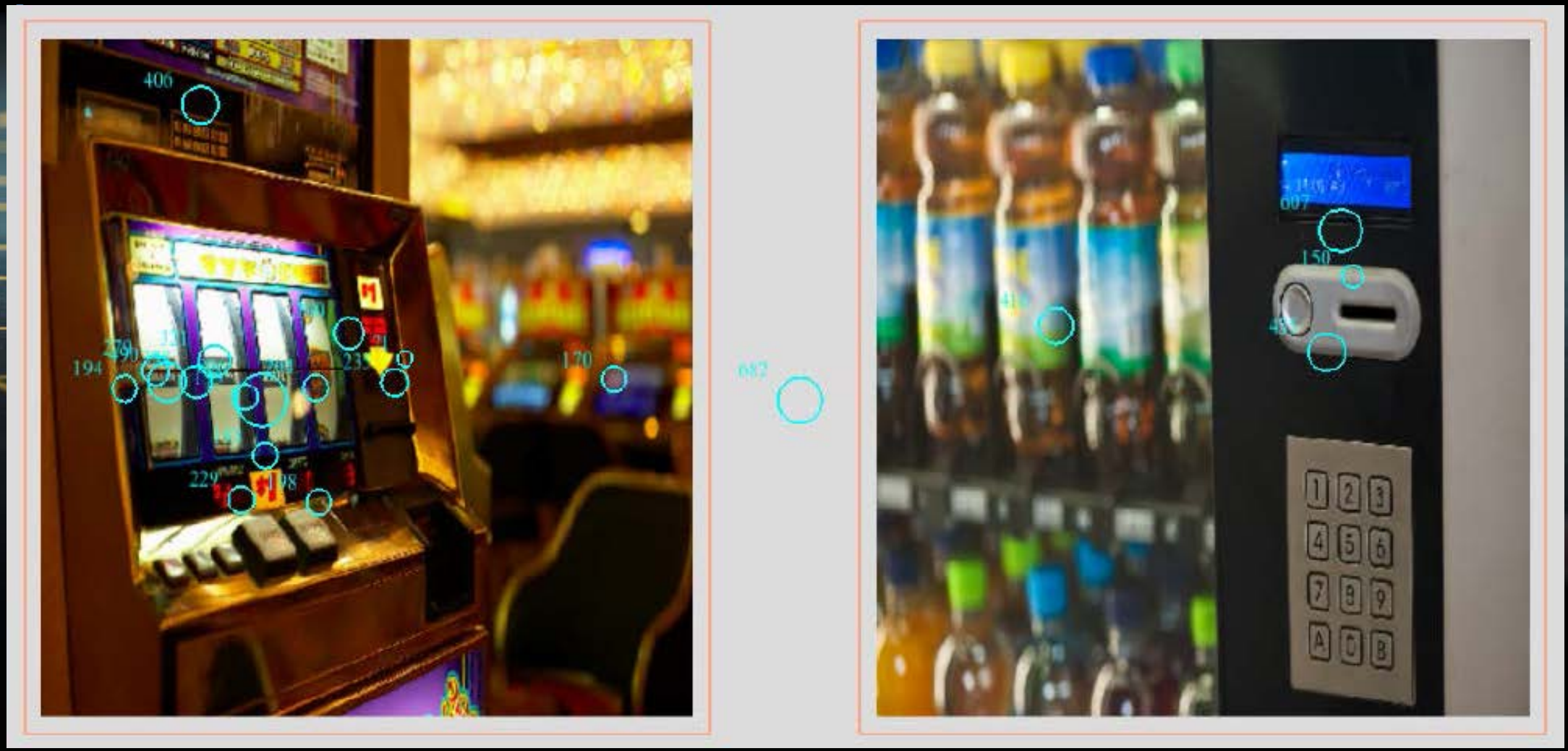


Prior Study: Colour or Content?



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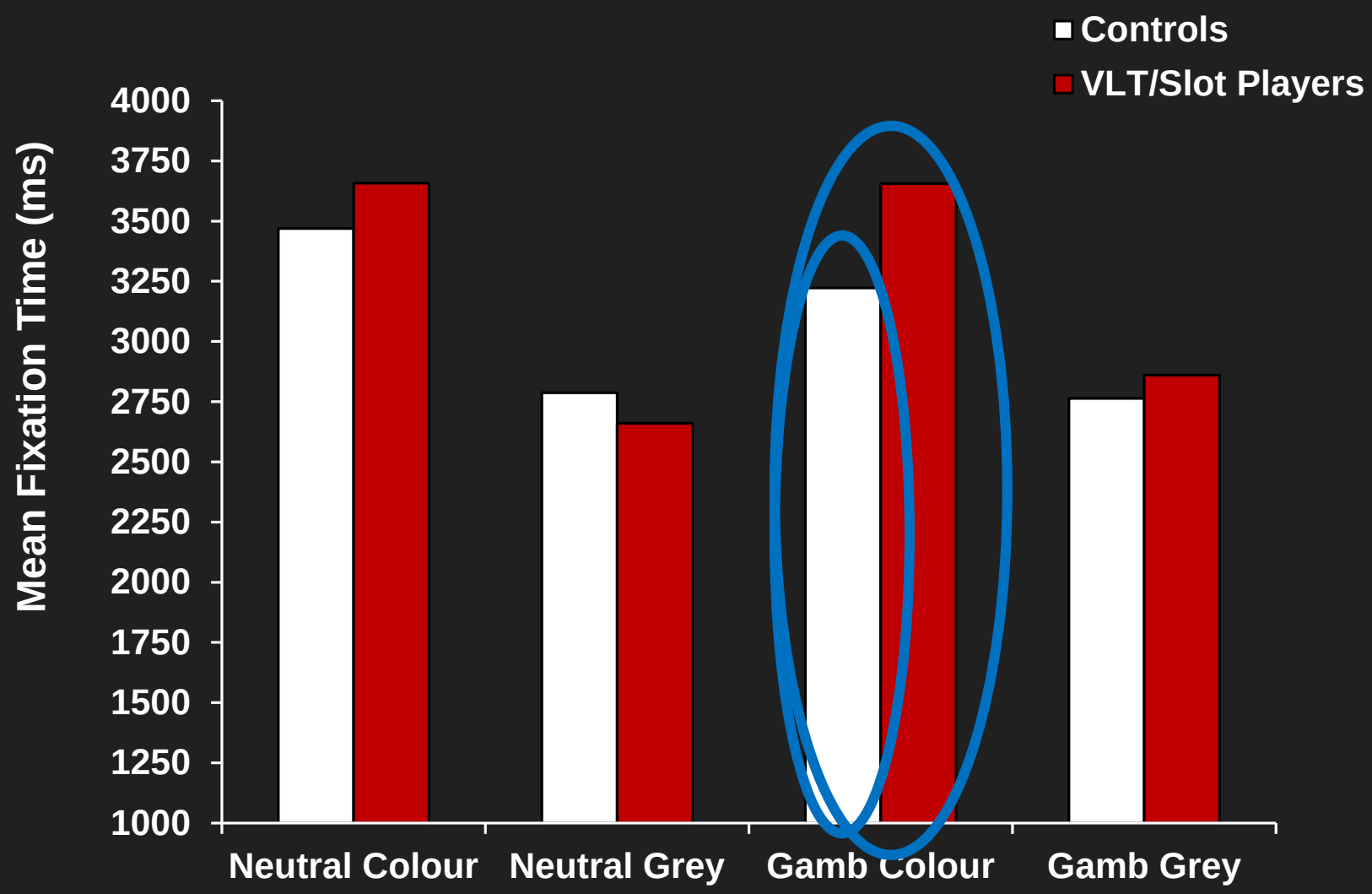


Prior Study: Gambling Type

- Gamblers are heterogeneous
- Strategic (skill) vs. Non-strategic (chance)
  - Differ demographically
  - Gamble for different reasons
  - Differing rates of DG
- Yet, the literature often lumps ‘gamblers’ together
- AB develops through classical conditioning
  - Experience with the drug/form of gambling is necessary

Prior Study: Gambling Type

- Brevers et al. (2011)
  - Paired eye-tracking with a change detection task
  - ‘Gamblers’ were recruited
- Grant & Bowling (2014)
  - Paired eye-tracking with a dot-probe task
  - Non-DGs were recruited
- ABs were detected
- However, stimuli were varied
  - Roulette, horses, dice, cards, sports, etc.

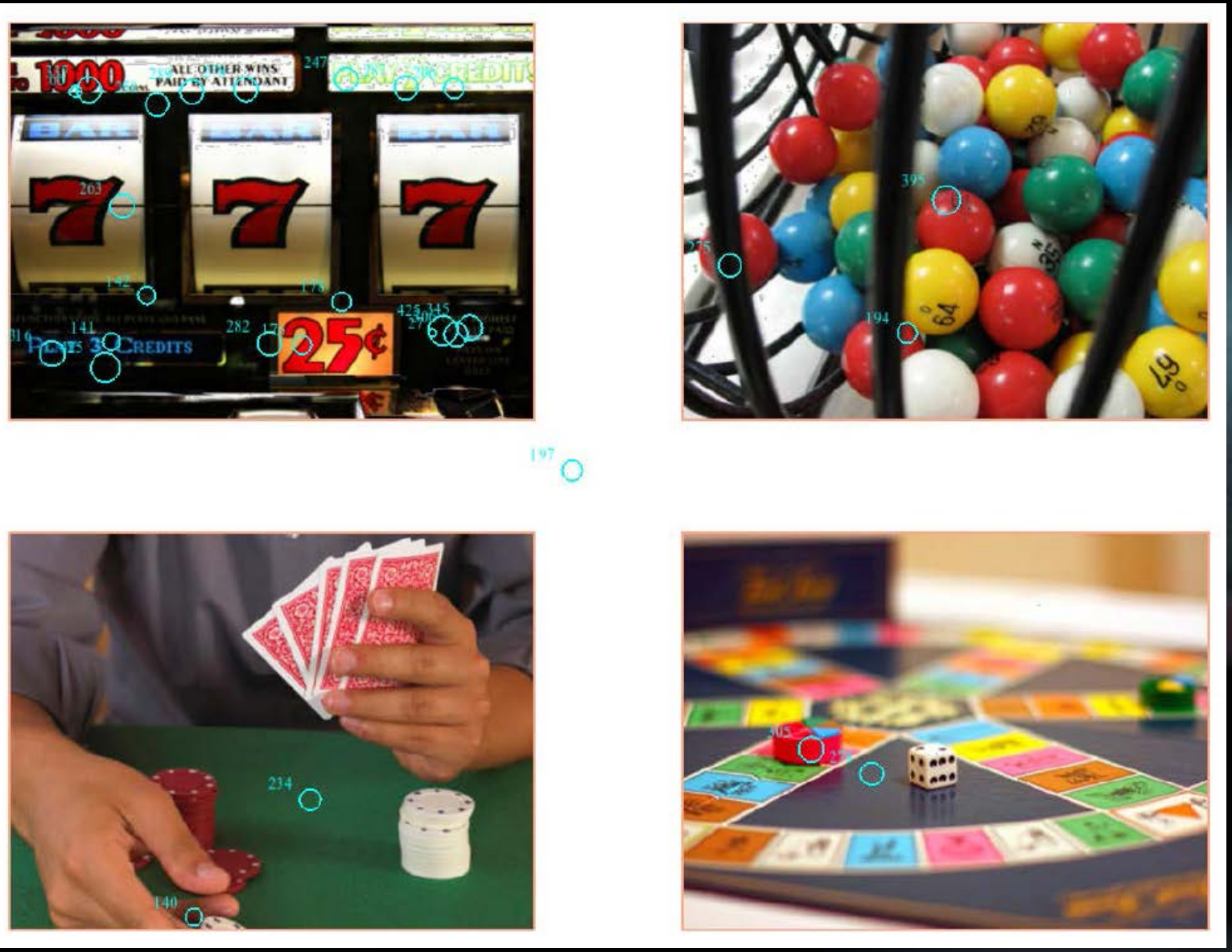
Prior Study: Gambling Type

- McGrath, Meitner, & Sears (2018)
  - Laboratory experiment
  - Research Question:
    - "How important is preferred gambling in AB?"
    - Strategic vs. non-strategic gambling
  - Recruited young male gamblers & controls (18-35 years)
    - (1) VLT/slot: 'preferred' form + past 3 months + no poker past 3 months
    - (2) Poker:'preferred' form + past 3 months + no VLTs/slots past 3 months
    - (3) Control: no gambling past 12 months (except lottery)

Prior Study: Gambling Type

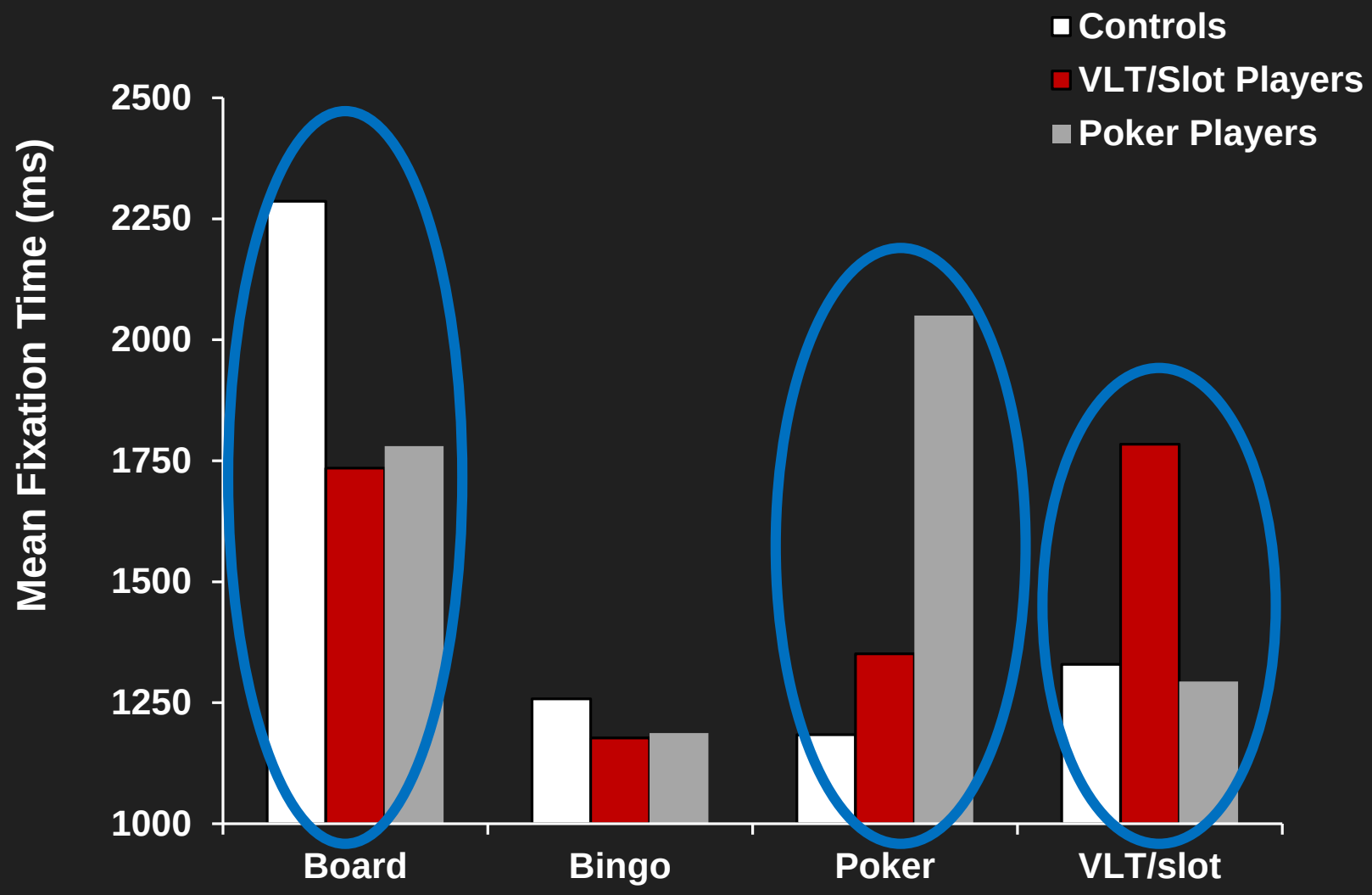
- Participants
  - 79 participants (*M*=21.9 years)
  - 19 VLT/slot, 31 Poker, 30 Controls
  - PGSI score (*M*=1.6, *SD*=2.6)
  - Hours spent gambling past 30 days (*M*=8.4, *SD*=17.5)
- Procedure
  - 25 experimental trials, 8 seconds per trial
  - Always 1 poker; 1 board game; 1 VLT and 1 bingo image displayed
  - $20 gift card

Prior Study: Gambling Type



Prior Study: Gambling Type

Mean Fixation Time



Conclusions

- Study 1
  - Low-level features such as colour grab attention
  - Gamblers did *not* preferentially attend to Greyscale gambling images
  - Gamblers attend to combination of gambling + colour
- Study 2
  - Very evident AB toward ‘preferred’ gambling
  - Further evidence of heterogeneity in gambling
  - Board games preferentially attended to (novelty?)
  - A competing form of gambling (Bingo) was not attended to

Current Study

- Generally accepted that AB develops through reward learning
- Also, AB predicts later relapse following abstinence
- Yet, little is known regarding correlates of AB

Current Study

- Several factors likely related to AB
  - Severity
- Grant & Bowling (2015): Non-DGs
  - Gambling frequency
  - Gambling attitudes and beliefs
- Substance use (Field & Cox, 2008)
  - Craving following abstinence
  - Expectation of availability
  - Trait impulsivity

Current Study

- Aims
  - Assess cognitive and personality correlates in AB for gambling
- Variables
  - Gambling severity
  - Expectancies
  - Subjective craving
  - Impulsivity

Methods

- Participants
  - 80 participants (51% Female, *M*=21.9 years)
  - 51 EGM players, 29 Controls
    - Played an EGM over the past 3 months
    - Prefer EGMs over other forms of gambling
  - PGSI score (*M*=4.4, *SD*=4.3)

Methods

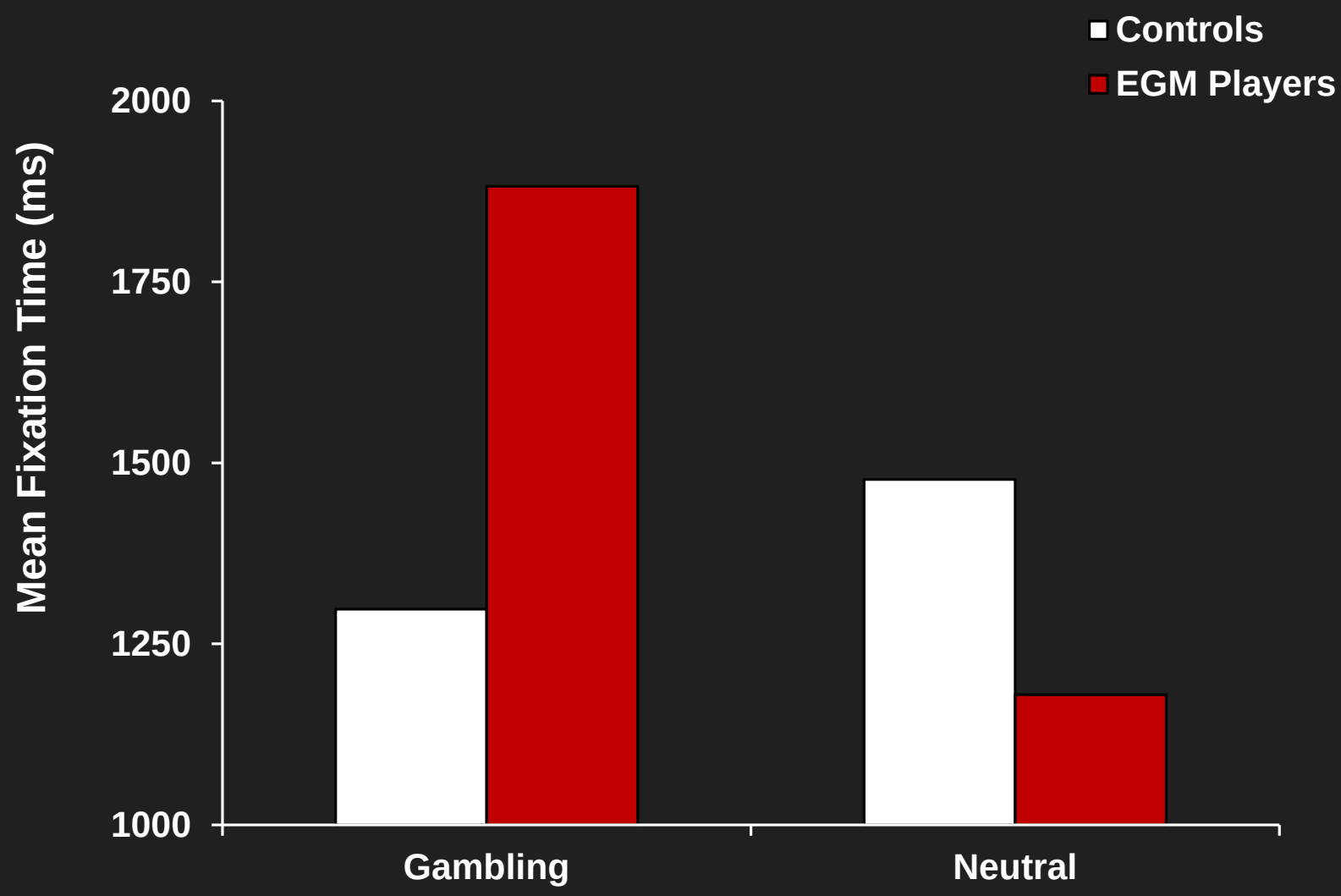
- Eye-tracking Procedure
  - 84 experimental trials, 6 seconds per trial
- Neutral vs. Gambling Images
  - Gambling Trials (1 Gambling Photo; 3 Neutral) = 28 trials (33% of the time)
  - Neutral Trials (4 Neutral Photos) = 56 trials
  - Photos matched on colour, design and content
  - Gambling photos randomized equally across all four quadrants


BONUS
BONUS
COLLECT

Methods

- Gambling Measures
  - Problem Gambling Severity Index
  - Gambling Craving Scale
  - Gambling Expectancies Questionnaire
  - Gambling Motives Questionnaire – Financial
- Other Measures
  - UPPS-P
  - Beck Depression Inventory
  - AUDIT
  - DAST

Existence of AB



Regression: GACS Craving

	Unstandardized Coefficient	SE	Standardized Coefficient	T-stat	P
Intercept	38.9	945.9		0.04	0.97
Anticipation	440.0	232.6	0.31	1.89	0.06
Desire	329.1	232.9	0.27	1.41	0.16
Relief	-490.3	258.3	-0.37	-1.89	0.06

Outcome: Mean Fixation Time Gambling Images (ms)

Regression: GEQ Expectancies

	Unstandardized Coefficient	SE	Standardized Coefficient	T-stat	P
Intercept	1942.0	2219.6		0.88	0.39
Enjoyment	-51.3	442.4	-0.02	-0.12	0.91
Money	-479.9	303.1	-0.31	-1.58	0.12
Overinvolvement	611.6	311.7	0.36	1.96	0.05
Emotional Impact	169.5	273.8	0.10	0.62	0.54
Self-Enhancement	-366.4	308.3	-0.21	-1.19	0.24

Outcome: Mean Fixation Time Gambling Images (ms)

Regression: GMQ Motives

	Unstandardized Coefficient	SE	Standardized Coefficient	T-stat	P
Intercept	2265.3	1681.5		1.35	0.19
Enhancement	-128.7	304.7	-0.07	-0.42	0.68
Social	731.5	576.1	0.21	1.27	0.21
Coping	204.9	596.2	0.06	0.34	0.73
Financial	-704.6	457.7	-0.26	-1.54	0.13

Outcome: Mean Fixation Time Gambling Images (ms)

Regression: UPPS-P

	Unstandardized Coefficient	SE	Standardized Coefficient	T-stat	P
Intercept	3114.7	1669.7		1.87	0.07
Negative Urgency	154.4	674.1	0.05	0.23	0.82
Premeditation	-336.1	649.9	-0.10	-0.52	0.61
Perserverance	526.3	778.6	0.15	0.68	0.50
Sensation Seeking	-623.3	435.9	-0.21	-1.43	0.16
Positive Urgency	-100.6	552.6	-0.04	-0.18	0.86

Outcome: Mean Fixation Time Gambling Images (ms)

Conclusions

- Overall Findings
  - An AB for gambling images over neutral was detected for gamblers
  - Consistent with other findings, craving was positively associated with AB (anticipation)
  - Not being able to stop one's gambling behavior (overinvolvement) associated with AB
  - No significant impulsivity traits

- Preliminary data...

Conclusions

- Future Directions
  - Strength of gambling AB vs. other reinforcers
  - AB for gambling cues in the periphery
  - Longitudinal analyses of AB
  - AB in co-morbid addiction
    - Drug challenge paradigms
  - Measuring attention to video stimuli

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Thank you for listening!