

*Players' Arousal and Reward Signatures to  
Loot Boxes:*

*"If it Looks Like a Duck, Quacks like a Duck  
and Walks Like a Duck, It's a Form of  
Gambling"*

Mike Dixon, Chanel Larche and Katrina  
Chini



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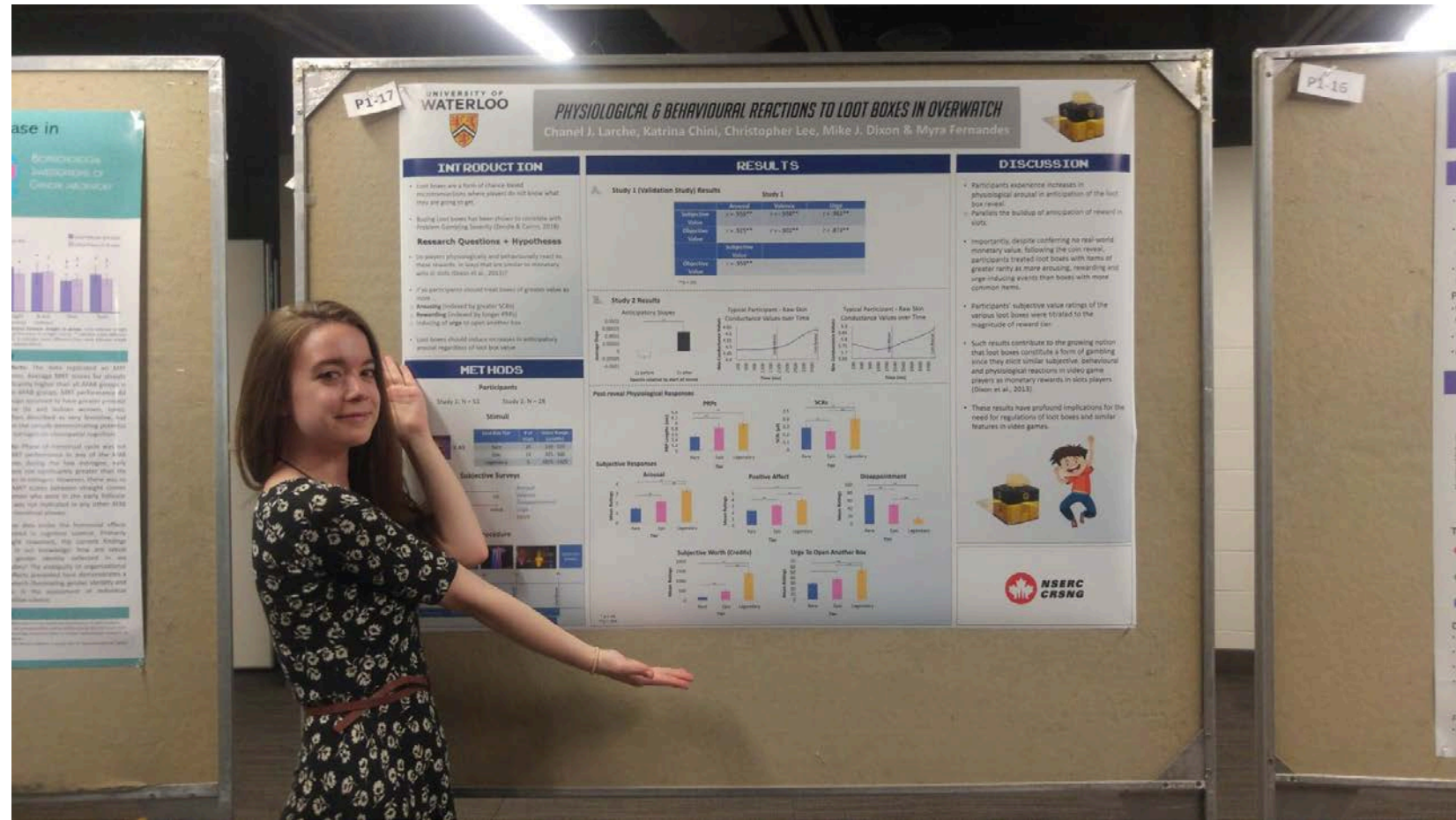
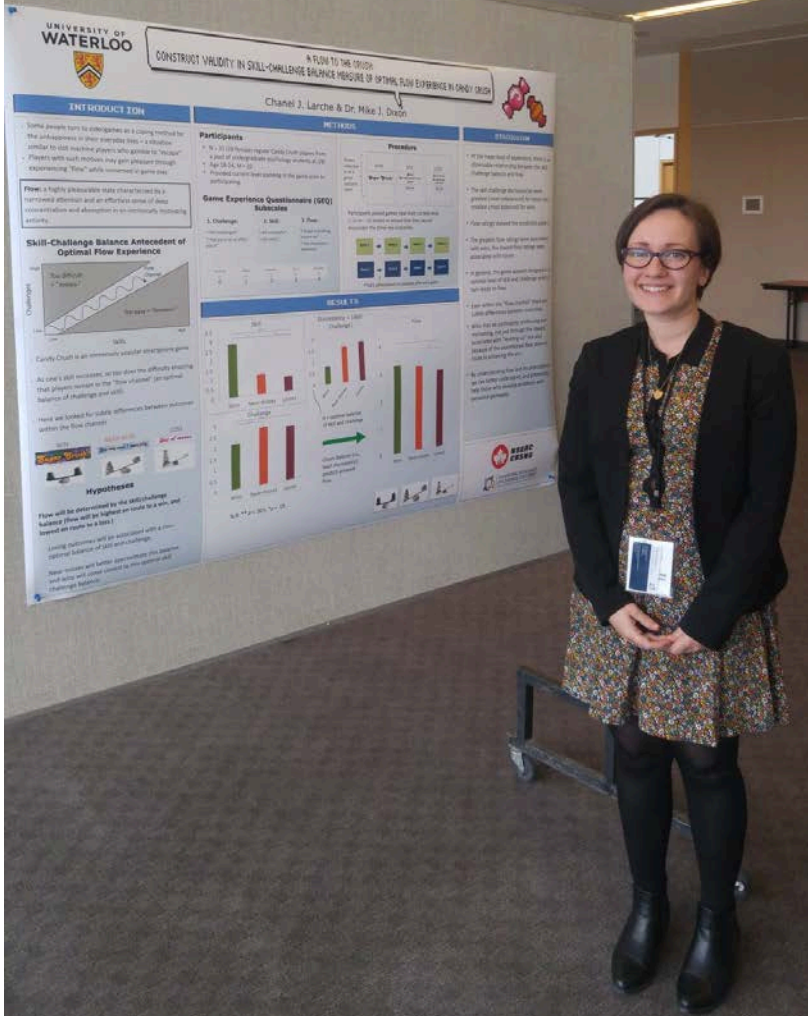
**NSERC**  
**CRSNG**

# Disclosure of Potential Conflict of Interest

## Presenter Disclosure

- I have no potential conflicts of interest for my presentation.

# Dramatis Personae



# What are loot boxes?

- Chests/crates/boxes containing in-game items that can either give you an advantage in game play, or are purely cosmetic (“skins”)



2,535



PREV

49 ANNIVERSARY LOOT BOXES

NEXT

OPEN LOOT BOX

SHOP

6 friends playing Overwatch.

PRESS ENTER TO CHAT

ESCAPE BACK

2,535



PREV 49th ANNIVERSARY LOOT BOXES NEXT

6 friends playing Overwatch.

PRESS ENTER TO CHAT

OPEN LOOT BOX

SHOP

ESCAPE BACK

# Loot box characteristics



- 1) Some loot boxes can be earned through game play – these are not of concern here
- 2) We will focus on Loot boxes purchased via “microtransactions” with real money
- 2) what is inside the box ranges from common (not valuable) to extremely rare (valuable to the player)
- 3) Items are randomly selected



# Loot boxes as a form of gambling

Anonymous Reddit post...

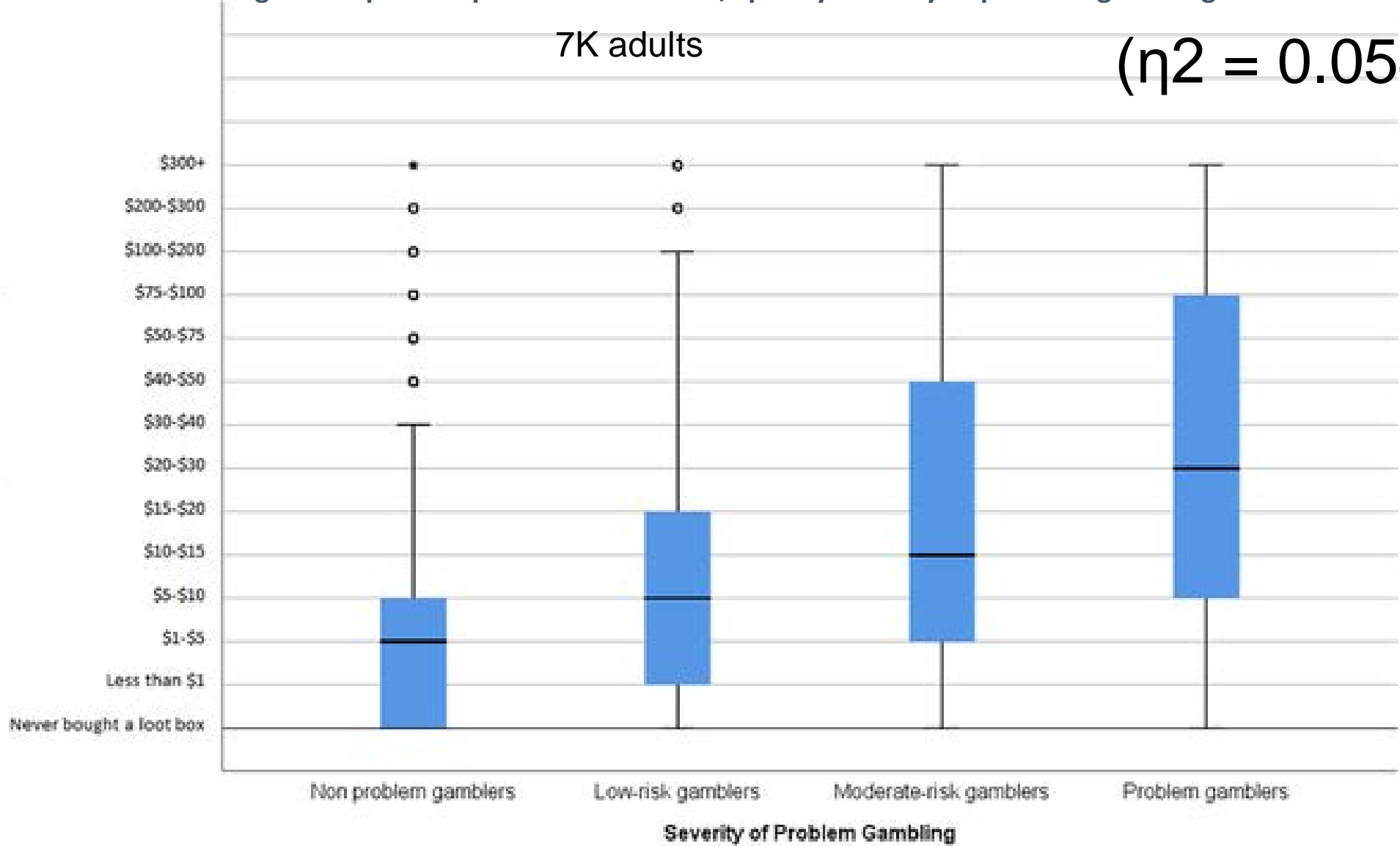
“When your brain works like mine, you can't stop. There is always the little voice of the back of your head that goes ‘Yeah no man, you should've quit like 30 boxes ago’”, but even when you're telling yourself to stop, you're still clicking buy, and you're still opening boxes”.

[Heather Alexandra](#) writes ... “To some, loot boxes may be a gameplay issue or a consumerist concern. To me, they’re far more seriously a moral issue. I know, because I have fallen for them. I don’t know how else to say this, but I have a gambling problem. I didn’t find this out at a casino. I found this out playing games”.



Fig 1. Box-plot of spend on loot boxes, split by severity of problem gambling.

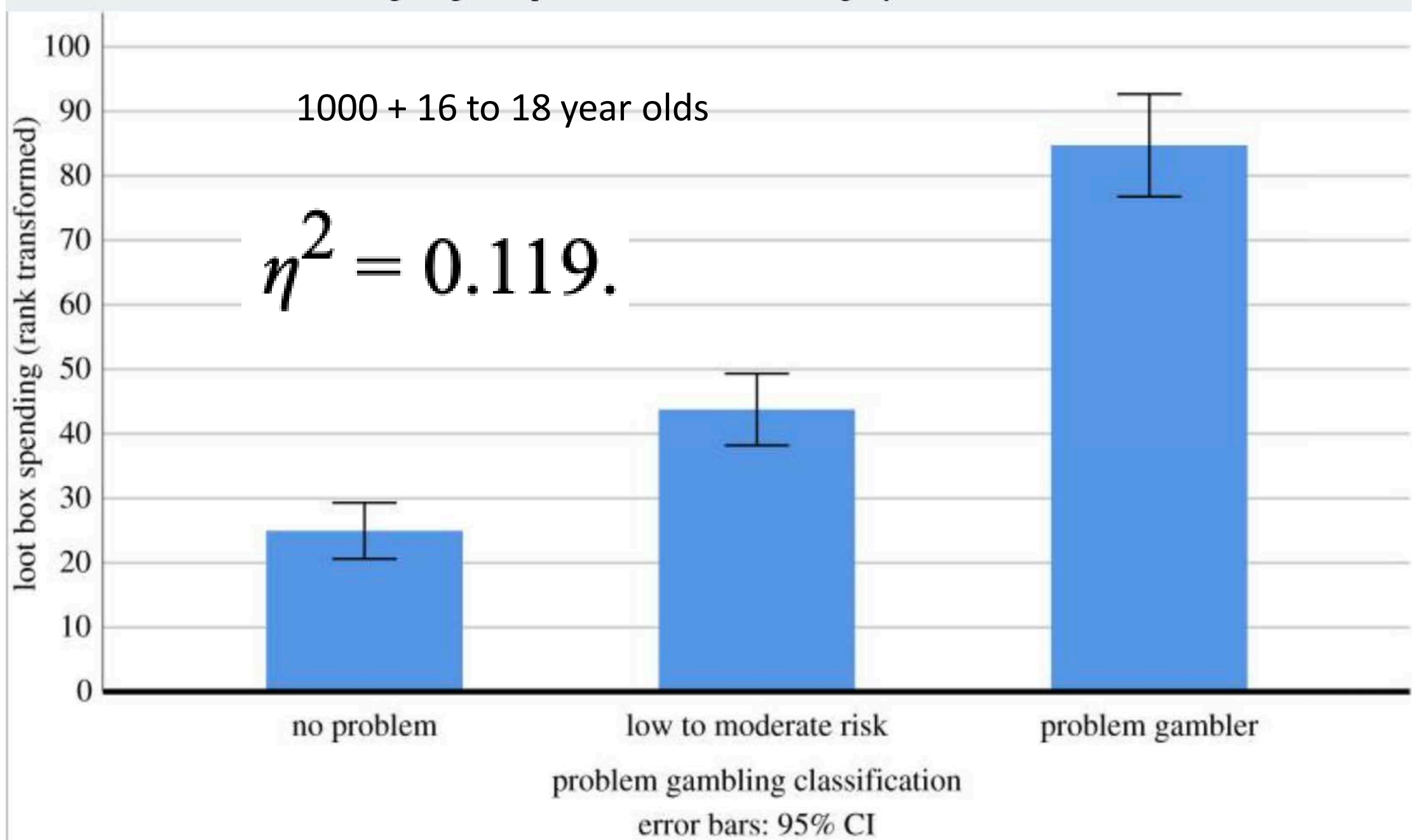
Amount spent on loot boxes per month



Zendle D, Cairns P (2018) Video game loot boxes are linked to problem gambling: Results of a large-scale survey. PLOS ONE 13(11): e0206767.

<https://doi.org/10.1371/journal.pone.0206767>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0206767>



# Goals

- Assess players reactions to loot box openings
- See if they resemble reactions of gamblers as they play a slot machine



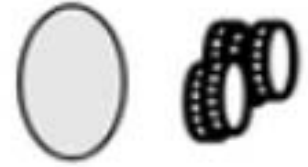
Slots – small wins are common  
big wins are rare



Pays	Hits (%)
2	22.50
5	52.65
10	6.73
25	6.36
30	4.78
40	1.96
50	1.15
100	0.88
150	0.57
200	0.83
250	0.13
330	1.18
500	0.24
1,000	0.04
10,000	0.00
Total	100.00



common



99% drop rate

slightly **Rare (r)**



95% drop rate

**Epic**



18.5% drop rate

**Legendary**



7.5% drop rate

<https://www.dexerto.com/overwatch/overwatch-reveals-drop-rates-for-loot-box-items-and-skins-1470750/>



# Gambling is exciting

- Operant conditioning occurs when intermittent wins delivered on a variable ratio produce states of **arousal** often described as equivalent to a 'drug-induced high',

## REVIEW

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# A pathways model of problem and pathological gambling

**Alex Blaszczynski<sup>1</sup> & Lia Nower<sup>2</sup>**

Department of Psychology, University of Sydney, Sydney, Australia<sup>1</sup> and Department of Social Work, University of Missouri-St Louis, St Louis, Missouri, USA<sup>2</sup>



Are loot boxes as exciting to gamers as gambling is to gamblers?

Does this excitement cause increases in the urge to open more loot boxes?

How exciting could getting cosmetic items be?

<https://www.youtube.com/watch?v=14-0g5b7nVw>

1,886,923



The screenshot shows a YouTube video player interface. The video content is an Overwatch game menu featuring the character Wrecking Ball. The menu options include: PLAY TRAINING, HERO GALLERY, LOOT BOX (with a gold coin icon and '60'), OVERWATCH LEAGUE, HIGHLIGHTS (with a 'NEW' tag), SOCIAL (with a '3' icon), CAREER PROFILE, and OPTIONS. The character Wrecking Ball is shown in a yellow and black vehicle with a biohazard symbol and the text 'WRECKING BALL 2/58 UNLOCKS'. The video player shows a progress bar at 0:04 / 18:45. Below the video, the title is 'Overwatch - OPENING EVERY LOOT BOX (50+ Loot Boxes)', the view count is '1,886,923 views', and the upload date is 'Jul 31, 2018'. Engagement icons for likes (24K), comments (2.3K), share, and save are visible at the bottom right.



# Study 1 Methods

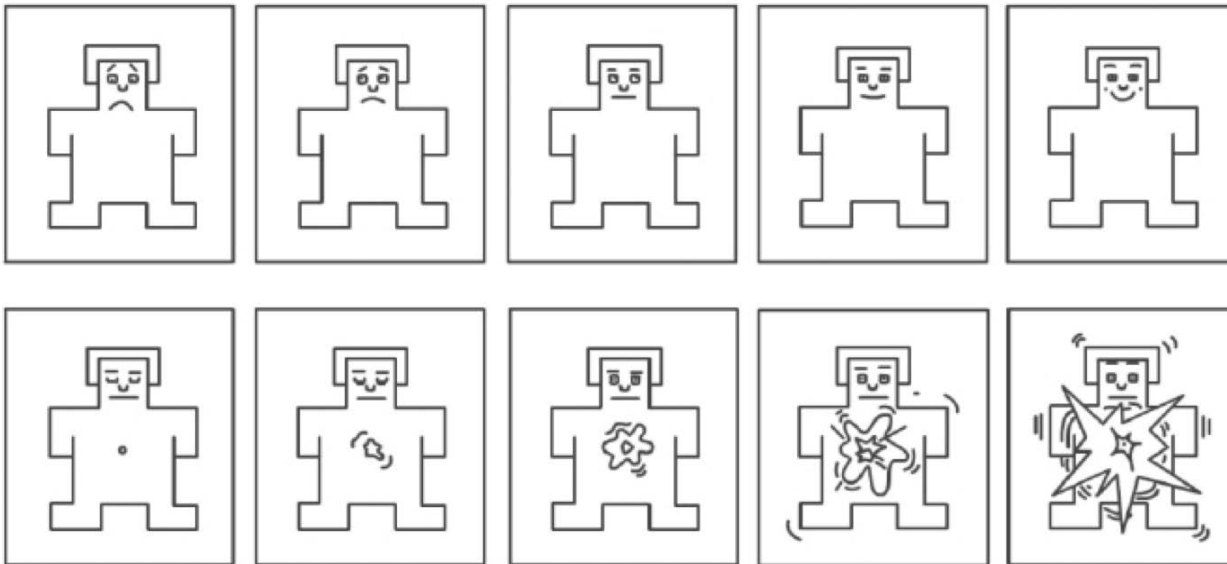
- 47 participants who had played Overwatch in the past month and opened a loot box.
- Watched 49 loot box openings



‘Using the scale below (0–4000), please indicate how many game credits you would be willing to spend on this loot box



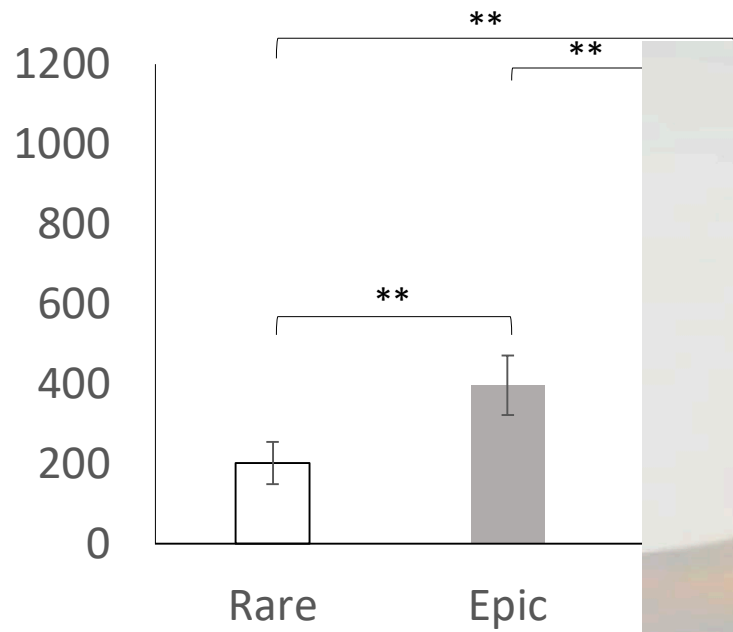
‘Using the scale below (0–100), please rate your level of urge to open another loot box’.





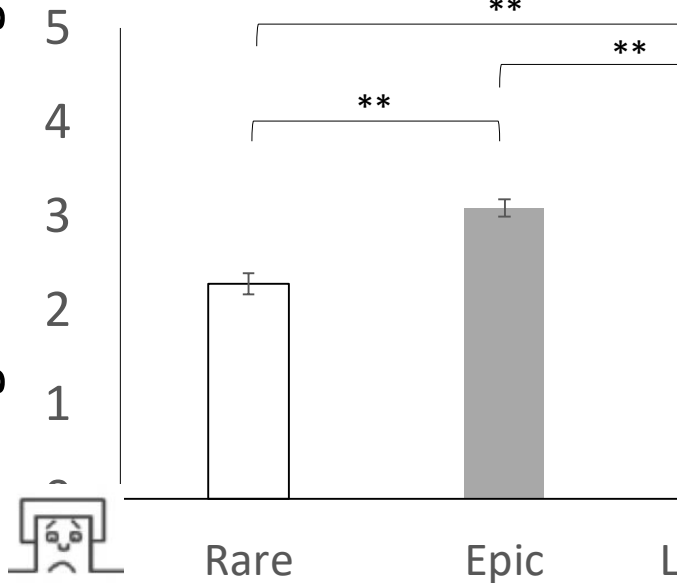
### Value (Credits)

Average Value Ratings

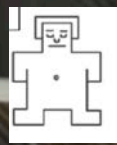
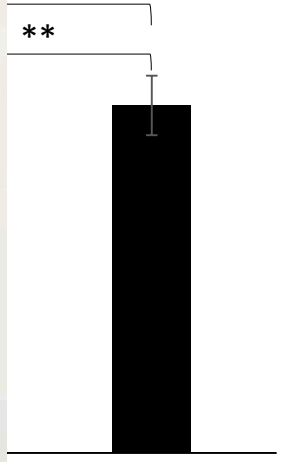
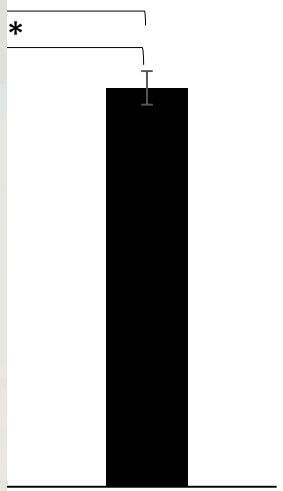


### Valence

Average Valence Ratings



### Arousal



# Study 2

- Replicate findings for subjective value, arousal, valence and urge
- Show using measures borrowed from the gambling literature that loot boxes are not only exciting, but also **rewarding**

MINI  OPEN ACCESS  PEER-REVIEWED

Front. RESEARCH ARTICLE

# Neural Alterations in Pathological Gambling and Obsessive-Compulsive Disorder

Jung-Seok Choi, Young-Chul Shin, Wi Hoon Jung, Joon Hwan Jang, Do-Hyung Kang, Chi-Hoon Choi, Sam-Wook Choi, Jun-Young Lee, Jae Yeon Hwang, Jun Soo Kwon 

Published: September 20, 2012 • <https://doi.org/10.1371/journal.pone.0045938>



J...

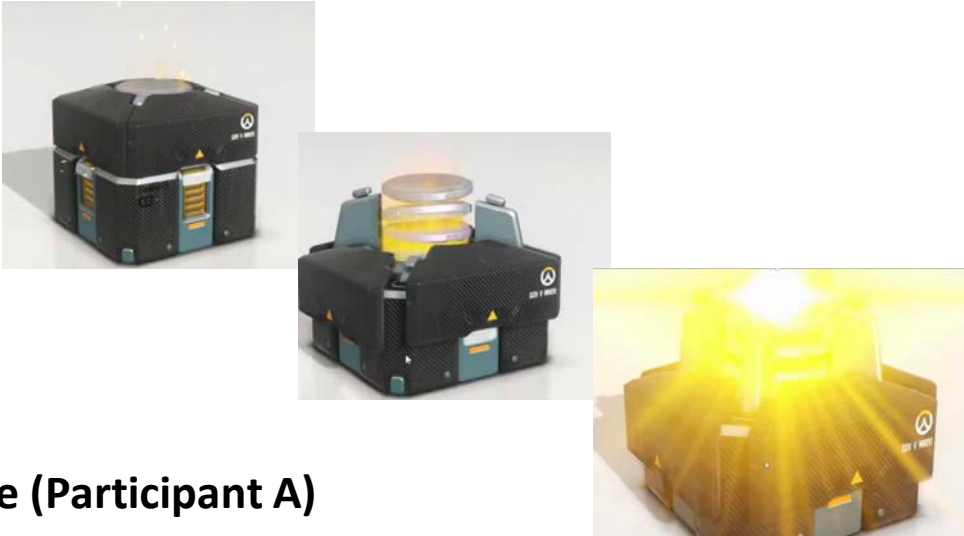
**Article****Authors****Metrics****Comments****Media Coverage**<sup>1</sup>Rese<sup>2</sup>Cent<sup>3</sup>Divis<sup>4</sup>Depa

Abstract

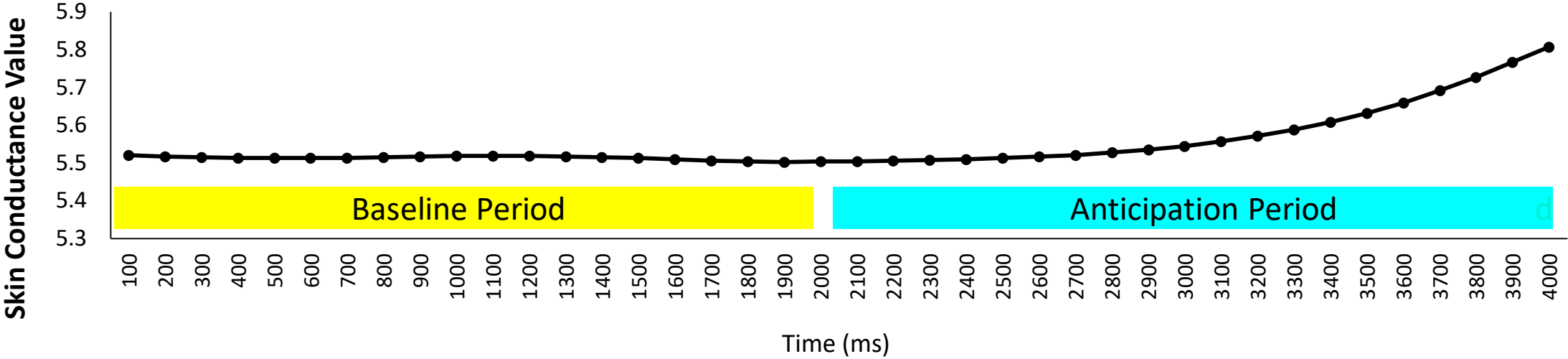
Introduction

**Abstract****Background**

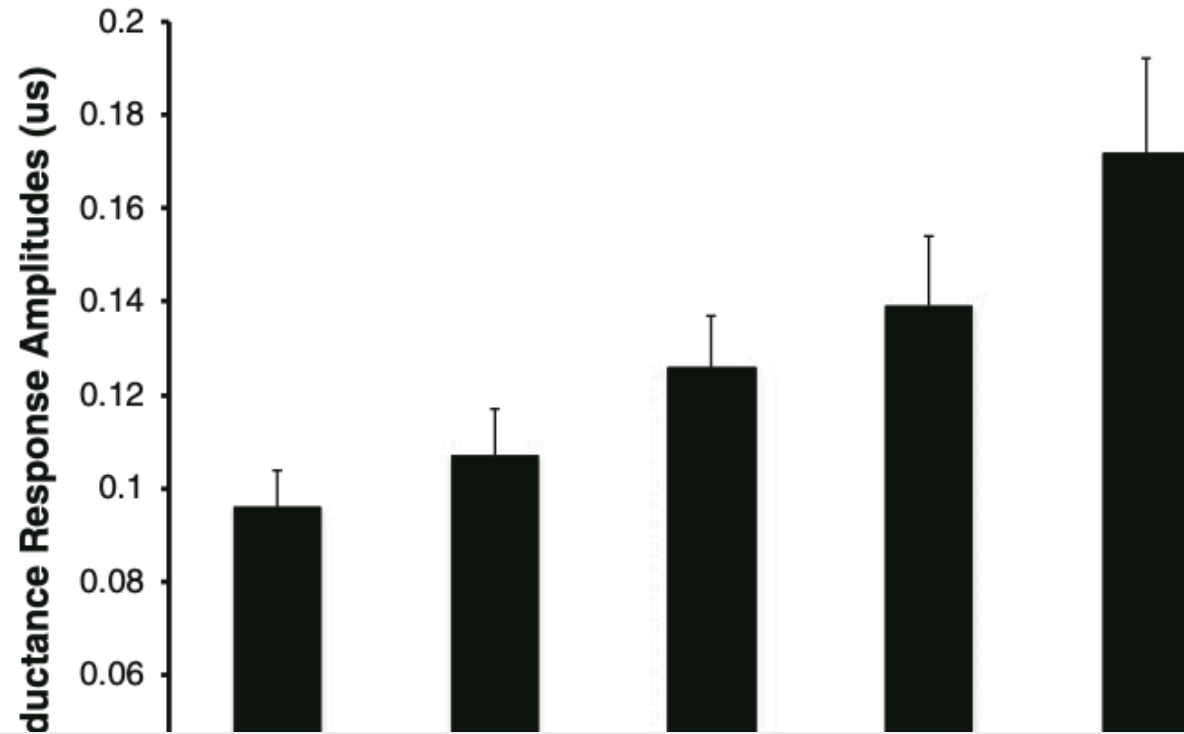




Raw Skin Conductance Values over Time (Participant A)

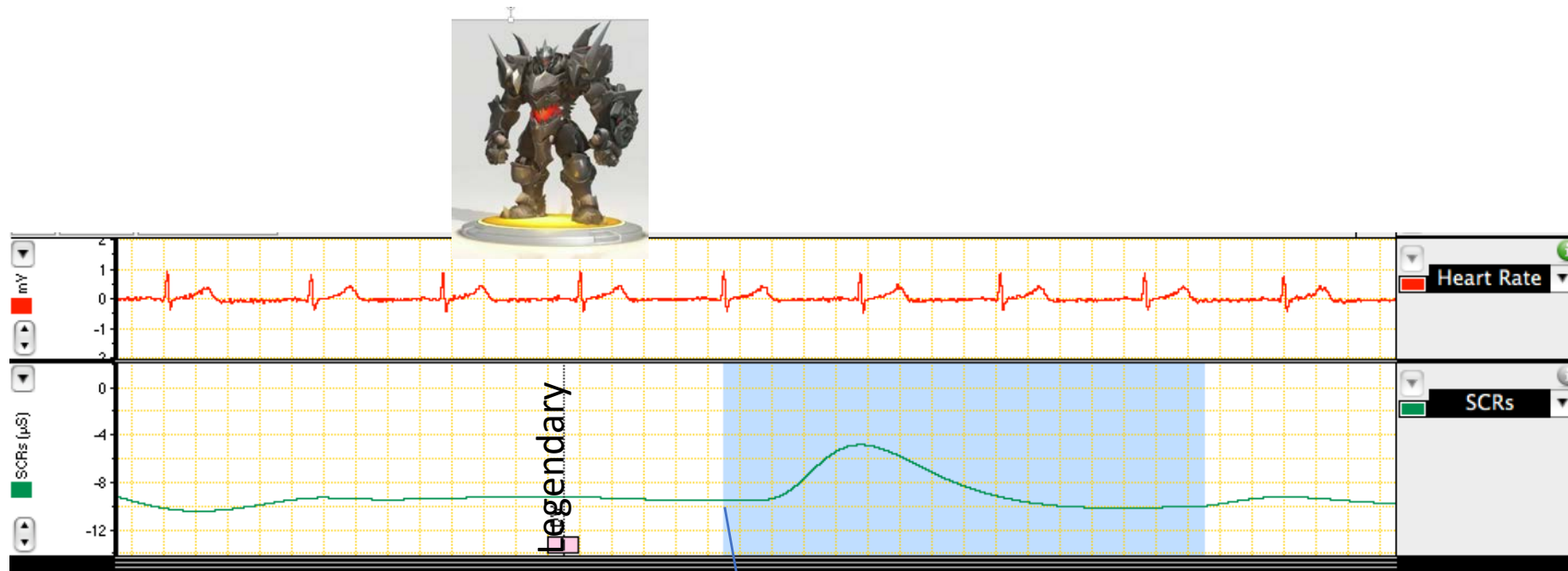


# Excitement reactions to slot machine outcomes





# Excitement *reactions* to the items in the loot box

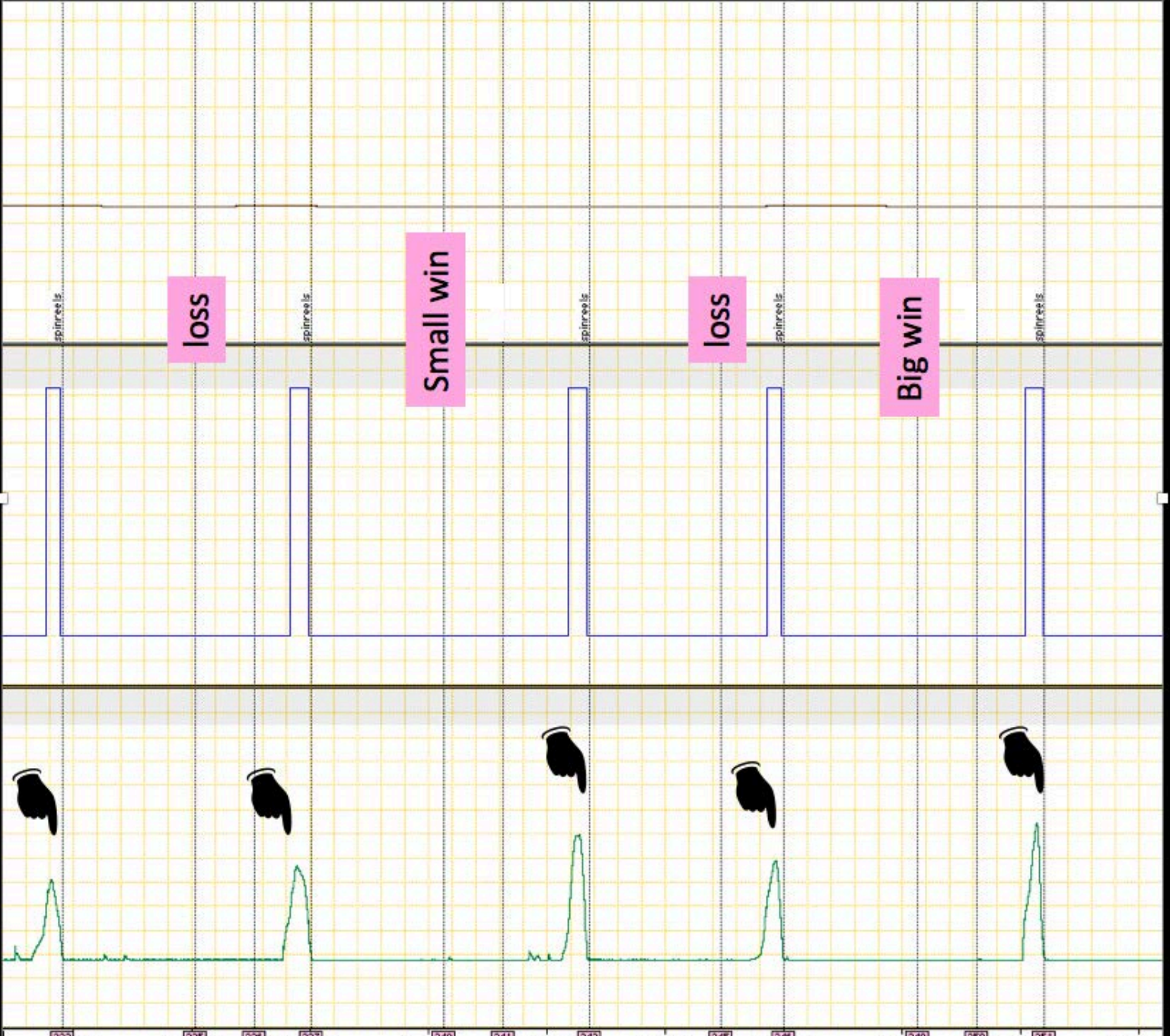


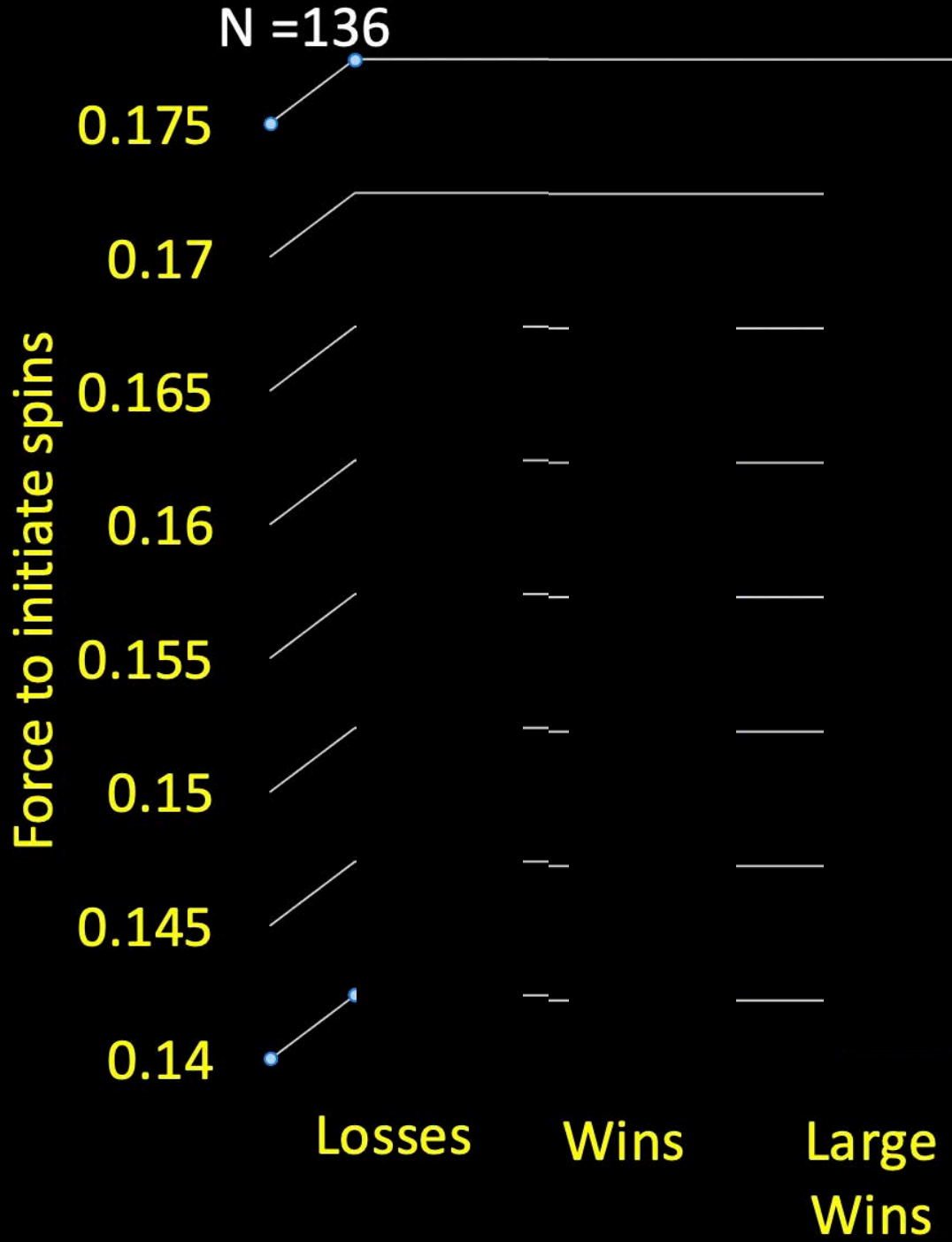
Measure initial value at start of window

Compare to peak within window

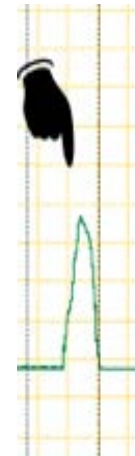
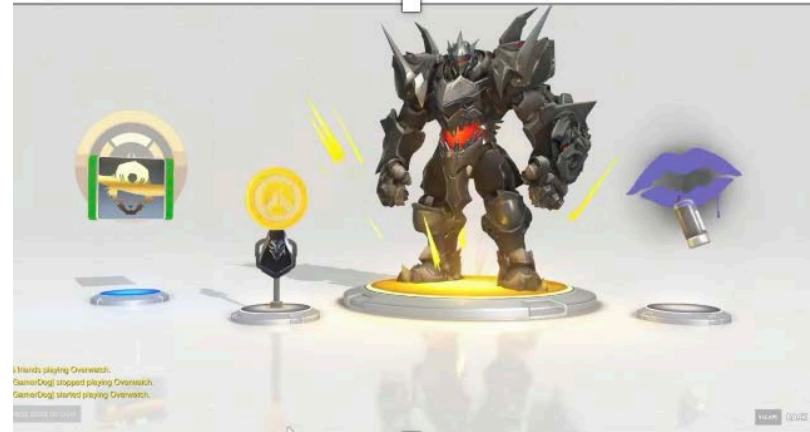
# Converging evidence of excitement induced arousal







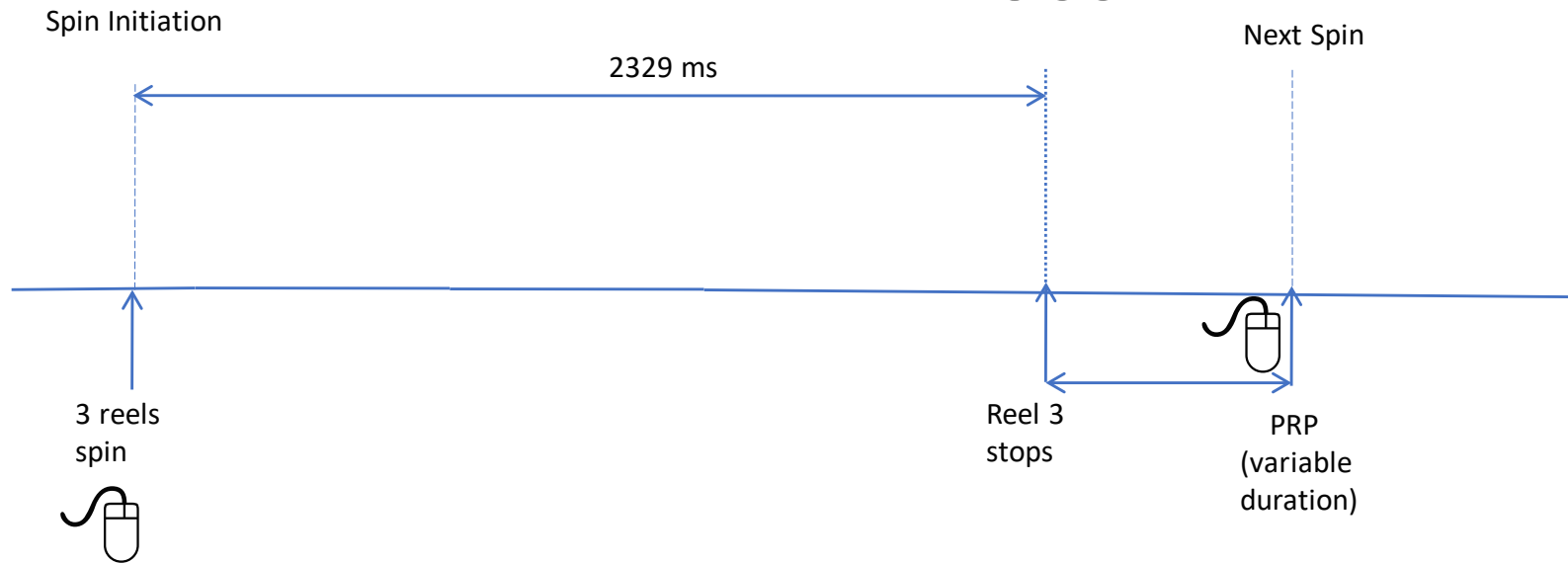
# Force used by players following item reveal



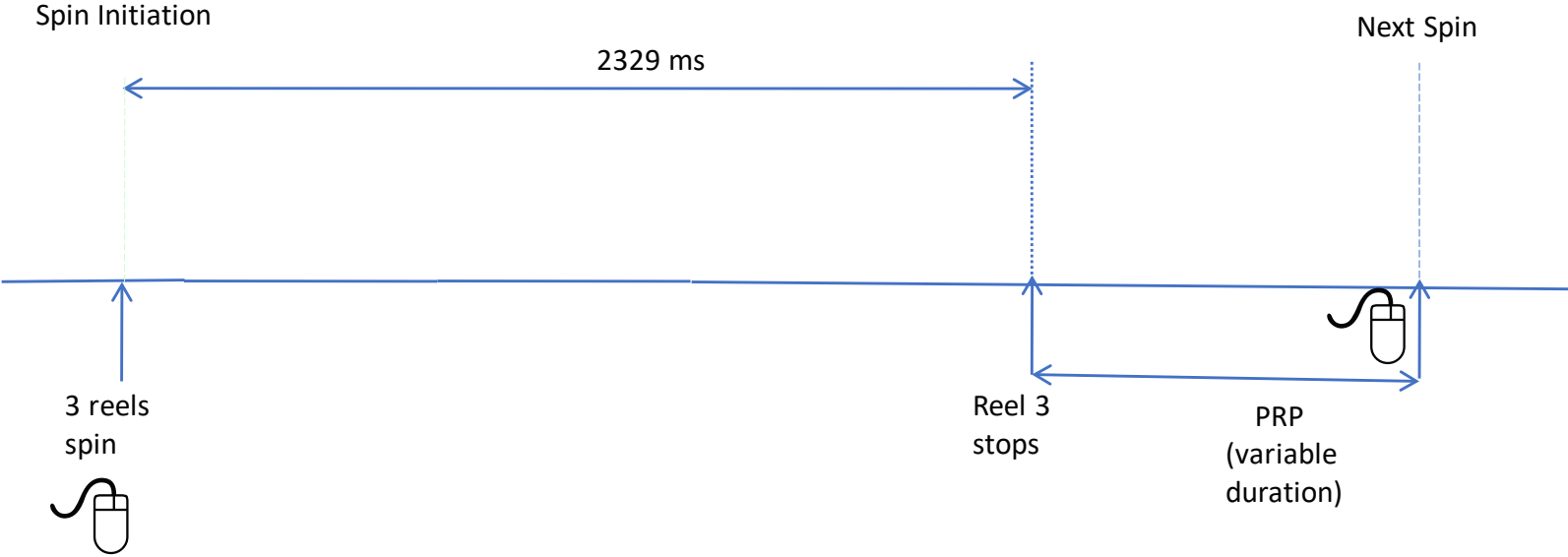
# Post-reinforcement Pauses as a measure of REWARD



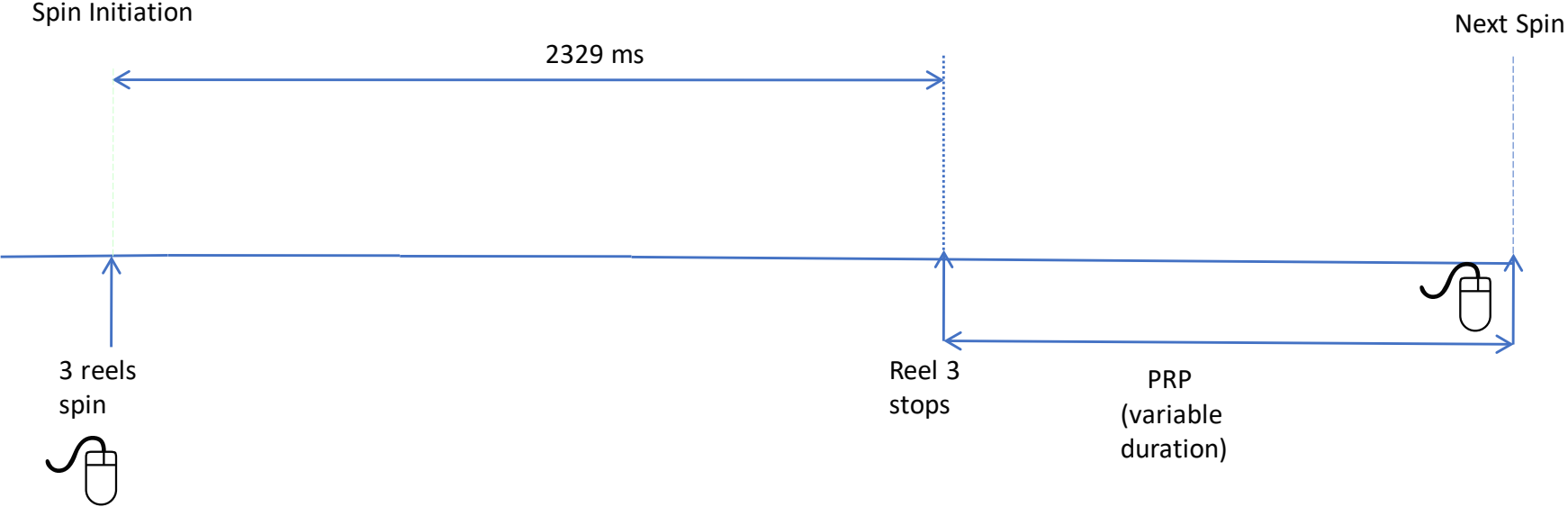
loss



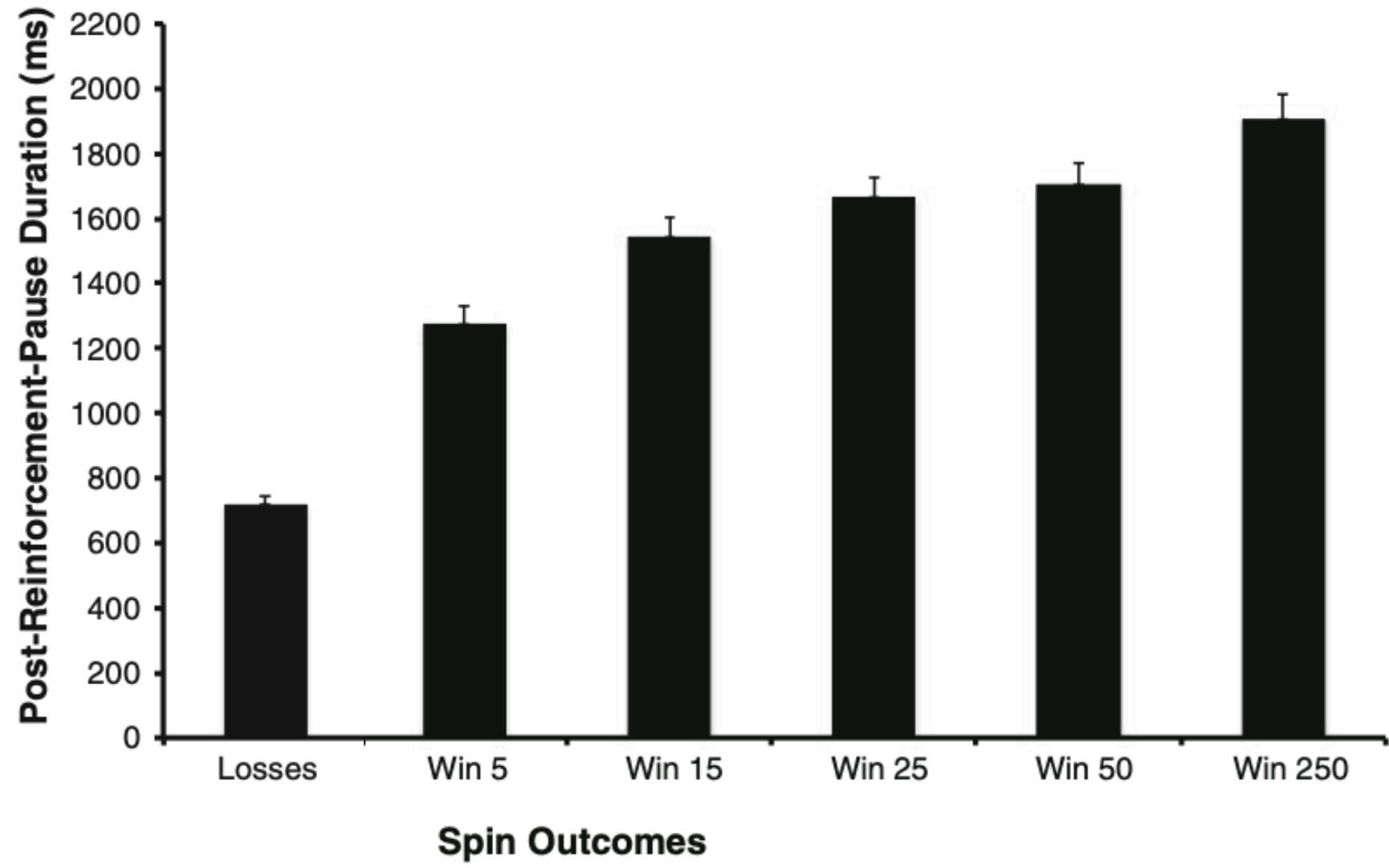
# Win 15

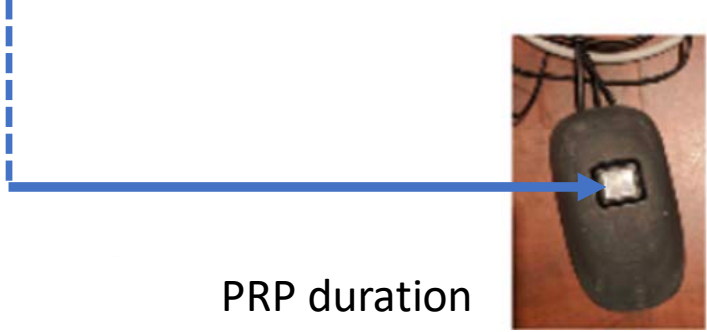
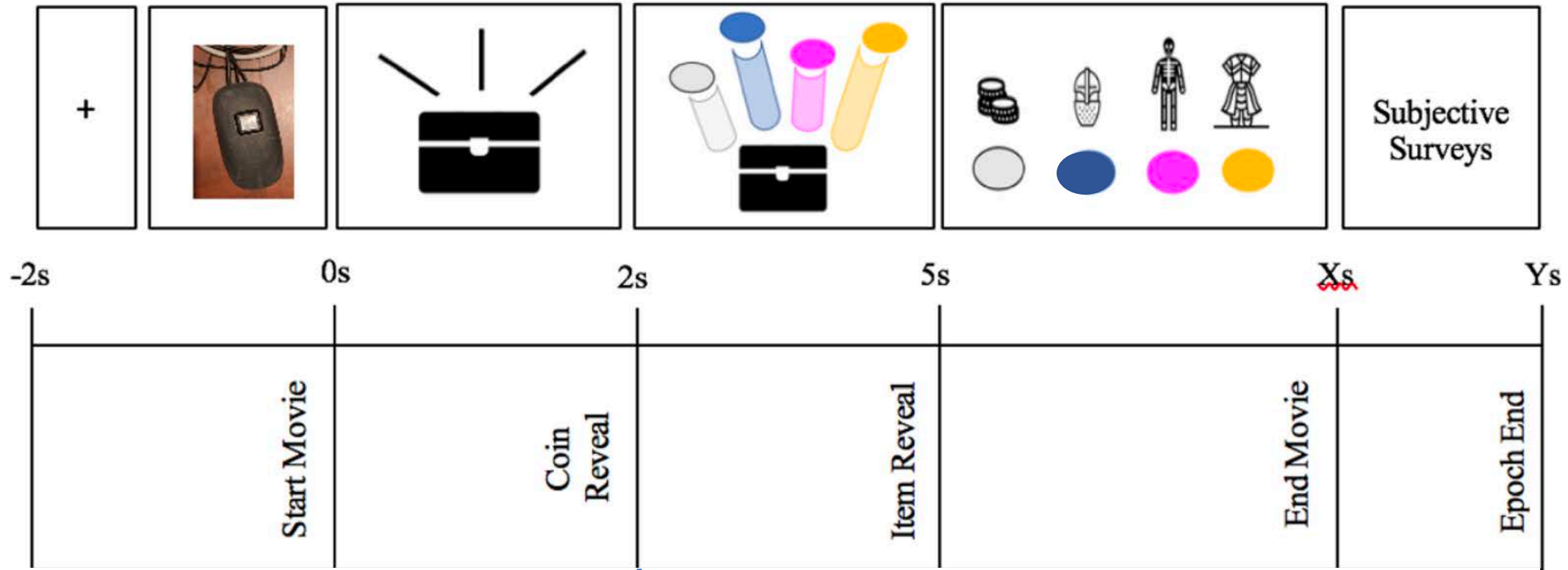


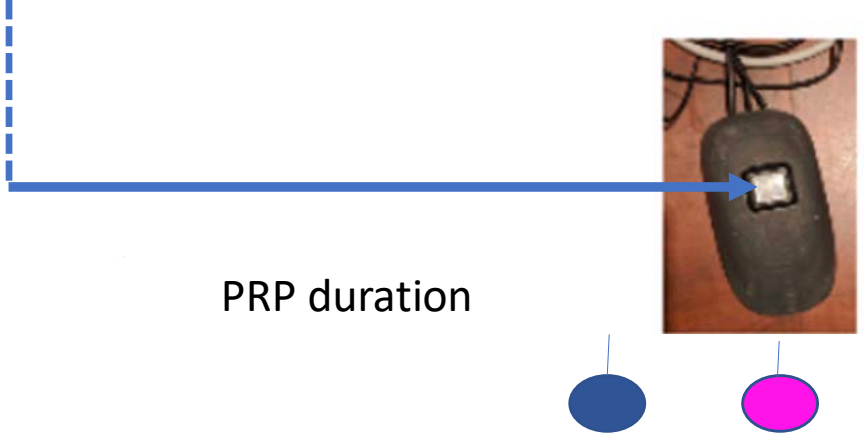
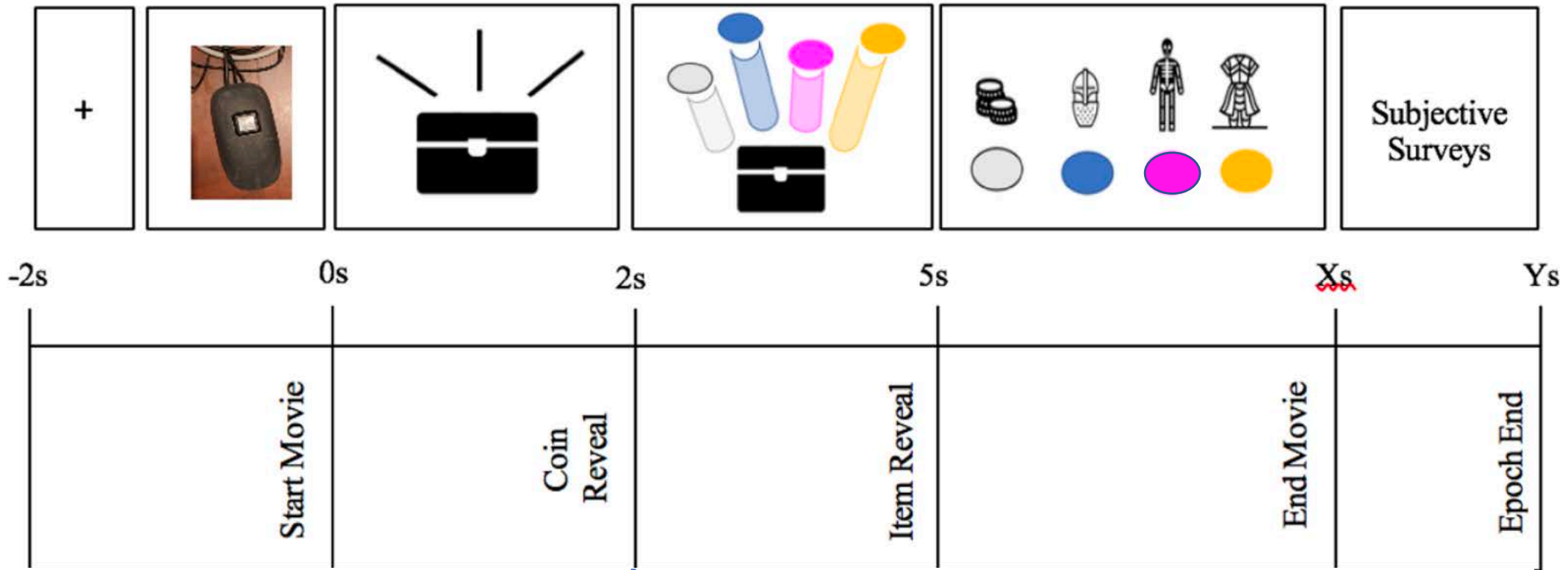
# Win 250

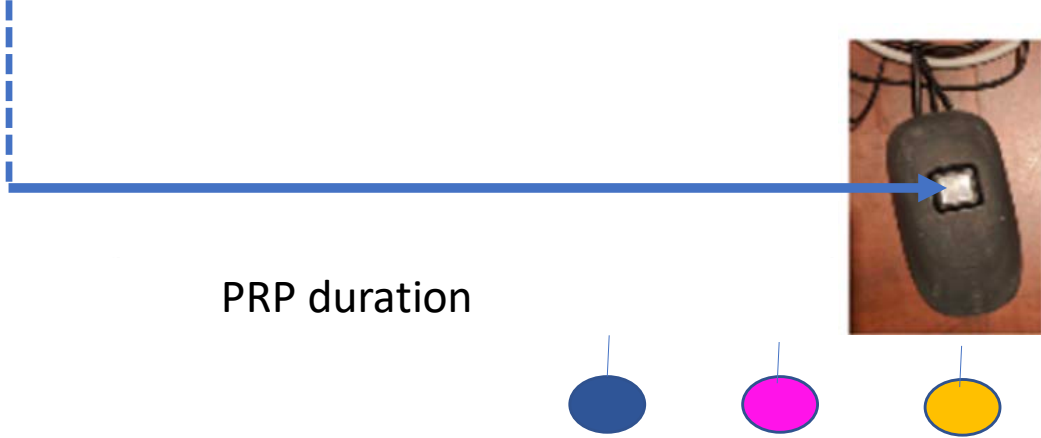
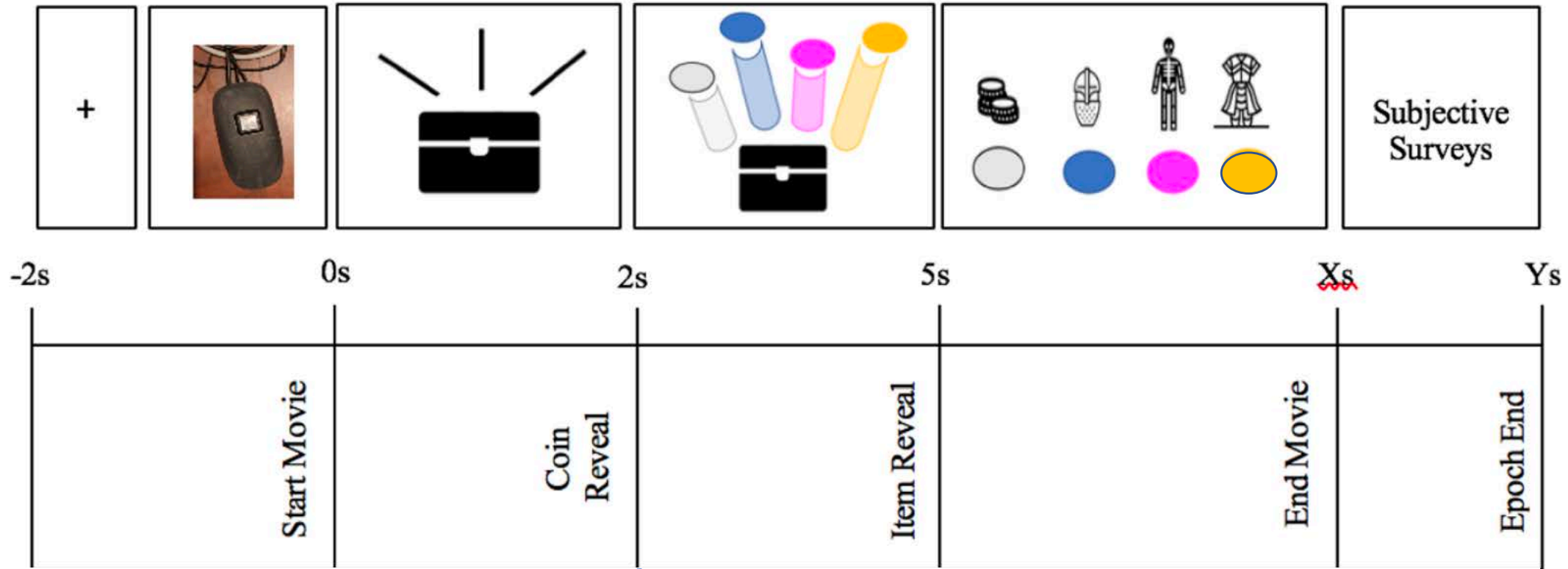








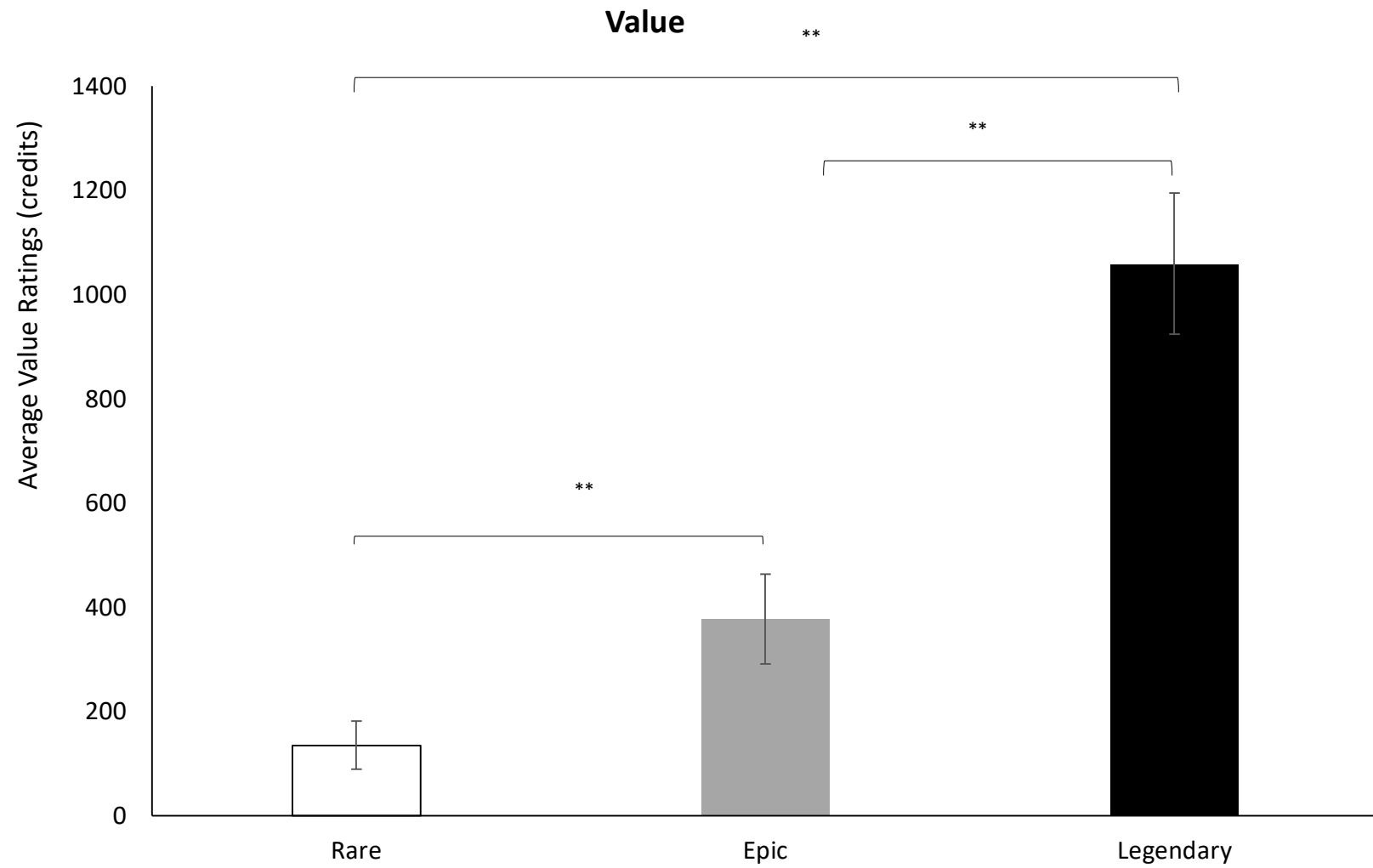




# Study 2 Methods

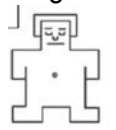
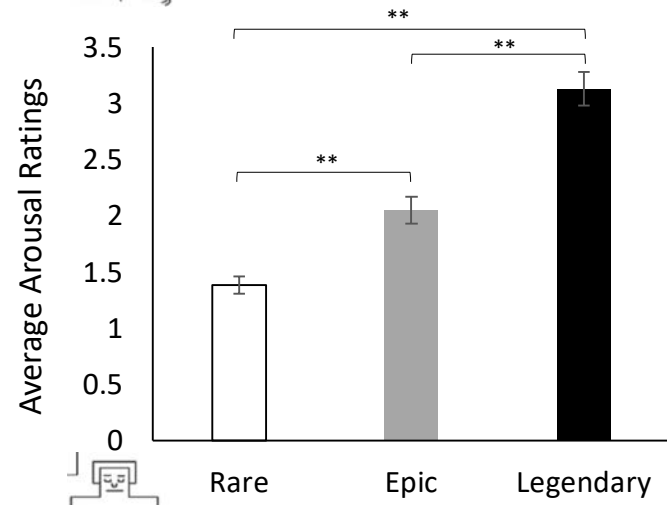
- 40 participants who had played Overwatch in the past month and opened a loot box.
- Watched 49 loot box openings

1<sup>st</sup> goal is to replicate experiment 1

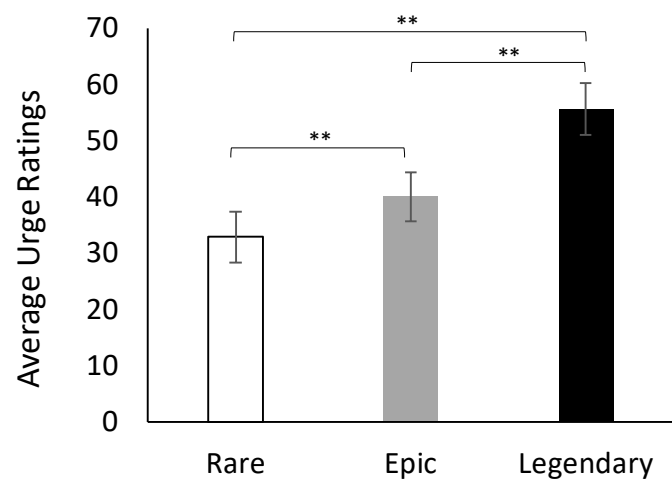




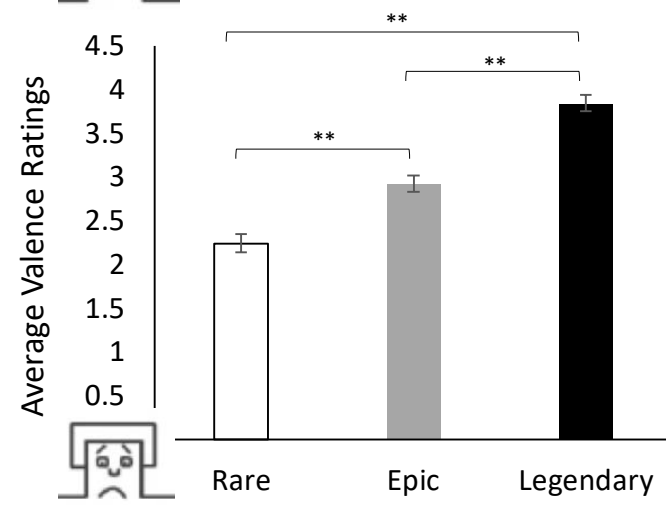
### Subjective Arousal



### Urge



### Valence



# Objective Reactions to opening loot-boxes

- 1) Anticipation
- 2) Highest arousal (SCRs) to the rarest loots
- 3) Greatest Excitement (force) to the rarest loots
- 4) Greatest Reward Responses (PRPs) to the rarest loots





2,535

PREV 4th ANNIVERSARY LOOT BOXES NEXT

OPEN LOOT >>>

SHOP

ESCAPE BACK

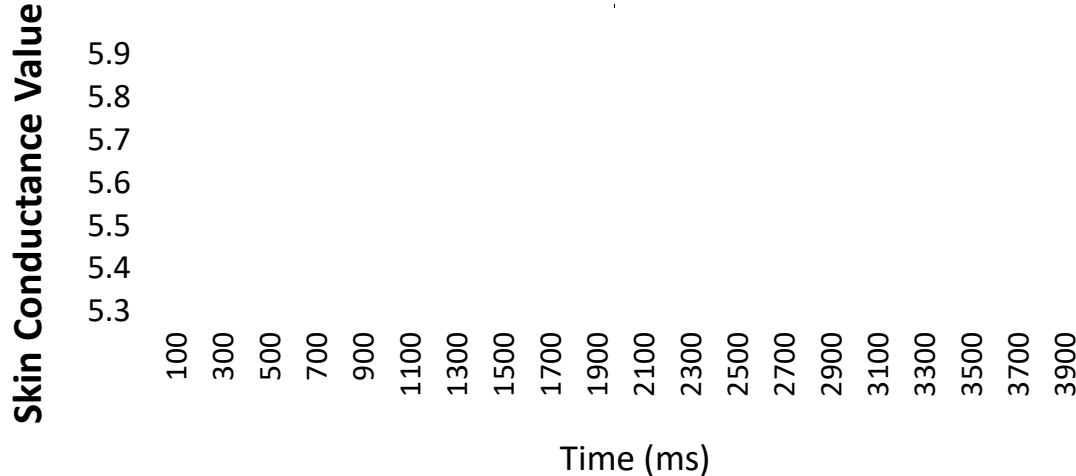
6 friends playing Overwatch.

PRESS ENTER TO CHAT

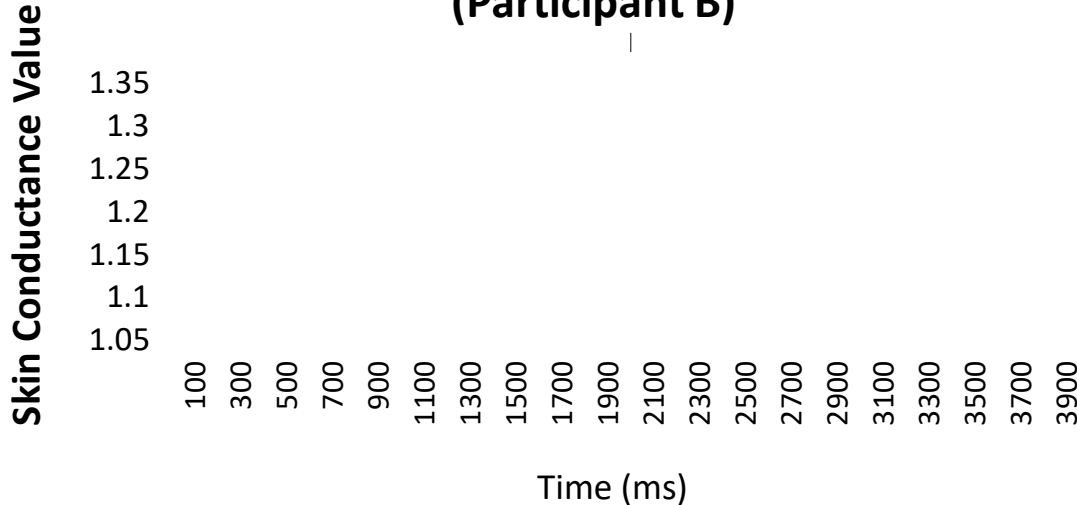
The image shows a 4th Anniversary Loot Box, a black cube with a glowing yellow top and a glowing yellow and blue base. The box is centered on a light gray floor. In the top right corner, there is a yellow coin icon followed by the number 2,535. Below the box, there are navigation buttons: a blue 'PREV' button, a blue 'NEXT' button, and a blue 'SHOP' button. In the bottom left corner, there is a gray button that says 'PRESS ENTER TO CHAT'. In the bottom right corner, there is a gray button that says 'ESCAPE BACK'. At the very bottom, there is a small text overlay that says '6 friends playing Overwatch.'



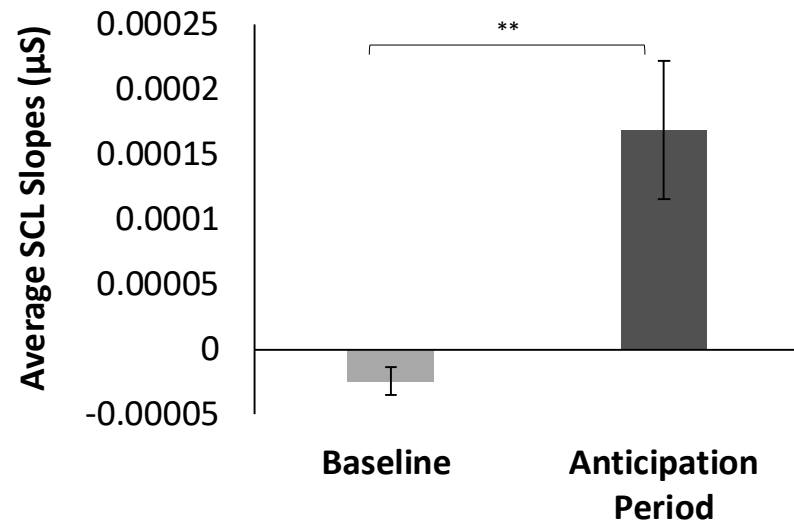
### Raw Skin Conductance Values over Time (Participant A)



### Raw Skin Conductance Values over Time (Participant B)



### Anticipatory Skin Conductance Levels (SCLs)



# Objective Reactions to opening loot-boxes

1) Anticipation

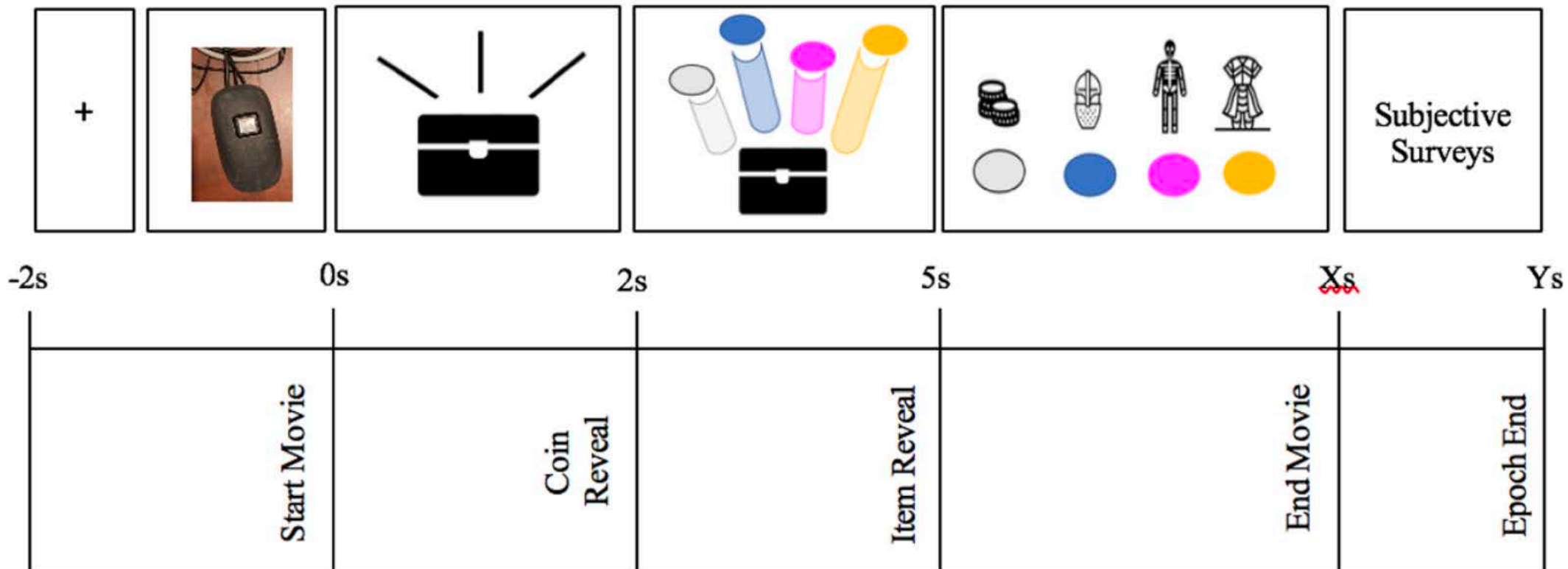


2) Highest arousal (SCRs) to the rarest loots

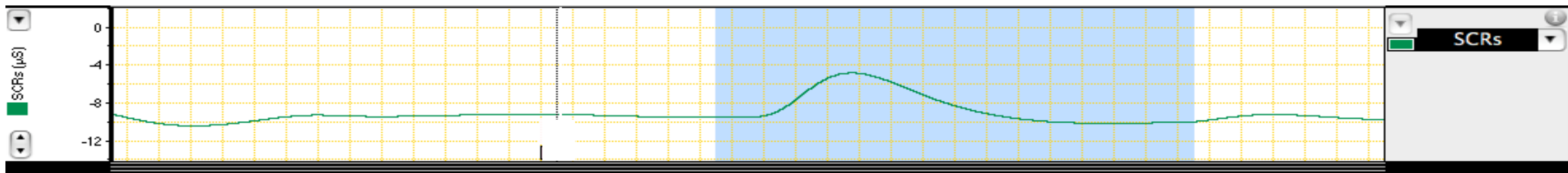
3) Greatest Excitement (force) to the rarest loots

4) Greatest Reward Responses (PRPs) to the rarest loots

# Autonomic Arousal responses to items in the loot box

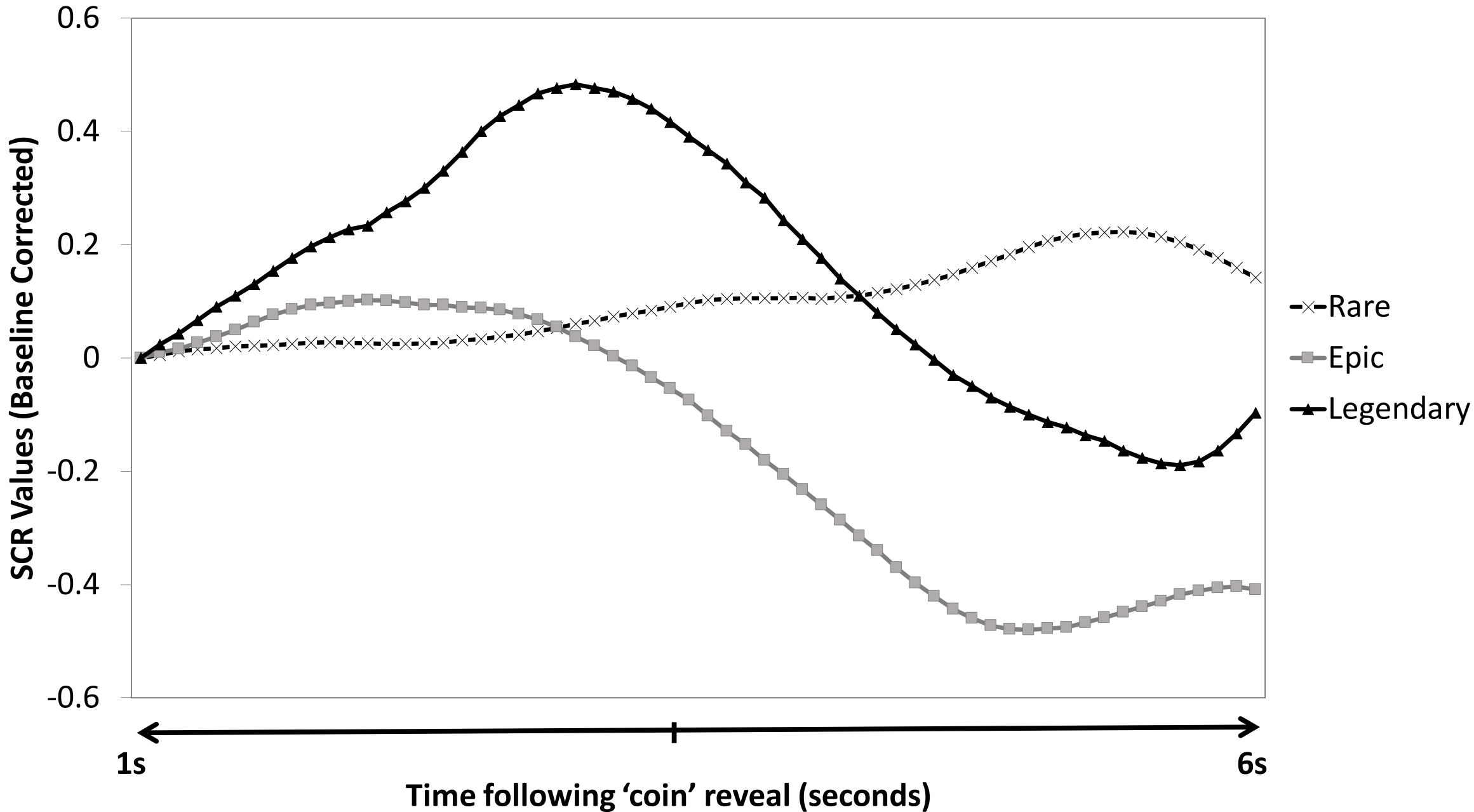


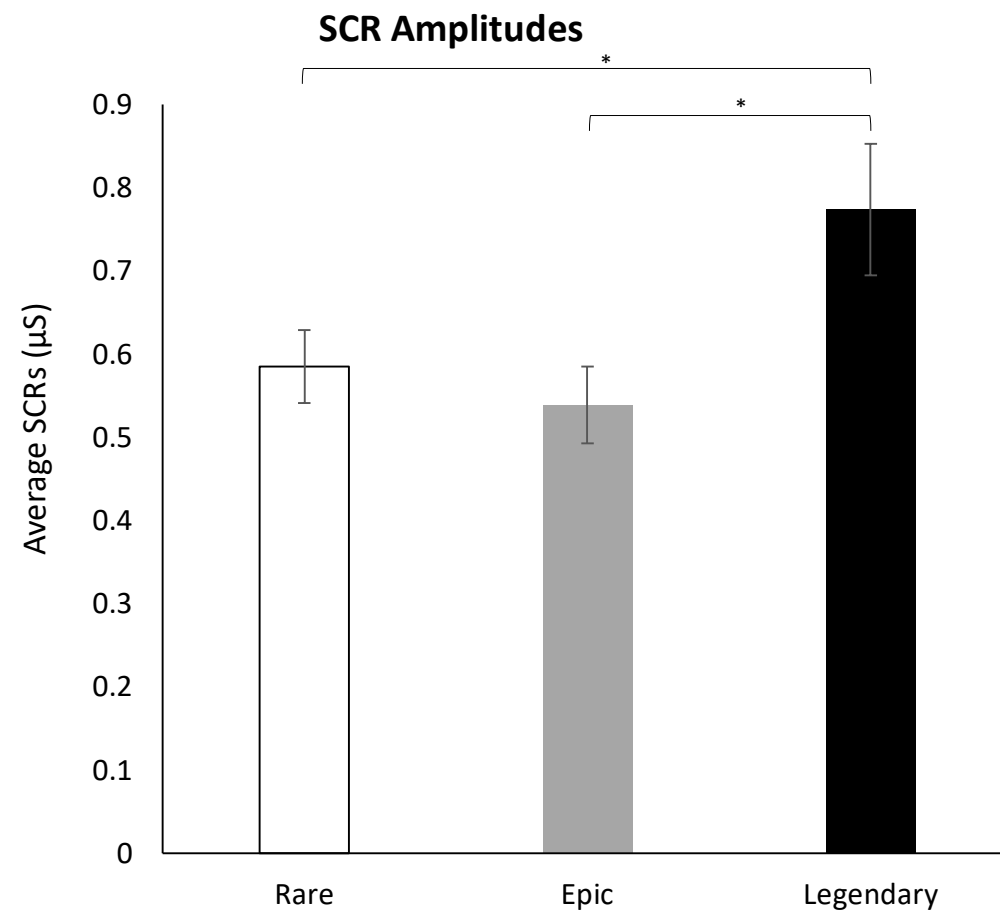
6 second window





# SCR Amplitudes by Reward Tier





# Objective Reactions to opening loot-boxes

1) Anticipation

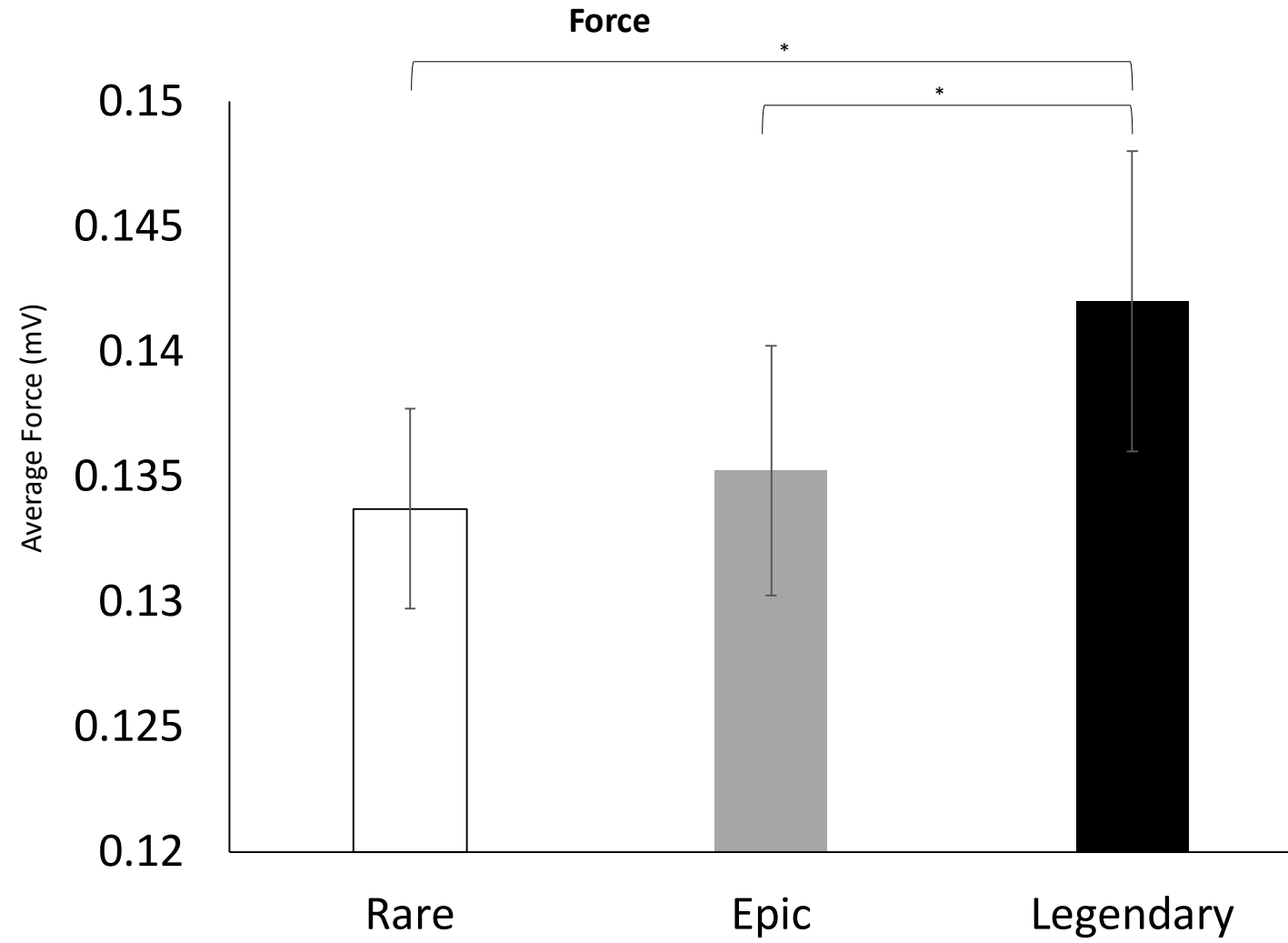
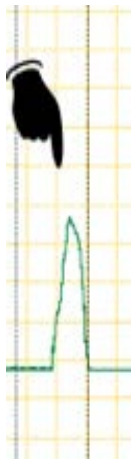
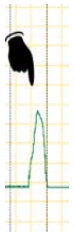


2) Highest arousal (SCRs) to the rarest loots



3) Greatest Excitement (force) to the rarest loots

4) Greatest Reward Responses (PRPs) to the rarest loots





# Objective Reactions to opening loot-boxes

1) Anticipation



2) Highest arousal (SCRs) to the rarest loots



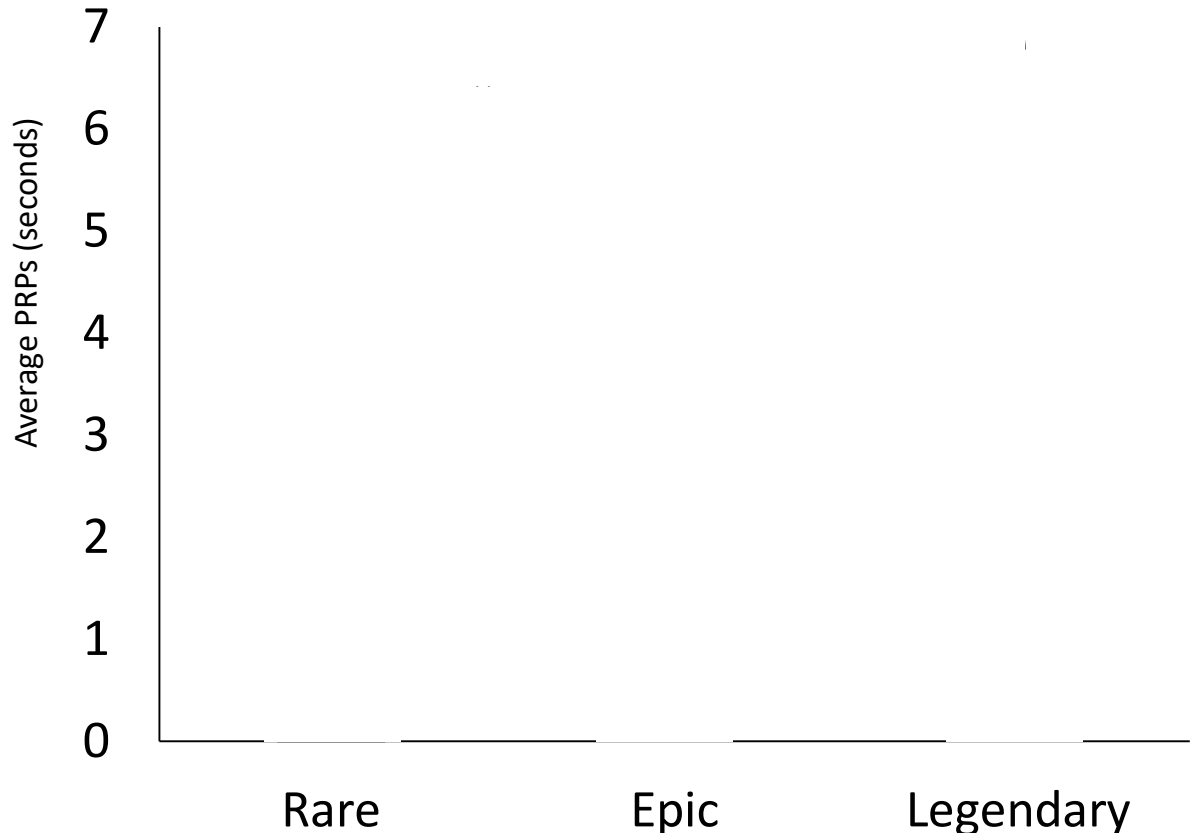
3) Greatest Excitement (force) to the rarest loots



4) Greatest Reward Responses (PRPs) to the rarest loots



### PRPs





# Objective Reactions to opening loot-boxes

1) Anticipation



2) Highest arousal (SCRs) to the rarest loots



3) Greatest Excitement (force) to the rarest loots



4) Greatest Reward Responses (PRPs) to the rarest loots





***“If it Looks Like a Duck, Quacks like a Duck and Walks Like a Duck, It’s a Form of Gambling”***