**Abstract**

Cognitive processing among video game players has been widely investigated. However, there has been serious debate regarding how methodological issues could be affecting these results. Our study is being conducted to assess the effects of covertly recruiting participants on performance in a Multiple Object Tracking (MOT) task. Covert recruitment conceals the role of video game experience in our study until after the cognitive task is completed. Additionally, we extend our research to include female participants, who have historically been omitted from cognitive video game research. The experiment began by administering the MOT task first, followed by a brief survey. The survey asked questions about how many hours each participant played, per week, in different genres of video games, as well as demographic information. Our results suggest that video game players (VGPs) of both genders perform better than non-video game players (NVGPs) when tracking a larger number of objects. This suggests that VGPs have an advantage in environmental awareness and visual short-term memory skills.

**Introduction**

Numerous studies have reported superior cognitive performance by video games players. For example, studies by Green and Bavelier (2006) found that video game players (VGPs) performed better than non-video game players (NVGPs) on a variety of cognitive tasks such as enumeration and multiple-object tracking. However, other researchers have questioned some of the conclusions made by Green and Bavelier. A study by Stothart (2014) examined whether the explicit recruitment of video game players and non-players could be producing demand characteristics, exaggerating the differences between them. Stothart concluded that there was no evidence for an advantage for VGPs. However, there were two, important problems with his analyses:

- He found no significant difference between VGPs and NVGPs both when they were overtly AND covertly recruited.
- Unlike prior research, Stothart averaged the results across all levels of item difficulty, greatly increasing the variability in his data and reducing the statistical power.

Our study is designed to address the problems in his work. In the study, we are attempting to answer two important questions:

- Do VGPs continue to perform better than NVGPs when they are covertly recruited?
- Do female VGPs show a similar advantage over NVGPs?

**Method and Survey**

- Participants were recruited through Amazon Mechanical Turk, an online platform where individuals can complete tasks for payment.
- 44 participants (13 female, 31 male) completed a MOT task followed by a brief survey. The survey was designed with the following format:
  - A table consisting of 11 different genres of video games, where participants indicated how many hours per week they played each genre
  - Demographic questions about gender and age.
  - An open-ended question about their most-played game titles (if they played games).

**Multiple Object Tracking Task**

- The MOT task was designed to assess participants’ visuospatial abilities and short-term memory skills.
- At the start of the task, 16 green squares were presented. Between 3-6 squares flashed red, indicating that they were the target squares to be tracked. Next, the squares returned to their original green colors and began to move in a randomized fashion for five seconds. Squaresrepelled each other to avoid collisions. After five seconds, the squares stopped moving, and one square was lit white and participants were asked to indicate whether it was a target square or a non-target square.
- Each target count (3-6 squares) was presented 12 times, for a total of 48 trials. These were split into 50% target and 50% non-target answers.

**Results**

- Table 1 shows a correlation analysis of the scores when participants tracked between 3-6 squares versus the number of total action video game hours and total game hours played. Action video game hours are calculated as the sum of the following game genres: Shooter, Action/Adventure, Role-Playing Games, Sports, Racing, Simulation, Fighting, and Music & Party. Additionally, males and females were divided to assess gender effects of action video game playing on the MOT task. While there was a general trend for action game hours to be predictive of task performance, this effect was only reliable when tracking the greatest number of items (six).
- Table 2 shows a correlation analysis of the MOT scores versus the hours they played by each genre.

**Discussion**

Our results suggest that VGPs have an advantage over NVGPs in object tracking. Unlike prior researchers, however (e.g., Green & Bavelier, 2016), we only observed this advantage in the most difficult trials (tracking six items). Therefore, while our results support the benefits of video game experience on cognitive processing, they also suggest that overt recruiting may have been exaggerating the extent of these effects in previous research. General conclusions:

- VGPs performed better than NVGPs in tracking large numbers of items.
- Selective or overt recruiting may indeed lead to performance biases.
- Covert recruitment could therefore be an important factor to consider in future studies on cognitive processing in action video game players.
- Future research should continue to include both male and female participants to ensure high external validity.

**References**
