

Research Statement

This summer for OppNet SSRP, I chose to research whether video games are effective at improving cognitive functions, specifically reaction times, and to what extent could they improve a person's reaction time. The thought behind my question is that if we could confirm the impact of video games on reaction times, that we could reduce the negative connotations of playing them, and perhaps one day they could even be prescribed at the medical level to aging adults with deteriorating reaction times.

Through my research, I have been surprised to discover the benefits that avid video game players experience as opposed to their non-video game playing counterparts - specifically increased performance in sensory, perceptual, and attentional tasks that go well beyond the specifics of gameplay. In a significant amount of the experiments conducted, the VGPs (video game players) were able to greatly outperform their NVGPs (non-video game players) counterparts without a loss in accuracy at all. For example the Department of Psychology at Center for Cognitive Sciences, The University of Minnesota conducted an experiment to test the hypothesis that video game experience leads to improved probabilistic inference. The experiment methodology was as follows: "subjects viewed a dynamic random dot motion display and were asked to indicate the direction of coherent motion (left or right) as quickly and accurately as possible by means of a keypress" (Green et al., 2010). The experiment showed the participants an arrow pointing either left or right, and the participants had to choose the direction of the arrow as quickly and accurately as possible. The VGPs were able to accomplish this with the same accuracy as the NVGPs, but at an average 200ms quicker reaction time.

Through my research, I learned that action games specifically have a great improvement on the Visuo-Spatial Selective Attention, which is used in many aspects of life. For example, just driving requires you to be able to eliminate unimportant distractions, such as mailboxes or other cars, while spreading your attention around to be aware of an oncoming pedestrian or animal. Modern action video games place similarly high demands on the player. For example in FPS (first-person shooter) games, the player must be able to aim and shoot in the middle of their screen while also tracking objects and other players in motion across the rest of the screen and

ignoring their constantly changing HUD (Heads Up Display) with their ammo, health, and other info on it, as displayed in *Figure 1*.



Figure 1: a typical FPS player view, with the HUD indicated for emphasis

VGPs learn to become comfortable amid all this information, and learn to better differentiate where they should allocate their attention and what doesn't need to be paid attention to right now.

If I were to pursue additional research after this, it would either be the impact of certain sports on cognitive function, or how gambling affects the pleasure centers of the brain. For my particular research question from this past summer, I still want to find out whether non-action games like RTS (real-time strategy games) or Animal Crossing, for example, have any effect on reaction time. If they don't have an effect on reaction time, do they have an impact on some other cognitive function that action games do not?

Works Cited

Green, C. S., Pouget, A., & Bavelier, D. (2010). Improved Probabilistic Inference as a General Learning Mechanism with Action Video Games. *Current Biology*, 20(17), 1573–1579.

<https://doi.org/10.1016/j.cub.2010.07.040>.