

Gaze control ability in esports expert

身体運動科学研究領域

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【Introduction】

Today it is common to play a competitive game with other players online by using electronic device; this activity is called electronic sports (esports). In real-time strategy (RTS) games are one of the genres of esports and players are required to multitasking using complex strategies. Indeed, in RTS, multiple information streams appear simultaneously in different locations on the monitor screen, and players must check them and select the information of importance. Based on the information obtained, they must judge how to make an appropriately timed response to the stimuli. Thus, multitasking ability could be the key element underlying higher performance in RTS. However, the characteristics of gaze strategy in esports players are still unknown. Purpose of current study was to clarify the difference in gaze control strategy between expert and low skill player of esports. We hypothesized that RTS experts would show superior gaze control strategy (wide and fast saccadic gaze movement) which was evaluated by measuring gaze distribution and saccadic movements.

【Method】

Nineteen participants (18 male, 1 female; 9 Expert, 10 Low Skill; mean age, 22.4 years; age range, 18-28 years) with experience playing “StarCraft” participated in the present study. StarCraft was developed in 1999 and is one of the most famous RTS games in the world.

Subjects were divided into two groups, the Expert group and the Low Skill group, according to the history and official ranking of StarCraft game players.



Figure 1. Feature of the task

We asked the subjects to conduct the tasks similar to the situation of StarCraft. Different types of jobs were required in the task necessary for playing the StarCraft (e.g. collecting the resources, destroying the enemy units). Three different types of tasks (Easy, Moderate, Hard) were conducted and each task was performed for 3 minutes. The difficulty of each task depended on how many jobs were required and how many zones are in play at the same time. When more jobs are required and more zones are used at the same time, the difficulty of the task increases. In order to examine where the gaze was distributed, we divided the whole monitor into six areas including the first area (Area i), which represents the overall flow. Participants were wearing an eye tracker when they played the task, and gaze movement was recorded. Specifically, not only location of gaze movement but also type of gaze movement (saccade and fixation), velocity of saccade, number of saccade and length of saccade were analyzed by eye tracker.

【Result】

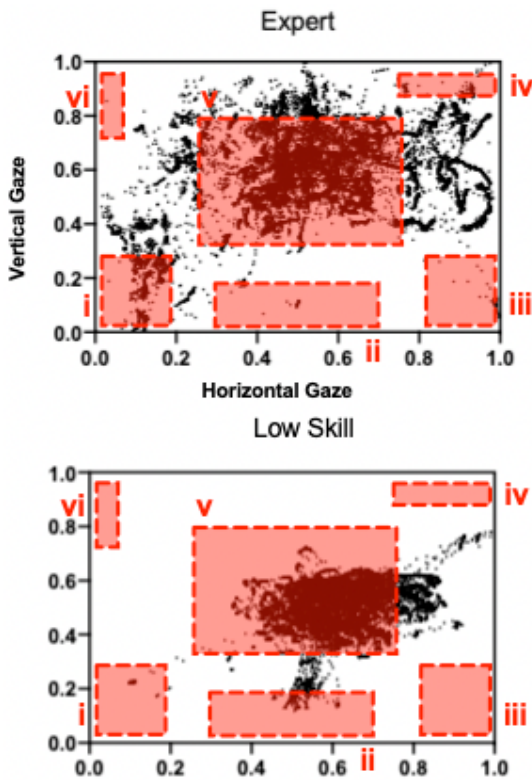


Figure 2. Difference in gaze distribution between expert and low skill in esports player.

First, the gaze of the Expert was distributed over wider areas than the gaze of the Low Skill player (Figure 2, 3A).

Second, saccade percentage of Expert was significantly higher than that of Low Skill (Figure 3B).

Third, the percentage of gaze position in Area i was higher in Expert than Low skill (Figure 3C).

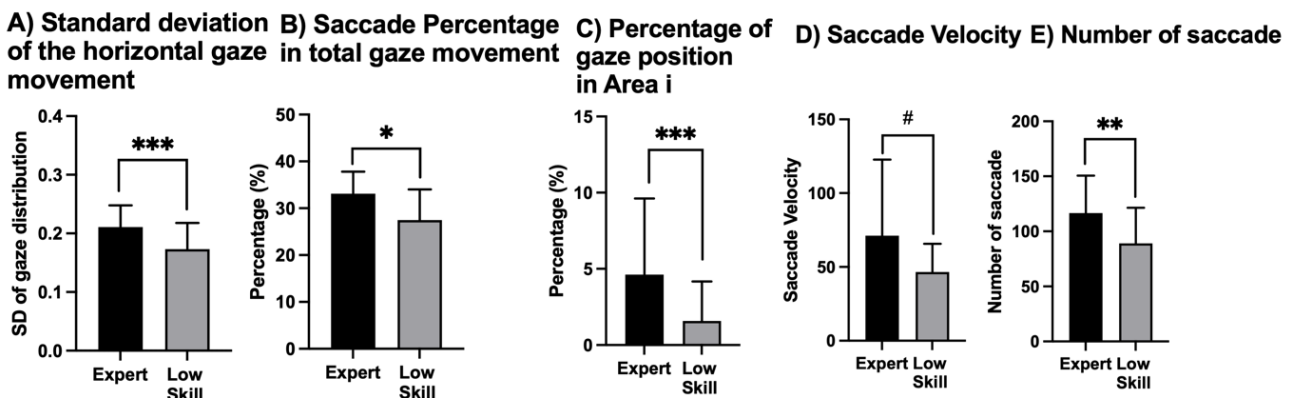


Figure 3. Difference of gaze behavior depending on skill level. Significant level was set at * $p < .05$, ** $p < .01$, *** $p < .001$, # $p < .08$

Finally, saccade velocity of Expert was higher than that of Low skill and Saccade number of Expert was greater than that of Low skill (Figure 3D, 3F)

【Discussion】

First, the Expert players showed a wider gaze distribution than did the Low Skill players (Figure 2, 3A). This could mean that the Expert players scanned a wider area of the screen, which likely helped them to obtain more information. Second, the Expert players frequently used saccade to quickly process multiple stimuli. Third, the Expert players would pay attention to the overall flow of the task.

According to the data of saccade velocity and saccade number, the Expert players jumped their gaze more frequently and more quickly from area to area than the Low Skill players did (for example, from Area i to Area v). These eye movements would be advantageous to processing multiple stimuli and successfully playing games when multitasking ability is required.

In esports, using wide gaze movement and saccade was the main strategy for getting a superior performance level. These specific gaze control strategies in experts would likely be related to the higher performance levels of esports that require multitasking ability.