The role of eyeand head movements in detecting information about fly balls

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Bongers and Michaels (2008) conducted a study to determine what specific mechanisms, either involving the eyes or other body parts, are most important when an individual decides to start the process of tracking the location of a fly ball. The focus for this study was put on eye movements, head movements, and neck movements. The researchers were mostly concerned with the possible repercussions that might be produced with efficiency for tracking balls after adding restraints to these body parts. This is due to previous research that suggests there are different parts of the body more important than others in the process of locating where a fly ball will land. The term extra-retinal was used quite a bit meaning the individual uses things outside of the retina in order to enable its ability to pick up the desired image. In this case the use of head movements or neck to adjust. The reason for the study, in fewer words, is to find out which part (i.e., eyes, head, or neck) play the most important role in the task being conducted. The researcher’s hypothesis consisted of the idea that eye movements and head movements would have a difference in importance for either the role of judging or catching a ball. Meaning eyes would likely be more important in catching, while head movements would be more important in tracking. Previous research laid much of the ground work for Bongers and Michaels experiment; in essence, theirs is a follow up to these research suggestions.

Bongers and Michaels (2008) experiment consisted of 10 male participants, whom all participate in the highest level of current Netherland baseball. The median age was 23 years old with approximately 15 years of experience. All of whom had normal vision.

All subjects participated in two tasks. Using a within subjects design, subjects were asked to participate in one judging task and another one catching task. Balls were projected out of a ball machine at desired speeds and heights. To ensure that the subjects did not move early or hear the projection of the ball, ear plugs and a screen were put in front of the ball projector. For the judging task, the subject used a joystick to indicate where they perceived the ball would land. For the catching task individuals actually maneuvered to receive the ball once that picked recognized it over the screen. The study of response time was defined by the differences between the initial movement of shoulder or body to catch the ball in the catching task, and the first movement of the joystick for the judging task. Likewise, for each task the accuracy of the action (i.e., how accurate they were in the judgment of where the ball would land) was also recorded and compared throughout the subjects.

Four conditions were created in order to manipulate the individually studied mechanisms being studied for tracking the ball. These manipulations are as follows: Immobilization of the eyes, immobilization of the head, immobilization of the eyes and head simultaneously, and a control trial of neither being immobilized. For the immobilization of the eye participants were asked to wear swimming goggles that were manipulated by having thin horizontal slits where vision was available just in front of the eye (just level with the pupil). For the immobilization of the head, a neck brace was placed on the participant. These immobilizations were designed to force the participant to use another mechanism to track the ball. The ball was shot in the direction of the participant in a controlled “tunnel”, or designated area straight from the machine to the participant. The experiment was held in a large gymnasium.

Bongers and Michaels (2008) found that when participants were asked to wear the eye immobilizing goggles, extremely exaggerated head movements were used in order to track the ball. When participants were asked to wear the both the goggles and the neck brace participants reported that if they did not receive the image of the ball when it appeared over the screen it was impossible to sufficiently perform the task. One main effect found that did not correlate with the hypothesis was that when the effect of wearing a brace was studied, there were more correct trials when subjects were wearing it rather than not wearing it. This is likely due to a heightened point of concentration. The main effect that did parallel the researcher’s hypothesis was in that when participants did wear the goggles they had significantly less correct trials. The main interaction found was when there was the use of both neck brace and goggles. This combination produced significantly lower numbers in accuracy.

Overall, the accuracy was consistently good even when restrictions were placed on participants. This shows that the study done by Bongers and Michaels (2008) found an interesting conclusion. This is that it’s accurate to suggest that the action of tracking the ball does not solely rely on any one of the studied mechanisms significantly more. Although we do get affected some by the restrictions, overall we compensate with the other mechanisms to even out any constraints present.

I believe this study done by Bongers and Michaels (2008) is extremely relevant to this course Sensation and Perception. It deals with eye sight and perception in great detail. It shows the importance of eye movement, head movements, neck movements, and visual perception. Baseball is a game that relies so much on eye sight. This study just so happens to bring in some really important factors in how we see and how our visual field operates. It shows just how important our head and neck movements are to use picking up such small images. It also shows just how complex and intelligent not only we are overall, but how smart our bodies are without us even telling them to be.

Its methods really revealed how we use our eyes and head to obtain desired images and follow them throughout a spatial area. I believe further research could be done on individual differences for this sort of task. Possibly using a more diverse range of people would be beneficial. For example a study that examines how adolescents and adults are different in the same sort of task. Even just the fact that this study had to restrict the starting point of the ball and sound of when it was being projected could stir up some other studies in those areas. One could do a study that deals with how we use sound to judge how far away something is. Another using where things start on how fast we begin to react to them. Overall this study had some really beneficial findings especially in its detailed conclusion. The only thing I would have done differently with this study is broadened the range of participants. I understand the researchers were focusing on professionals at their craft. I would have liked to change that slightly and bring in people, perhaps that aren’t so familiar at the task of tracking a baseball, and see what things they use when their eye sight and neck movements are restricted.

References

Bongers, R., & Michaels, C. (2008). The role of eye and head movements in detecting information about fly balls. *Journal of Experimental Psychology: Human Perception and Performance*, *34*(6), 1515-1523.