アンダースロー投手の新たな優位性はあるのか

-VR を用いた打者からの投球の見えの実験的検討-

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There are roughly four types of baseball pitching, and among them overhand pitching is predominant due to the effect of Saber Metrics, while submarine pitching is the smallest and there are currently only four players in Japan Professional Baseball. However, recent submarine pitchers continue to play an active part not only in Japan but also in international games. I thought that submarine pitchers should have not only existing advantages and disadvantages, but also new advantages that have not yet been discovered. If we could find a new advantage of submarine pitching, we thought that submarine pitchers would be more active and the number of submarine pitchers would increase. Therefore, I aimed to newly discover the superiority of the submarine pitching from the batting results when comparing the submarine pitching and other pitches. To achieve this goal, we conduct a pitching simulation using VR and examine the difference in the batter's reaction to clarify the effect of different pitching forms on the appearance and predictability of pitching from the batter's perspective.

In this research, as a first preliminary experiment, the subjects were presented with a simple virtual environment on a 2D screen or computer display, and the ease of hitting by a batter was investigated. As a result, it was suggested that the submarine pitching may be harder to hit than the overhand pitching, since the submarine pitching seemed to be faster than the overhand pitching and there was no confidence that the ball could be hit. Next, as the second preliminary experiment, we asked the subject to wear the VIVE Pro HMD, swing a bat for each pitch in the VR space, and swing the VIVE controller in the real space. As a result, it was found that 130 km/h was harder to hit the bat than 110 km/h regardless of overhand pitching and submarine pitching. In addition, it was confirmed that the VR space was closer to the contact ratio in the VR space than in the actual 2D bat swing environment. This confirmed the effectiveness of using VR.

In addition, as the main experiment, the subject swings the bat for each pitch in the VR space, and the subject swings the wooden bat in the real space. As a result, it was found that the submarine pitching of 90 km/h was almost the same without lowering the contact rate compared with the submarine pitching of 70 km/h. It was also found that the 90km/h submarine pitching hits the core of the bat most often and hits the center of the strike zone

well. At 70km/h submarine pitching, it was found that the batter was hard to hit from the center to the lower corner and the inner angle from the center.

From the results of the experiment, it was found that the 70km/h submarine pitching and 90km/h submarine pitching have many difficult-to-hit courses, and conversely have some easy-to-hit courses. Also, from the ball trajectory of each condition/course, the trajectory of the ball seen by the batter has an illusionary effect due to the height difference, and I thought that this was related to the batter's ease of hitting. This may create a strategic advantage for submarine pitching. Submarine pitching is still a deep pitching method, and there are parts that have not been clarified. Also, it is a throwing method that has many parts to clarify.