

# A STUDY ON THE RELATIONSHIP BETWEEN EYE MOVEMENT AND GRIP FORCE DURING GOLF PUTTING

Hyung-Sik Kim<sup>1</sup>, Jin-Seung Choi<sup>1</sup>, Gye-Rae Tack<sup>1</sup>, Young-Tae Lim<sup>2</sup>,  
and Jeong-Han Yi<sup>1</sup>

Biomedical Engineering, Konkuk University, Chungju, Korea<sup>1</sup>  
Sports Science, Konkuk University, Chungju, Korea<sup>2</sup>

**KEY WORDS:** Eye Movement, Grip Force, Head Movement, Putting.

**INTRODUCTION:** Golf is becoming a very popular sports game. In golf games, there are four kinds of strokes: driving, Iron, chip shots and putting stroke. Among the strokes, putting stroke accounts between 42% and 45% in a golf rounding (Pelz, 2000) and most golfers have difficulties on doing it. There are various parameters affecting the results of a putting stroke but effects of a few parameters were studied (Delay, 1997). However, there is a lack of studies for the simultaneous measurement and analysis of eye movement, grip force, and kinematic parameters with putting results. A purpose of this study was to quantify the parameters and identify the relationship between eye movement, grip force, and putting results.

**METHODS:** We conducted sets of experiments in our indoor lab facility. We designed the experimental set-up as close to a real putting green as possible. A hole (108mm in diameter) was placed on a 2m x 10m artificial green putting surface. Three groups of participants were recruited: professional (handicap < 3avg.), experienced (> 1year), and novice (< 6month) groups. Before the experiment, all the participants had enough time to adapt to the experiment set-up. The measurement system consists of GF (grip force), EOG (electrooculogram) and 3-axis accelerometers. We developed the system using low power ATMEGA128L micro-processor and it had bluetooth wireless link to transfer the measured data sets to a computer. During the experiments, 3D motion analysis system (Motion Analysis Corp., USA) with 6 infrared cameras was synchronized with the measurement system. All the participants performed identical putting trials of 2.1m distance. The data were analyzed using MATLAB (Mathworks Co., USA).

**RESULTS AND DISCUSSION:** Brief results of eye movement are shown in Table 1.

**Table 1** The result of eye movement with each group

Novice player (n=8)		Professional player (n=8)	
Mean	STD	Mean	STD
7.28%	5.89%	3.19%	2.33%

In this study, relationship between the putting results and three different measured parameters such as eye movement, grip force and kinematic parameters will be more investigated.

**CONCLUSION:** In this study, we are finding relationships between putting results and measured values of eye movement, grip force during the putting strokes. We expect strong relationship between putting result and eye movement and also different tendencies of grip forces among three participant groups.

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