INTRODUCTION

Biomechanical studies of golf, although limited in number, have demonstrated that skilled golfers show more efficient patterns of motion and force application than less skilled golfers (Richard et al., 1985). Since the down swing in golf lasts only a fraction of second, golfers must rely on the stored memory of the motion to determine this phase of the swing, rather than on sensory feedback. This suggests that the phase that precedes the down swing, the preparation phase (address to top of the swing), may be crucial in creating the optimum conditions for a successful down swing. Information about this phase, relating to the involved movement patterns and the associated weight shift, may be of great practical value. Therefore, the purpose of this study was to examine the weight shift pattern associated with the preparation phase of a full-shot golf swing to determine how it differs between expert and novice golfers.

METHODS

Subjects: Fourteen right-handed JPGA touring professional golfers (skilled group-SG) and twelve amateur golfers (unskilled group-UG, handicaps from 20 to 35 stokes), ranging in age from 22 to 45 years, volunteered to participate in this study.

Instruments: The weight transfer pattern during the golf swing was measured using a custom designed portable force platform (Kyowa-Dengyo, Tokyo, Japan). This platform system consisted of two separate footplates synchronized with a video camcorder, by which vertical ground reaction force (VGRF) was measured for each force plate. The VGRF data was collected at 1000Hz, while the associated video data was recorded at 30 fields per second. The camcorder was positioned perpendicular to the subject’s frontal plane of motion and was used to identify the specific events during the swing.

Procedure: Data collection took place at an outside driving range so that the complete ball flight from each trial could be monitored. After a fifteen minute warm up, the subject performed three full-shot swings with their own driver while VGRF and video data were collected. The best shot in the three trials was determined subjectively and then used for data analysis. During post-processing of the data, the trial was analyzed at four specific points identified by the video data, which served as a basis for the analysis in this study. The four specific points were: (1) address, (2) back swing (club shaft horizontal to the ground), (3) top of the swing, and (4) ball impact.
Analysis of data: The subject’s weight distribution between the two feet was converted into a percentage and analyzed at the four specific points. Because of this study’s small sample size, applying a nonparametric statistical method is needed. A nonparametric repeated measures ANOVA was used to identify the difference between the SG and UG group followed by nonparametric post-hoc tests to identify the points where the difference existed.

RESULTS AND DISCUSSION
Figure 1 illustrates right foot weight distribution across the four points, and the associated analysis revealed a significant (p< .04) difference between the two groups. The post-hoc tests indicated that there was a difference between the groups at the address (p< .04) and the top of the back swing (p< .05). The median value of right foot weight distribution at the address was 46.5% for the SG while that of UG was 40.0%. The median value of right foot weight distribution at the top of the swings was 77.0% and for the SG while that of UG was 66.0%.

In addition, as illustrated in Figure 2, the pattern of weight transfer was examined. This figure shows median values of the weight distribution change from the back swing to the top of the swing (p< .012).

Collectively these results demonstrate a pre-downswing weight shift pattern for the SG group that is characterized by increased loading on the rear foot and a weight shift to the left that is delayed until the club reaches the top of the backswing. This is in contrast to the reverse weight shift pattern that was observed in the US golfers. The pattern that was evident in the SG group may reflect trunk rotation and postural adaptations that ultimately enable optimization of the downswing.

SUMMARY
The weight transfer pattern from the back swing to the top of the swing clearly differs between the SG and the UG golfers, and may be a major factor influencing the downswing.

REFERENCES