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The Effect of Grip on Body Motion in the Driver Swing

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Golf instructors normal refer to the way that the hands grip the club as either weak, strong, or neutral. Neutral is with the hands facing each other and side on to the handle, strong is with the lead hand more on top of the handle and the trail hand more under the handle, and weak is with the lead hand more under the handle and the trail hand more on top of the handle. It is however very surprising that no one, until Cheetham (2017) had made a quantitative definition of the degrees of strong or weak. Using this definition and the AM M3D motion capture system, the aim of this study was to discover if there is an affect on body motion due to the type of grip the golfer uses.

The swings of 16 low handicap golfers were captured with the AMM 3D full body motion capture system at 240 samples per second. The golfers were asked to complete 5 normal swings, 5 swings where the club face was preset at address to 30 degrees closed (strong grip equivalent) and 5 swings where the club face was preset at address to 30 degrees open (weak grip equivalent). The golfers were asked not to change this grip for the subsequent swings. For the swing to count, the ball had to have an initial path of within 3 degrees of straight. A Trackman ball flight monitor was used to determine compliance with this requirement. Of the 16 golfers measured only 10 were able to complete the test with these requirements. The average of the grip values was calculated using the algorithm of Cheetham (2017), to verify that the golfers did actually follow the neutral, strong, weak protocol. The averages for several body measurements were calculated for each of the complying golfers. Then the averages of the averages were calculated for each parameter to see if there was a difference between the strong, weak, and neutral conditions. A one-way ANOVA with follow-up Tukey test for individual comparisons was used to determine these differences. A value of 0.05 was chosen as the significance level for the parameter to be considered significantly different between the groups in question.

	Strong vs Normal	Strong vs Weak	Normal vs Weak
Lead Hand Grip Angle (deg)	0.003 (-13.4)	<0.001 (-26.5)	0.012 (-13.1)
Trail Hand Grip Angle (deg)	0.011 (-9.8)	0.001 (-20.8)	0.007 (-11)
Lead Wrist Flex/Ext (deg)	0.063 (-4.2)	0.008 (-6.1)	0.189 (-1.86)
Rib Cage Side Bend (deg)	.003 (2.8)	.002 (4.1)	.219 (1.3)
Pelvis Rotation (deg)	.99 (1.6)	.99 (1.8)	.98 (.93)
Pelvis Lift (inches)	.40 (.07)	.18 (.07)	.45 (.03)
Pelvis Sway (inches)	.97 (.05)	.025 (.72)	.03 (.67)

* Grip Angles are at address, others are at Impact

Table 1: Grip and body parameter comparison between groups

From Table 1, the difference of the grip angles between groups was not 30 degrees as initially preset, however, the differences were significant with about a 13-degree difference between conditions. Of the parameters compared, several significant differences in body posture were found at impact between the conditions.

- Lead wrist flexion-extension angle was significantly different between the strong and weak grip groups with the strong grip group being 6.1 degrees more extended at impact.
- The strong grip group had significantly more trail side bend at impact than both the normal and weak grip groups.
- The weak grip group had significantly less pelvis sway toward the target than both the normal and strong grip groups.
- No differences were found between the groups for both pelvis lift and pelvis rotation (turn) at impact.

Only a few body positions were compared in this study, but the premise that grip affects body motion in the swing has been substantiated showing that when a golfer's grip is changed, certain body motions will change in order produce an initially straight path of the ball. It is also believed that grip changes will change the kinematic sequence in the downswing. That should be examined in a future study.

References

Cheetham, P. J. A 3D definition of the club-hand relationship in the golf club grip. Cool Clubs Summit. October 2017.