QUALITATIVE ANALYSIS OF MOE NORMAN'S GRIP AND SWING MECHANICS

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INTRODUCTION: Moe Norman is a member of the Canadian Golf Hall of Fame, and is considered by many golf professionals to be the greatest ball striker of all time (O'Connor, 1995). This has led to the theory that Moe Norman used a golf swing, which had a mechanical advantage over the conventional technique. The foundation of this theory hinges on the grip. Moe Norman has been described as using a ten-finger palm grip (Elliott & Yocum, 1995), where the handle is placed between the thenar and hypothenar eminences (groove of the hand) so that the club shaft is aligned with the right forearm at address (Kuykendall, 1995, 2000; Natural Golf, 1997; Single-axis golf, 1999 a&b; Birchenough, 2003; Hoy, 2004). This grip is supposed to encourage the club shaft and the right forearm to move on the same plane during the swing, and on a single axis. In contrast, the conventional grip has the handle placed more in the fingers of the right hand or across the palm, which is hypothesised to cause the hand to swing on plane, and the club shaft on another (Hoy, 2004; Owen, D., 1995). Hence, Moe Norman's palm grip is considered a major factor in enabling him to perhaps produce one of the most repeatable golf swings in the history of golf.
However, photographs and video footage suggest that Moe Norman does not use the grip attributed to him, but a conventional-type ten-finger baseball grip with the handle held more in the fingers of the right hand so that it runs across the palm (Shankland, 1994; Single-axis golf, 1999 a&b;Rudy, 2001). The fact that Moe Norman forced the left thumb into the groove of the hand means that the handle must move towards the fingers (Shankland, 1994; Suttie, 1995; Single-axis golf, 1999a). Further, a qualitative analysis of golf grips, including preliminary field tests indicate that there is no significant advantage in using a forearm-aligned palm grip. A conventional finger grip of the trailing right-hand is not responsible for either excessive shoulder and hip rotation or the lifting of the body during the stroke. Also, the traditional emphasis of placing the handle more horizontally across the palm towards the fingers so that there is some angle between the forearm and club shaft in the plane of the swing could facilitate a more effortless release of the golf club through impact.

METHODS: Three elite conventional golfers using Vardon overlapping grips, and three golfers (one professional and two amateurs) trained in the use of forearm-aligned grips were filmed with an eight-camera 3-D Eva Motion Analysis System (240 Hz) at the University of Auckland. The forearm-aligned grip was achieved by placing the handle of the club in the groove of the right hand when the hand was supinated by 45 degrees at address so that the forearm was directly behind the handle (Kuykendall, 1995). Also, the hands were slightly separated or the left thumb would have forced the club into the fingers of the right hand (Kuykendall, 2000). A forty-eight retroreflective marker system was designed to give a full body representation of the golfer with club. Each subject performed six maximum swing speed trials while two force platforms simultaneously measured the ground reaction forces.
The markers were tracked and analysed to calculate the kinematics of each of the golfers. The kinematic data will be further used as input to a 3D fifteen-segment inverse solution model of the human body, developed in Mathematica (Version 3.0) using a Newton-Lagrange multiplier iterative method to make the following calculations to compare the mechanical effects of the two grips on the golf swing:

1. The angle between the right forearm and shaft in the plane of the swing.
2. The rotation and angular velocity vectors of the right forearm and club shaft through out the swing.
3. The calculation of moment arm length between the handle and right wrist joint centre.
4. The degree of right hand adduction through impact.
5. The inertial effects of the club during release.
6. The torques on the right upper arm, forearm and hand.

In addition, a mechanical model of the right hand will be forward simulated to test the effects of the position of the handle in the hand on the mechanics of the golf swing.

DISCUSSION: There are many claims that a forearm-aligned grip enables the golfer to swing the club on an approximately single plane so that the body can play its optimal role as a stabiliser, while the arms generate the power (Natural Golf, 1997; Kuykendall, 1995, 2000). Hence, this grip is hypothesised to simplify the golf swing by reducing the number of moving parts. However, there has been no three-dimensional scientific study to validate this theory. Preliminary field studies have shown that the body can be stabilised as effectively during a golf swing even with a traditional Vardon or interlocking grip with the handle placed in the fingers of the right hand. If these field studies are validated, then the forearm-aligned grip does not have a meaningful role in the golf swing. This could also explain why Moe Norman did not use a forearm-aligned palm grip, and yet still produce a near optimal golf swing. It has also been reported that originally Moe Norman used an interlocking grip, and only changed to a ten-finger grip in 1993 (O'Connor, 1995). This is important because he was a great striker of the golf ball well before this grip change.

Conventional golf grips require the thumb to be firmly placed in the groove of the hand, forcing the handle to be more in the fingers of the right hand and more horizontally across the palm. Moe Norman also placed the thumb in this way, and had the hands close together (Single-axis golf, 1999a). His efficient golf swing technique may have absolutely required the use of a conventional finger grip of the right hand.

The limitations of this study are the number of subjects. One of the difficulties lies in the training of golfers to use a different grip. The process takes time, and can have a detrimental effect on the golfer's original game. Therefore, elite golfers are generally reluctant to take part in such research. It is fortunate in this study that there was one elite golfer, who was fully trained in the method. However, this is a work in progress, and will continue for a number of years. Also, it is expected that other researchers in the field will replicate these studies. Conclusions about the grip and the planes of motion in the golf swing cannot be validated without three-dimensional measurement and mechanical models.

REFERENCES:

Birchenough, E. (2003). The Appliance of Science. Golf Links. 3 (5).
Elliott, J. & Yocum, G. (1995). A method to the madness. Golf Digest, 46 (12), p. 37-43.
Hoy, D. (2004). Get in the Swing. Herald Sun (9 February 2004), Melbourne.
Kuykendall, J. (1995). You can swing like Moe. Golf Digest, 46 (12), p. 47-52.
Kuykendall, J. (2000). Kuykendall Golf. www.kuykendallgolf.com (Accessed March 2004).
Natural Golf. (1997). www.naturalgolf.com/ (Accessed March 2004).
O'Connor, T. (1995). Mysterious Moe. Golf World, 48 (45), p. 116-125.
Owen, D. (1995). Moe Knows. Golf Digest, 46 (12), p. 30-40.
Rudy, M. (2001). The Swing. The Secrets of the Game's Greatest Golfers. Carlton Books, London.
Single-Axis Golf. (1999a). Moe Norman Grip Photos.
www.megspace.com/sports/moetown/ng/moe_grip_photos.html/ (Accessed March 2004)
Single-Axis Golf. (1999b). IMA Grip Photos.
www.megspace.com/sports/moetown/ima/grip_photos.html/ (Accessed March 2004)
Shankland, C. (1994). An Interview with Moe Norman. Tommy Armour PGA Teaching and Coaching Summit. Video: Adcraft Associates, USA.
Suttie, J.M. (1995). Pipeline Moe Norman. Video, EPI, N.J.