



The myriad changes to Tiger Woods' golf swing have been oft-discussed yet rarely understood, so we enlisted Sport Science to apply its method to his madness. Degree by degree, frame by frame, SS analyzed video of Woods' pro career under coaches Butch Harmon, Hank Haney and Sean Foley.* Its findings? The only common denominator among Woods' four swings is the man holding the club. **BY SPORT SCIENCE AND SCOTT T. MILLER**

[TOP OF BACKSWING]

HEAD DIPS

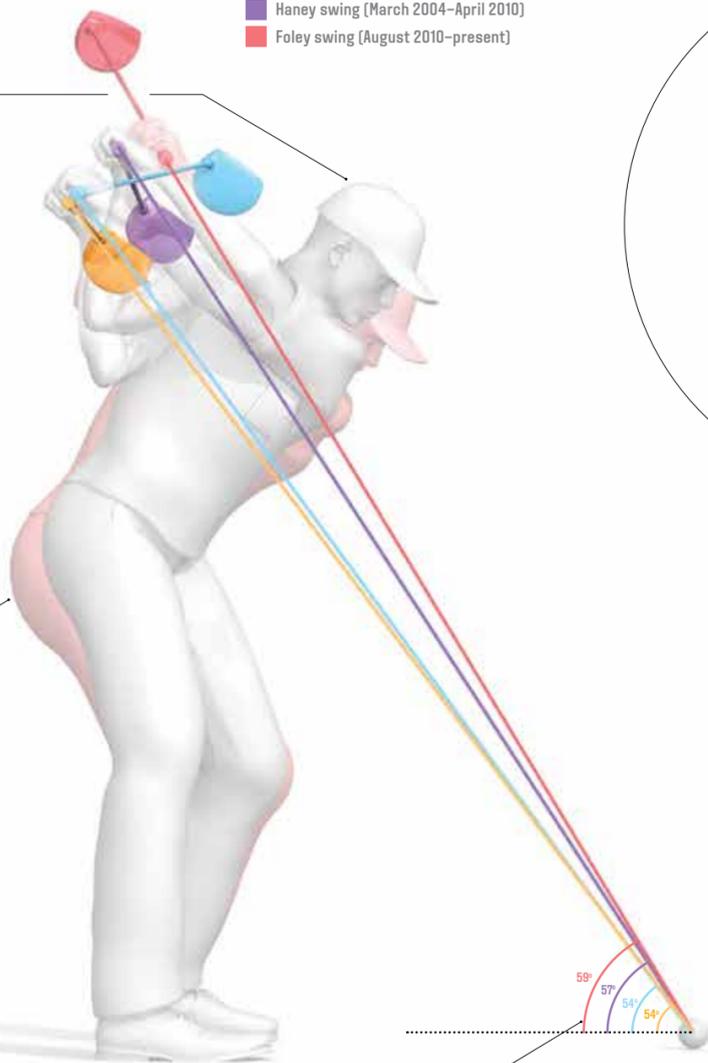
Yes, even Tiger Woods has a few bad swing habits. Throughout his career, Woods' head has dipped a few inches as he begins his downswing. Although each of his coaches has tried to fix it, Woods has reportedly resisted, believing it to be a source of his prodigious power. Apparently his two most recent coaches have had a modicum of success in fixing the flaw.

- 4-5" head dip
- 4.5-5.5"
- 3-4"
- 3-4"

POSTURE

The shaded profile of Woods illustrates his body posture at the top of his current backswing—demonstrating the flatter spine angle and lower head position that result from Foley's quasi-Stack & Tilt methods. The foreground image of Woods represents the relatively uniform body posture of his three prior swings.

- Harmon swing No. 1 (August 1996–June 1997)
- Harmon swing No. 2 (June 1997–March 2004)
- Haney swing (March 2004–April 2010)
- Foley swing (August 2010–present)



SHAFT ANGLE

Conventional wisdom says that a downswing should begin with the club's shaft pointing directly at the target, along the "target line" (see dotted lines above). Woods began his career with the shaft pointing severely to the right or "across the line." In mid-1997, Harmon brought the club closer to the target line. Haney and Foley then moved the club progressively left of target or "laid off." The result: a shaft angle moved nearly 50 degrees since Woods' 1997 Masters win, the most visible difference over his four swings.

- 17 degrees across the line
- 0-5 degrees across the line
- 10-15 degrees laid off
- 29 degrees laid off

SWING PLANE

One of the most noticeable differences in Woods' swing under Foley: He's bent more at the waist and swings more from the arms up, creating by far the largest differential in his career between his shaft angle (measured at address) and swing plane (measured, as shown, at top of the backswing). This is the reason Woods' current swing looks so different from almost every other one on tour.

- 10 degrees difference (54-degree swing plane; 44-degree shaft angle)
- 12 degrees (54-degree swing plane; 42-degree shaft angle)
- 11 degrees (57-degree swing plane; 46-degree shaft angle)
- 14.5 degrees (59-degree swing plane; 44.5-degree shaft angle)

[SWING PATH]

BACKSWING

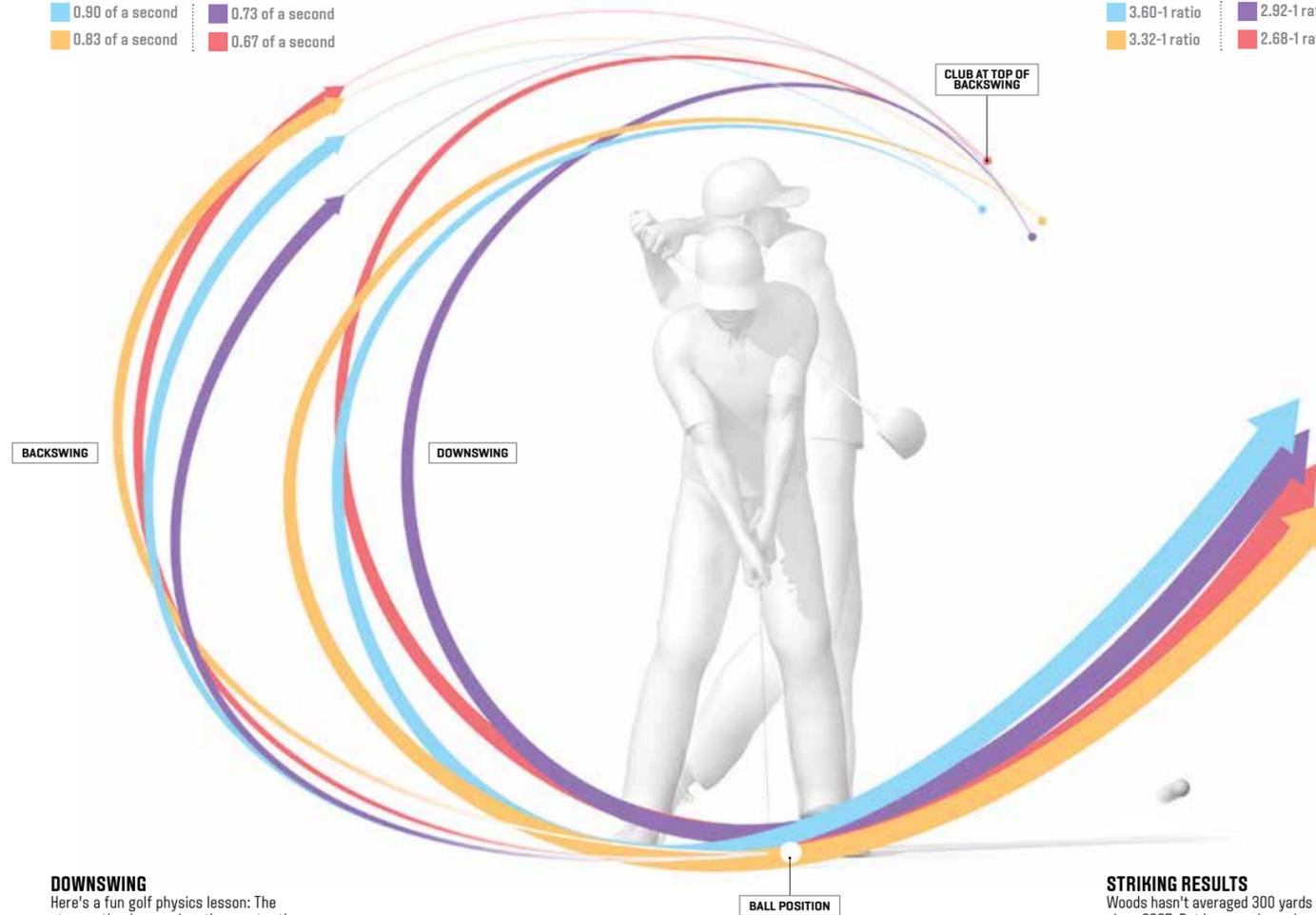
Remember the violently athletic lash Tiger used to win the 1997 Masters? Here's a shock: It featured the slowest backswing of his career, nearly a quarter-second slower than in 2012. His ever-quickening backswing wouldn't pose a problem as long as his downswing kept pace.

- 0.90 of a second
- 0.83 of a second
- 0.73 of a second
- 0.67 of a second

TEMPO

Woods' downswing speed has remained consistent over time (approximately 0.25 of a second). An accepted axiom in golf (embraced by Jack Nicklaus) is that a 3-1 ratio of backswing to downswing represents the perfect tempo. Here's how Woods' swing tempos have ramped up.

- 3.60-1 ratio
- 3.32-1 ratio
- 2.92-1 ratio
- 2.68-1 ratio



DOWNSWING

Here's a fun golf physics lesson: The steeper the downswing, the greater the compression of the ball (think less of a scoop and more of a bludgeon). The greater the compression, the harder it is to control the distance the ball flies. But don't believe us, believe the numbers. Woods' accuracy from 125 to 150 yards has suffered mightily under his new, steeper swing.

- n/a
- 22'9" from hole (97th on tour, 2002)
- 19'10" (1st, 2005)
- 22'6" (69th, 2012)

STRIKING RESULTS

Woods hasn't averaged 300 yards per drive since 2007. But because he no longer sprays so many ghastly tee shots into wrong fairways, his total driving rank (distance plus accuracy) is nearing the dominance of his finest season. With a bit of fine-tuning, Woods is poised to provide proof of ownership for his latest swing in 2013.

- 190th on PGA Tour (1996)
- 1st (2000)
- 12th (2009)
- 5th (2012)

*No two golf swings are alike—over the course of a season, a tournament or a round. These numbers represent, in many cases, the average of the data amassed from several swings in each era.