1990 PGA of America Laws ‘Swing and Club Focused’

**Ball Flight Result**

- **Distance**
  - Centeredness of Contact
  - Clubhead Speed
  - Angle of Approach

- **Direction**
  - Path
  - Face

**Centeredness of Contact**
The exactness with which the ball makes contact on the face of the club relative to the ‘sweet spot’. Contact could be either on the center, fore (toe), aft (heel), above or below that ‘sweet spot’.

**Clubhead Speed**
The velocity with which the clubhead is traveling. Speed influences the distance the ball will be propelled, as well as the trajectory and resultant shape of the shot.

**Angle of Approach**
The angle formed by the descending or ascending arc of the clubhead on the forward swing in relation to the slope of the ground. Due to its influence on the ball’s spin rate, the trajectory and distance the ball travels will be affected by this angle. Note: This parameter is more commonly referred to today as the ‘Angle of Attack’.

**Path**
The direction of arc described by the clubhead in its travel away from and then back towards the target. Its line of travel at impact is one of the primary factors influencing direction for a full shot.

**Face**
The degree at which the leading edge of the clubface is at right angles to the swing path. It will determine the accuracy of the ball’s flight along that line, or produce a left or right curve away from that line.

These laws were used as a starting point to diagnose and self-correct any ball flight result issues affecting Distance or Direction or both. The player would make purposeful changes in their swing and club delivery to affect one or more of the five areas until the desired improvement was achieved.

MODERN BALL FLIGHT LAWS

2017 – Modern Laws* ‘Strike and Ball Focused’

*Derived from the ‘Strike and Ball Focused’ OptimalStrike mathematical model

It is now mathematically possible to define the Ball Flight, Shape, Trajectory and Distance Results using Spin, Ball Velocity, Launch Direction, and Environment factors as inputs.

3D Strike Force Vector
The 3D Strike Force is the result of a golf swing process, club delivery, and ball impact event through the Strike-Point. It produces observed launch metrics of Spin, Velocity and Direction and can influence the Strike-Point position via changes to the clubface orientation.

Understanding and controlling this vector offers valuable insights on spin and how you’re shaping the ball flight.

During the impact interval, the relationship between the 3D Strike Force Vector and the Strike-Point is a dynamic one. A change in one will influence the other by some degree. The effect of changes to the Strike Force Vector are often manifested in significant changes to the clubface orientation and the resultant Strike-Point position. Note: These are impact induced changes, in the sense that they occur as a result of how the strike force is directed through the ball and the effect this has on the clubface.

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MODERN BALL FLIGHT LAWS (detailed view)

2017 – Modern Laws* ‘Strike and Ball Focused’

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Ball Flight Shape, Trajectory and Distance Results

Ball Velocity
Ball Spin
Launch Direction

3D Strike Force Vector

Strike-Point on ball

Face
(or 3D Club Face Orientation)

Clubface Angle
Delivered Loft

Strike Dynamics

3D Strike Force Vector
The resulting vertical and horizontal force vectors through the Strike-Point via the clubface producing observed launch metrics.

Other Factors*: Friction, Ball Type, Clubshaft Flex Dynamics, Club Head COR at impact

Strike Intent to form desired shot result and ball flight shape:
- Angle of Approach (Vertical Angle of Approach of the Clubhead)
- Path (Horizontal Angle of Approach of the Clubhead)
- Centeredness of Contact on the Clubface
- Clubhead Speed
- [new] Dynamic Strike Effect (Gain/Loss of Traction on Ball)
- [new] Gear Effect, Impact Induced Clubface Rotation*

Note: Clubface Angle and Delivered Loft are horizontal and vertical clubface components at the point of separation of the clubface from the ball.

Note: The components shown in black bold underlined text are established in the 1990 PGA Ball Flight Laws.

(* hard to measure effects )