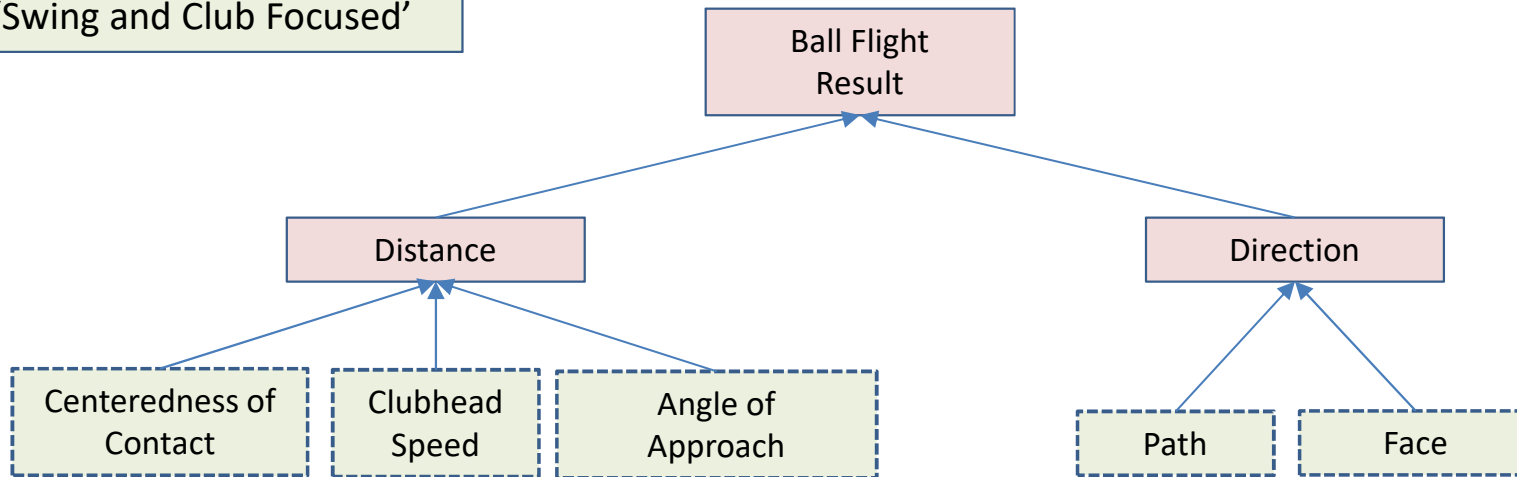


# BALL FLIGHT LAWS

1990 PGA of America Laws  
'Swing and Club Focused'



## 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.

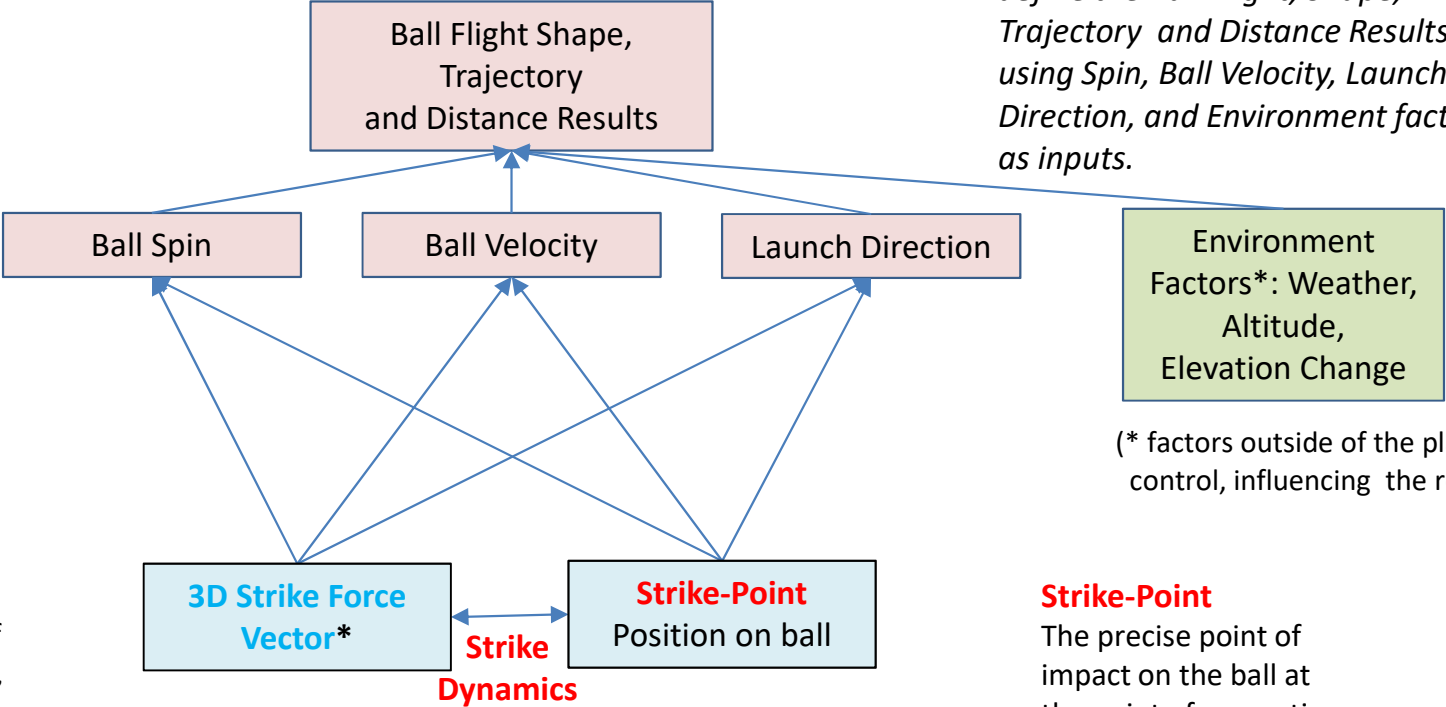
These laws were used as a starting point to diagnose and self-correct any ball flight result issues affecting Distance or Direction or both. The player would make purposeful changes in their swing and club delivery to affect one or more of the five areas until the desired improvement was achieved.

# 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.*



Environment Factors\*: Weather, Altitude, Elevation Change

(\* factors outside of the player’s control, influencing the result)

### 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.

### Strike-Point

The precise point of impact on the ball at the point of separation of the ball from the clubface

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.

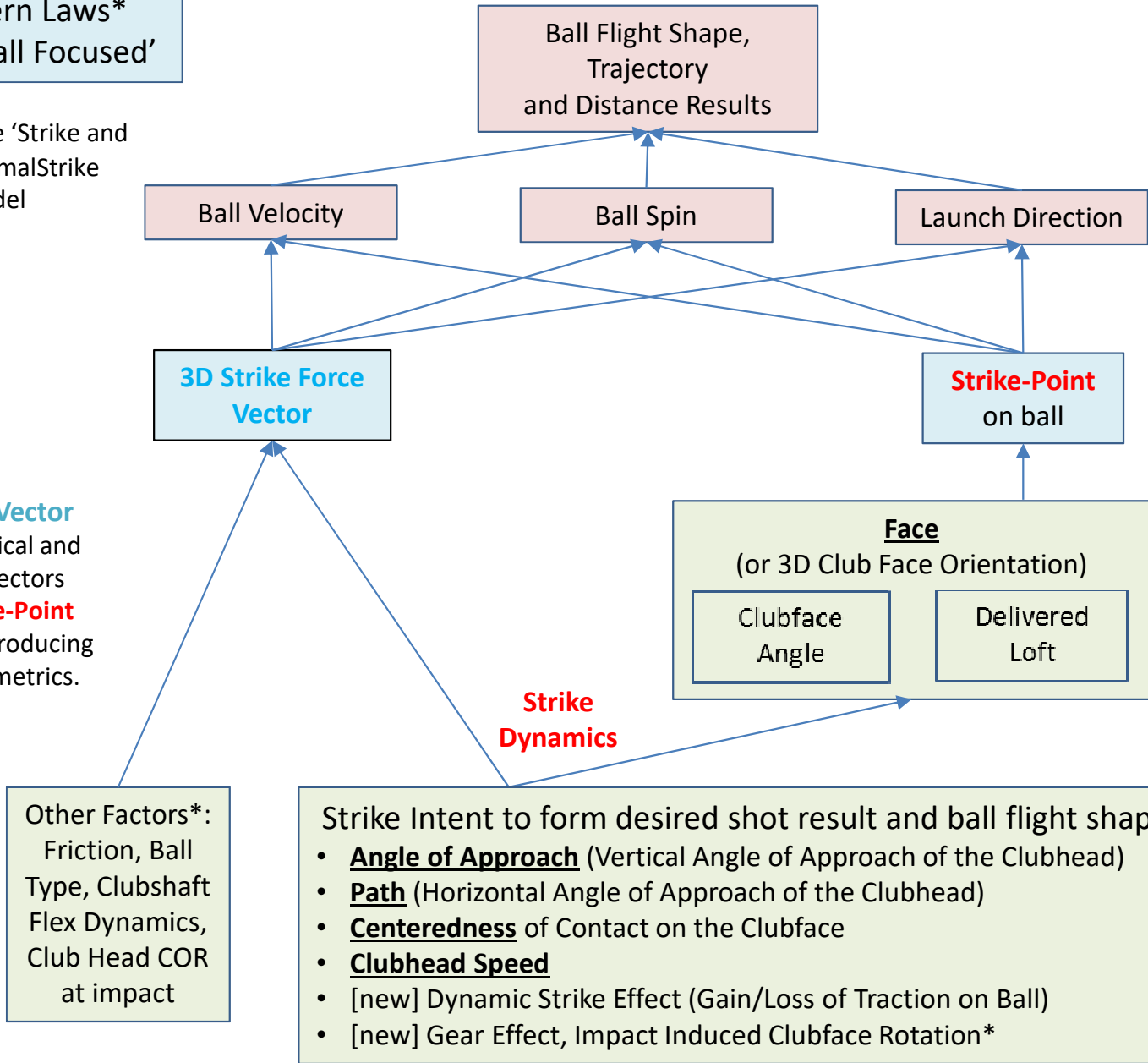
\*

# MODERN BALL FLIGHT LAWS (detailed view)

2017 – Modern Laws\*  
‘Strike and Ball Focused’

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

**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\*

**Strike-Point**  
The precise point of impact on the ball at the point of separation of the ball from the clubface.

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)