

## **How to Resolve Chronic Swing Faults What They Don't Teach You in the PGA Manual**

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Virtually every PGA playing and teaching pro knows that ball flight is primarily controlled by five factors:

1. Club Face Alignment
2. Swing Path
3. Angle of Attack
4. Hitting the Sweet Spot
5. Clubhead Speed

Swing faults are to be expected when a player's swing displays characteristics that adversely affect one or more factors above. The pro consulting with the player will identify the aspects of the swing producing aberrant ball flight and will then attempt to instruct the player toward correction. Frequently, two, three, four, five . . . or more adjustments are made, often resulting in such modifications as altering stance, swing amplitude, hip/shoulder turn ratio, grip and so on.

In the majority of players, these swing changes are necessary to compensate for imbalances in the musculoskeletal structures of their body. Eventually, the experienced teaching pro finds a way to trick the system, allowing the player to overcome the swing fault of primary concern; at least for the time being.

### **IDENTIFYING THE ELUSIVE OBVIOUS**

No matter how good you are at tricking the system, it is always just a trick, and tricks are compensations. The more compensations a player learns and attempts to manage to overcome structural mal-alignment, the more likely they are to experience inconsistency in their game. This is because the brain is the organizing force behind any bodily movement and works, in a sense, like a computer; the more windows you have open, the slower it runs. Brain computing speed is crucial when you consider that the movement from the top of the backswing to impact can take place in as little as 250 milliseconds, yet it takes approximately 300 milliseconds to process a new movement!

The harsh reality is that the brain processes information in series. Stated simply, when your clients have more than one thing to concentrate on, they will either be forced to think about what you are telling them to do, or, hitting the ball. If they concentrate on altering their stance in addition to one or more aspects of their swing, they are usually lucky if these work to correct the flight of the ball. And if the swing does improve, this improvement is usually transient! There are sound physiological reasons for all this.

### **THE FOUR NEUROMECHANICAL FACTORS THAT GOVERN THE FIVE BALL FLIGHT FACTORS**

The body is a complex system of interrelated systems. Those predominantly involved in producing the swing are the nervous, muscular and skeletal systems, which combine to create the neuromechanical system.

The player's neuromechanical system's state of readiness can always be determined by assessing the following four physical factors:

1. Muscle Balance and Flexibility
2. Static and Dynamic Postural Stability
3. Strength
4. Power

Each individual has a given level of ability and a specific level of skill relative to the demands of any given task or challenge; in this case producing a sound swing is the challenge or task at hand. It is critical that the serious teaching pro learns to identify lack of skill or physical ability in any of the physical factors as they relate to the golf swing (Table 1). Failure to make the

connection between performance and the neuromechanical system will ALWAYS RESULT IN SHORT TERM FIXES TO SWING FAULTS!

As you can see by reviewing Table 1, the four factors most critical to controlling ball flight are under the greatest influence of muscle balance and flexibility plus static and dynamic postural stability. These factors directly influence both joint mechanics, muscle recruitment patterns and consistency of movement. I am sure you would all agree that if you had to trade some distance for a straighter shot you would have a much greater chance of lowering your handicap.

If physical factors 1 and 2 (Table 1) are not adequately addressed and attempts are made to improve physical factors 3 and 4, you only get to walk further into the rough!

**Table 1**  
Correlating Ball Flight Factors and Physical Factors

| BALL FLIGHT FACTORS          | PHYSICAL FACTORS                         |
|------------------------------|--|
| Clubface Alignment (1,2)     | 1. Muscle Balance and Flexibility        |
| Swing Path (1,2)             | 2. Static and Dynamic Postural Stability |
| Angle of Attack (1,2)        | 3. Strength                              |
| Hitting the Sweet Spot (1,2) | 4. Power                                 |
| Clubhead Speed (1,2,3,4)     |  |

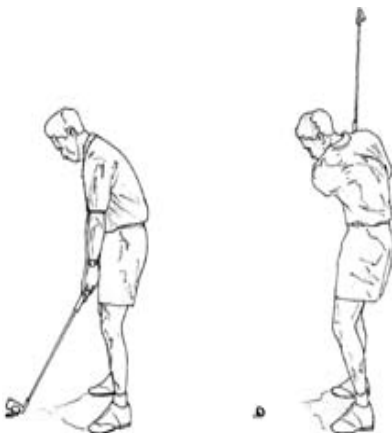
As indicated here, Muscle Balance (1) and Static and Dynamic Postural Stability (2) are intimately related to control of all ball flight factors. In contrast, Strength (3) and Power (4) are only of great influence to clubhead speed. Interestingly, most golfers who condition spend the majority of their time developing only those physical factors that improve clubhead speed, which is only ~20X responsible for controlling ball flight!

**NOT ALL MUSCLES WERE CREATED THE SAME**

- Joint dysfunction
- Muscle imbalance
- Static or dynamic postural stability problems

All the above are reasons why a player's swing faults are hard to improve long term. Aside from blatant lack of skill, muscle imbalance is by far the most common source of altered neuromechanics and both poor and/or inconsistent swing mechanics.

Teaching pros need to be able to identify and correct length-tension relationships. Length-tension relationships (the balance between muscles and groups of muscles) represent and dictate both the real-time function of the working joints and how well the body executes the brain's swing command. In the presence of muscle length-tension imbalances, what may be a very good motor engram leaving the brain often manifests as a swing with notable faults (Figure 1A and 1B). This is commonly expressed by the golfer as "damn, I thought for sure that was going to be a good one!"



**Figure 1A** - A player with muscle imbalance is most easily identified by his/her poor posture. Altered spinal curvatures disrupt spinal mechanics, leading to compensatory movement at other joints. As demonstrated above, increased thoracic kyphosis restricts torso rotation causing faulty swing mechanics; no matter how well trained this player may be, there will always be neuromechanical distortion of his swing.

**Figure 1B** - When the player's muscle balance and postural alignment are optimal, there is minimal engram (motor command sequence) disruption. In this state, good motor programming results in long term correction of swing faults and minimizes chances of orthopedic injury.



One of the main reasons for muscle imbalance is the way our muscles are designed. We have muscles that are classified as TONIC and muscles that are classified as PHASIC (1,2,3). The physiological reality of how these two muscle types react to both physical and mental stress is what underlies many chronic swing faults that persist despite having spent large sums of money on elite coaching and high-tech clubs (Figure 2)!

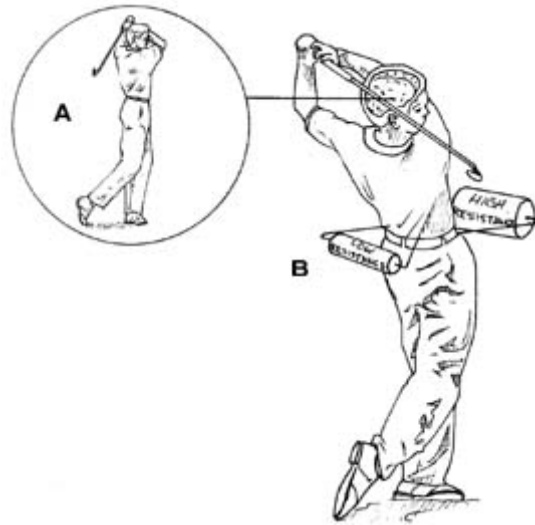


**Figure 2**

Today's golfer will go to any extreme, spending unlimited amounts of money on high-tech equipment in hopes of gaining a few extra yards on his drive. What the teaching pro, playing pro and amateur must realize is that the club is only as good as the player holding it! It is failure to make this realization that has resulted in a sixteen-year stagnation of the average American golfer's handicap.

- Tonic muscles are ideally suited to postural duties such as holding an address posture and an optimal swing axis. Tonic muscles react to aberrant physical or mental stress by shortening and tightening.
- Phasic muscles are more suited to dynamic movements such as actually swinging and accelerating the club. Phasic muscles react to aberrant physical or mental stress by lengthening and weakening.

One of the key reasons for the difference responses between the muscle types is the threshold of stimulation; tonic muscles have a low threshold of stimulation, while phasic muscles have a high threshold of stimulation (Figure 3). Additionally, as we age (beyond 40) our phasic abdominal and gluteal (butt) muscles tend to weaken, further encouraging muscle imbalance.



**Figure 3A-B**

**A** - Experienced golfers often have a very good mental image, or consciousness of the ideal swing, and try with all intent to execute one.

**B** - Because tonic muscles have a lower threshold of stimulation than phasic muscles and tend to override commands to antagonistic and synergistic phasic muscles, which have a high threshold of stimulation, the physical image or expression of the motor command may not represent the mental image used to generate the movement. Here the tonic lumbar erectors and hip flexors override the phasic abdominal and gluteal musculature, pulling the player into an over-swing; not only does the player frequently not realize he/she is doing this, back pain is a common byproduct.

Note that muscle imbalance is most easily identified as poor posture (the key is recognizing what is poor posture versus good posture!). When a player develops any degree of muscle imbalance, the swing motor engram that leaves the player's brain is altered in proportion to the degree of facilitation (4) and muscle imbalance that exists in the musculoskeletal system. Additionally, each time a player executes a swing in the presence of muscle imbalance, the engram is progressively altered and the muscle imbalance is further facilitated.

This is one reason that golfers play for five or even ten years with minimal improvement in their handicap; even though their understanding of the game is improving, their level of neuromechanical imbalance is of greater influence on their game!

#### THERE IS A SOLUTION!

You can make significant gains toward a better swing by simply stretching the shortened tonic muscles just before you play (Table 2). Using slow static stretching on the shortened tonic muscles only, you will get sufficient results to see an immediate change in swing mechanics.

Don't be surprised if you develop an unexpected swing response after stretching a few shortened tonic muscles. This is because you are now seeing a more accurate representation of the messages leaving your brain, which are frequently chock full of compensatory messages programmed in by past experimentation and under the influence of a teaching pro that was doing his best with the knowledge he had at that time.

The good news is that as you restore normal muscle balance in either your client's body, or your own, the coaching you receive from that point on has a fighting chance of making long term changes in your swing!

**Table 2**

Tonic Muscles That Frequently Shorten, Effecting Swing Mechanics

| TONIC MUSCLES      |                     |
|--------------------|---------------------|
| Cervical Extensors | Quadratus Lumbourm  |
| Levator Scapulii   | Iliopsoas           |
| Upper Trapezii     | Rectus Femoris      |
| Scalenii           | Hamstrings          |
| Subscapularis      | Adductors           |
| Pectoralis Minor   | Piriformis          |
| Biceps Brachii     | Tensor Fascia Latae |
| Wrist Flexors      | Gastrocnemius       |
| Lumbar Erectors    | Soleus              |

REFERENCES

1. Spring, H. Stretching and Strengthening Exercises New York: Thieme Publishing, 1991. , New York,
2. Lewit, K. Manipulative Therapy in Rehabilitation of the Locomotor System, 2nd Ed. Oxford: Butterworth-Heinmann Ltd., 1991.
3. Chek, P. **The Golf Biomechanic's Manual** C.H.E.K Institute, 1999.
4. Dorlan's Illustrated Medical Dictionary, 27th Ed. W. B. Saunders, 1988.

GLOSSARY OF TERMS

- Length-tension relationships - the balance between muscles and groups of muscles.
- Motor engram - a series of neurological processes or commands associated with a specific goal.
- Facilitation - when an impulse has passed once through a certain set of neurons to the exclusion of others, it will tend to do so on a future occasion and each time it traverses this path the resistance in the path will be smaller. By the Law of Facilitation above, repetition of any movement (good or bad) becomes progressively more programmed in the nervous system.