**SCIENTIFIC THEORY**

**Karl Popper (An Austrian-Born Philosopher): Popper defines science as a discipline founded on the creation of hypotheses that predict phenomena - preferably new ones - that can be tested. If a prediction fails, the scientist abandons the hypothesis; if the hypothesis survives, the scientist does not claim to have proven it but merely to have established the hypothesis as a basis for further research. Popper's principle holds that testability rather than truth should be the criterion for judging scientific theories. For instance, Popper dismisses Marxism and psychoanalysis as "pseudo-science" because he believes those theories are so flexible that they can explain any fact and thus elude any test.**

**Max Planck's (developed Planck’s constant *E=hf*) more cynical view of science: A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents die, and a new generation grows up that is familiar with it.**

**Jack Kuykendall: Max Planck's view is definitely applicable to the golf swing. The incorrect dogma and closed-minded beliefs are rampant. No traditional golf instructor ever lets facts get in the way of a theory.**

**What is a Scientific Theory?  
From Stephen W. Hawking's, "A Brief History of Time":  
(1)    "A theory is a model and a set of rules that relate quantities in the model to observations that we make. A theory is a good theory if it satisfies two requirements.**

* **First it must accurately describe an observations on the basis of a model that contains only a few arbitrary elements**
* **Second, it must make definite predictions about the results of future observations.**

**Any physical theory is always provisional, in the sense, that it is only a hypothesis. You can never prove it. No matter how many times the results of experiments agree with some theory, you can never be sure that the next time the result will not contradict the theory.**

**On the other hand, you can disprove a theory by finding even a single observation that disagrees with the predictions of the theory.**

**A good theory is characterized by the fact that it makes a number of predictions that could, in principal, be disproved or falsified by observation. Each time new experiments are observed to agree with the predictions, the theory survives and our confidence in it is increased. But if ever a new observation is found that disagrees, we have to abandon or modify the theory.  
At least that is what is supposed to happen. But you can always question the competence of the person who carried out the observation.  
Stephen Hawking's statements on theory paraphrased for golf by Jack Kuykendall:**

* **Since theories can't be proven, we can never be sure we have the correct theory for the golf stroke.**
* **But if the theory is mathematically consistent, and always gives observations that agree with predictions, we can be reasonably confident that it is the right one.**

**It should bring to an end the long history of ineffective golf theories. However, golf instructors NEVER let facts get in way of their theories. Misleading and incorrect instruction will always be a part of golf.**

**I will be using Stephen W. Hawking's criteria to disprove most of the theories used in traditional golf instruction. I will be pointing out both the correct and the incorrect statements. Unfortunately for golfers, the incorrect statements outnumber correct statements by a large factor.**

**I will also state my theories and leave them for anyone to find a single observation that disagrees with the predictions.  
I use the following equations to make my predictions:**

* ** Conservation of momentum**
* ** Velocity is distance divided by time**
* ** Work = (force)(distance) = kinetic energy**
* ** Torque is equal to: (force)(radius arm)**

**These equations predict the following:**

* **Clubhead Speed Production:** 
  + **The body is a stabilizer and contributes approximately 10%.**
  + **Arm speed (muscle that move the arms from the top of the stroke to half way down in the downstroke)contribute approximately 30%.**
  + **Shorting the radius of an arc contributes approximately 20%.**
  + **Right wrist extension (stretch reflex) and rotation (pronation) contributes approximately 35%.**
  + **Left forearm rotation (supination) contributes approximately 5%.**
* **The WORK necessary to go from an 80 mph clubhead speed to a 110 mph clubhead speed is doubled.**

**This is why the approximate 10% contribution from body rotation cannot contribute significantly to increasing clubhead speed.  
This is why "big muscle" theories of the dog wagging the tail are perceptions and not reality.  
The only place that "double the work" can come from is:**

* **Arm speed: Muscle that extend the arms**
* **Stretch reflex of wright wrist**
* **Shortening the radius of an arc**