THINKING THEORETICALLY

By

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When I ask students what a theory is, they usually balk at a definition. A lot of people are confused about what a theory is and is not. A theory, as used in sciences, refers to a set of explanations for generalizations about a subject matter. Likewise, when I ask what constitutes a science, there is almost an equal amount of confusion.

Most students will mention the scientific method, hypothesis testing, experimentation, statistics, sampling, etc. By themselves, these activities do not constitute scientific research. A science, historically understood, has meant a 'systematic body of knowledge' with some sense of unity. Thus, it is not unusual to mention the moral sciences (as did **John Stuart Mill**), or the theological sciences (as did **St. Thomas Aquinas**). What matters to theory and to science is coherence. That is why Einstein spent the remainder of his career attempting to reconcile the theories of the microcosm with those of the macrocosm, or the so-call **unified field theory**. Logical coherence and internal consistency are necessary characteristics of a good theory; bad theories may fail on logic alone. Others depend on evidence for their demise. According to most experts in the philosophy of science, we can never 'prove' a theory. For example, the next observation, or series of observations, may contradict our hypothesis, thus we cannot know that we are right in advance of those observations (This is the skepticism expressed by **David Hume** in the 18th Century.).

Nevertheless, we all have informed opinions about how things work and that is our starting point for organizing ourselves in a real-life evaluation. Sometimes, the program we are evaluating already has a 'logic-model' built into its design, or its enabling legislation expresses the theory behind the program. Regardless of whether one considers herself a theorist, theories play an important role in our interpretations of *how the world works.* Logic-models are merely formal expressions of a theory.

Practical Theories

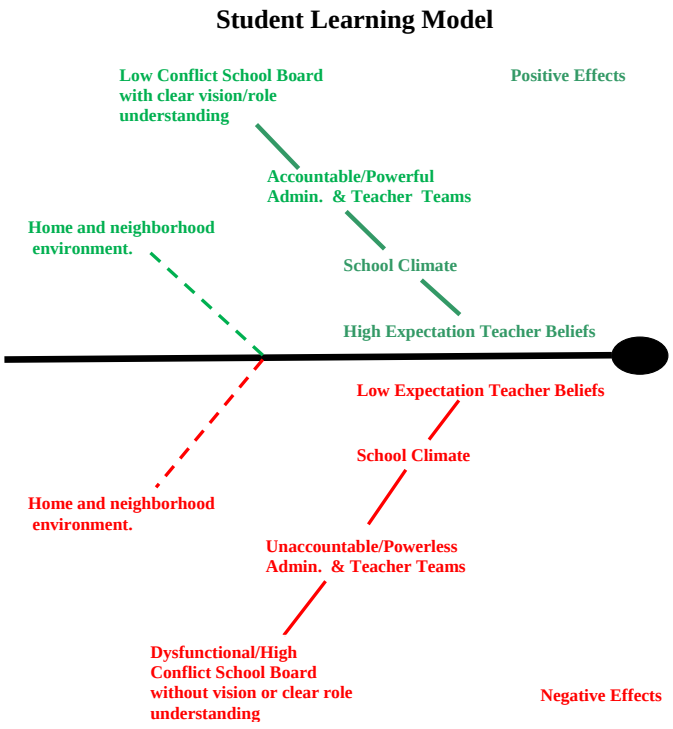
Most people do not spend a lot of time theorizing, studying causes and effects. To make things simple some planning facilitators use a diagram, known as a "fishbone" to help program managers, administrators, and line staff analyze the 'critical success factors' related to their program goals. Facilitators draw a fishbone on the board and ask practitioners to fill in the pieces. What are the positive performance drivers (direct or indirect)? What are the negative performance drivers (direct or indirect)? Through what drivers do indirect drivers (secondary factors) function? How much influence does each driver have?

Recognizing where the levers of change might be, from a practical standpoint, requires an understanding of how things get done. In industrial settings, this is sometimes referred to as the 'production process.' Managers and policymakers in public programs do not generally think in terms of production, or producing a product for consumption, though services are clearly

fashioned to meet specific needs of the people who are provided the services. Even the terminology used to describe the recipient has practical theoretical implications relative to other terms such as client, customer, stakeholder, public, citizen, or owner.).

Figure 1, below is an example of a partially completed 'fishbone' related to the question of what drives student learning:

Figure 1



The Good, the Bad, and the Ugly Theories

Not all theories deserve equal weight. The ongoing political dispute between proponents of **creationism** and those who study **evolution** revolves around what counts as a theory. (It is worth noting that one side is supported by a minority of ministers, the other by a majority of scientists.) Some theories have been completely discredited, like those about the earth being flat. Even so, some people somewhere believe that it is. There is actually a **Flat Earth Society** devoted to that proposition. What matters between good theories and bad theories is not merely their status as logically coherent explanations, which is a precondition of any good theory, but the weight of evidence, often referred to the explanatory power, relative to the explanatory power or evidence supporting alternative explanations.

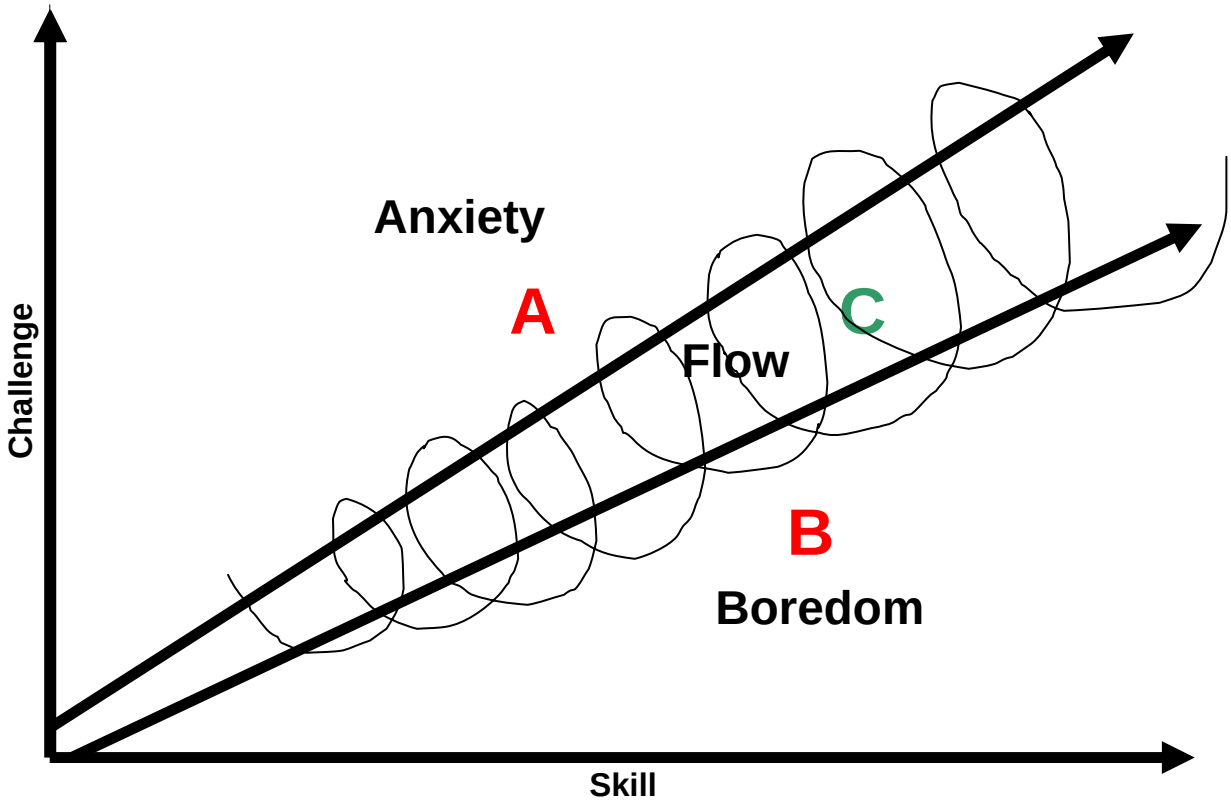
This is where it gets tricky. Evidence is a wide-ranging term. For the theological sciences, evidence may be scripture, revelation, or certain professions by people of particular attributes or status. In the physical sciences, physical evidence is paramount. Quantities and tangible

measures of various kinds (e.g. distance, weight, and viscosity) are familiar to most people. Theories are good when they provide explanations about how things change (because of) or why they are structured as they are (in order to). Either way, theories are about understanding, which may, but not necessarily, lead to prediction and potential for control or manipulation.

A Good Theory: Flow

In *Flow: The Psychology of Optimal Experience*, **Mihaly Csikszentmihalyi** presents a theory that has great explanatory power. That is, the theory applies to a wide variety of circumstances, it is robust in the sense that it stands up, outside the lab, in real-world situations where there is contamination of various kinds, under a variety of situations.

Figure 2: Csikszentmihalyi's Flow Theory



Flow is identified by two important characteristics: (1) the loss of the sense of time, and (2) the loss of the sense of self (self-consciousness). Some people might even describe it as 'an out-of-body experience.' The aches and pains of daily life disappear. The mind is clear, focused, engaged. Some people might even say 'happy.'

Constant and frequent feedback is essential for finding "Flow." As anyone who has read *The One Minute Manager* recognizes, it's not the monetary rewards that motivate (necessary but not sufficient), but the fulfillment of the activity and the confirmation of actualized, competent self

that spurs people to commit to the work at hand. It's the feeling of doing well at something meaningful that generates the satisfaction and energy of the Flow experience.

Flow works at the office, on the shop floor, in the classroom, and in relationships. Whether it's listening to music, which can be low-flow or high-flow, or listening to your spouse, which can also be low-flow or high-flow, it is the concentration and the appreciation for the complexity of the object of attention that sustains the experience of being in flow or not. One person may hear noise, while another hears a brilliant string ensemble. One person hears a spouse's complaints or "nagging," while another hears the heroic saga of fighting the good fight for the sake of what is good and meaningful in life. What matters in the experience is the effort to comprehend and to stay focused on something, which involves ***feedback*** (the spiraling loop in the illustration).

That feedback might be the fulfillment of expectations for the next quatrain of poetry or the next play in the football game, or the next verse of the Bible. Those mundane expectations bring the feedback through the confirmation of a skill, of a form of knowing, either by memory or by pattern recognition. It can also mean that the person is not performing, and needs to provide more effort, more concentration to get the reward. When there are interruptions that break concentration, poor feedback, or lack of connections between activity and results, flow is not likely to occur. When feedback is not present or a rhythm is broken, flow is very unlikely. As some people would say, "You've knocked me off my groove," or "You broke my train of thought." Either way, the concentration needed to sustain the activity had been disrupted.

From the standpoint of a theory, "Flow" is also 'elegant,' a characteristic of good theories recognized as far back as 14th Century by **William of Ockham**. Known as Occam's Razor, the principle is that, given a choice between competing explanations, the simpler one is better. Another term applied is parsimony. An explanation is parsimonious if it is economical in the use of words. Alternatively, Harry G. Frankfurt, professor emeritus of philosophy at Princeton, notes in his book, *On Bullshit*, that deceptive explanations tend to be 'pleonastic,' that is an explanation that is full of a lot of words, i.e. bullshit.

Good theories are simple: $E=mc^2$

This notion of robustness and theoretical power applies to all kinds of theories in all kinds of subject areas or 'domains.'

Bad Theory #1: Low Self-Esteem Causes Behavioral Problems

In his book, *The Optimistic Child*, **Martin E. P. Seligman**, former president of the American Psychological Association, and Robert A. Fox Leadership Professor of Psychology at the University of Pennsylvania, describes the self-esteem movement and the theory upon which it is based as one of the most flawed and dangerous theories of the 20th Century. It is based on the notion that poor self-esteem is the cause for drug abuse, teen pregnancy, school drop-outs, and juvenile delinquency. The solution to these maladies is the constant reinforcement of positive statements to children about themselves. The movement based on this theory has many celebrities and prominent advocates. From the 1960s onward, the movement gained acceptance

in schools of education and psychology, resulting in the institutionalization of self-esteem counseling in almost every high school in America.

Since its inception as public policy, the incidence of major depression, as defined clinically, has increased seven-fold. Suicide rates, likewise, have increased. And there is little evidence that the self-esteem movement has resulted in anything but failure. Still the theory continues to be taught.

What the self-esteem movement did was to institutionalize praise, regardless of performance, essentially randomizing rewards and punishments, cutting the causal linkage with performance. When performance and rewards are once again linked, in the real world, the experience appears unfair. Like the dogs in experiments where rewards and punishments are randomly distributed, children experience 'learned helplessness,' and become depressed.

Alternatively, Seligman's work on optimism and resiliency relies on a theory that rejects the most fundamental elements of the self-esteem theory: the attribution of self-esteem through verbal reinforcement (You'll have to read *The Optimistic Child* to find out what the alternative perspective is.).

Programs based on the self-esteem theory will inevitably fail. They will fail precisely because they are based on a bad theory. Likewise, foreign policies and programs in other areas based on bad theories will cause more problems than they will solve. So, a good theory is important.

Bad Theory #2: Balance-of-Power in International Relations

For more than 50 years the prevailing theory of international relations in the discipline of political science was 'balance-of-power' theory. The leading proponent was Hans J. Morgenthau, a professor at the University of Chicago, whose book, *Politics Among Nations* was the most popular textbook in the field. Unfortunately, it still is.

The theorem posited in the book, as in the theory (in one of its most lucid moments), is that parity among nations, in bi-polar, or multi-polar environments, produces stability and peace. Imbalance produces instability, disruption, and war.

The problem with the theory is that it can never explain long wars, which are conflicts characterized by relative equality between contenders (think of Muhammad Ali versus Joe Frazer). Preponderance, where one side is much stronger, is a problem for Morgenthau's theory. It would lead to violence. What is more problematic for the balance-of-power theory is the occurrence of long, major wars between countries that are equal in power.

A contending theory, known as the 'power transition theory,' posits that equality is more likely to produce conflict than inequality. According to this theory, peace occurs when the environment is characterized by high degrees of inequality between competing nations. The situation would be analogous to parents with small children; whereas conflicts occur more frequently and more intensely as the children reach their teens, but resolves after the children reach full maturity and independence (the 'power transition' is complete).

The evidence with respect to major wars is overwhelmingly supportive of the power transition theory (preponderance equals peace) and not the balance-of-power theory. In *The War Ledger*, A.F.K. Organski and Jacek Kugler found that half of all instances where major powers have reached near parity in the modern age has resulted in war – usually a major war lasting several years (e.g. World War I, World War II, etc.). Conversely, short, lopsided wars could only occur when one side has a preponderance of power (e.g. Mike Tyson versus Joe Adams, or U.S. versus Grenada). Internationally, order results relatively quickly when there is a lopsided conflict. Increasing parity, as in the post-1980 international economy, results in increasing conflict.

Policies based on balance-of-power theory would differ significantly from those based on power transition theory. Moreover, the applicability of the power transition theory extends well beyond international relations. Conflict in all kinds of human social interactions can be predicted on the basis of the relative power of the protagonists. In fact, the power transition theory has been used to predict black market exchange rates in developing countries and may be used to explain increases and decreases in the value of blue-chip stocks, where anticipated escalation of conflict generates uncertainty and capital flight to more secure investments. Preponderance models also help explain failures in policies based on balance-of-power, were conflicts and violence increase due to a lack of preponderance. Below are two examples, one showing how preponderance works and how relative balance fails.

Comparing Theories

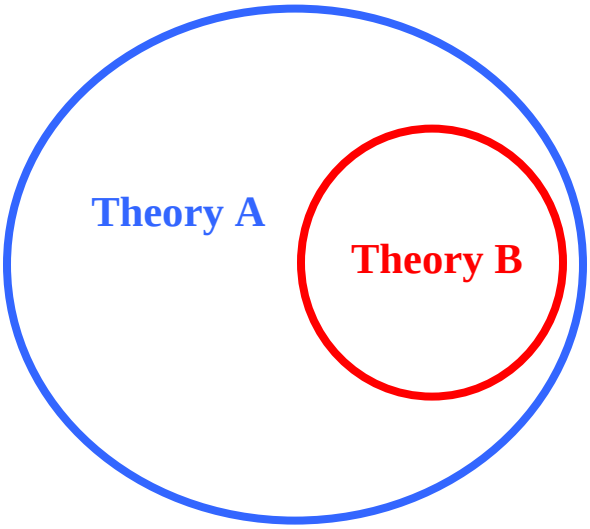
Theories fail when they do not account for certain events of interest. No theory explains everything, not even one as famous and well established as **$E=mc^2$**. Recently, some scientists have revisited Einstein's own speculation that the speed of light may not be constant as assumed in his famous equation, which may enable them to explain things that his theory could not.

Propositions may be adjusted, assumptions changed or relaxed, or variables shifted or reordered in importance as research progresses in an area of research. It is rare that entirely new perspective, or so-called 'paradigm shifts' in **Thomas Kuhn**'s terms (See *The Structure of Scientific Revolutions* for a full exposition). Some philosophers have even challenged the notion that such large intellectual shift actually occur as abruptly as Kuhn postulates. Most would assert that in most cases, theories evolve with additions, amendments, and other adjustments, based on various kinds of tests. On occasion, two or more theories provide competing explanations for the same phenomena. The famous mathematician **Imre Lakatos** provided three criteria for determining the superiority of a theory relative to another theory. The three principles are these:

Theory A is superior to theory B if, and only if:

1. Theory A explains all of Theory B (subsumes B); and
2. Theory A explains more than Theory B (has 'excess empirical content'); and
3. Theory A explains data more simply than Theory B (principle of parsimony, known as Occam's Razor).

Figure 3: Lakatos Criteria Illustrated



First Criterion: Elaborated

The first principle is deceptively simple. That is why is it important to recognize what makes it deceptive. Disagreements between some schools of thought are more fundamental than how to interpret data or rearranging causal relationships. The very basis for making statements that are true or not true depend on criteria that may be laden with metaphysical assumptions about what is a valid 'fact' and what is not.

To say that one theory subsumes another is to say that the theory (Theory A) explains all of the phenomena contained in the domain labeled 'Theory B,' that there is nothing in Theory B that cannot be explained by reference to the derivations or statements made in Theory A. Moreover, there are things in the domain of Theory A which cannot be explained by Theory B. Consider the ongoing dispute between the practitioners of witchcraft and those of medical science:

A man goes to Mardi Gras, has enormous bouts of drunken excesses and debauchery. Suddenly, he gets sick, complaining of abdominal pains, fever, vomiting, and diarrhea.

Medical Science Explains the Problem

The man goes to see a physician. The doctor does tests and discovers that the man has amoebic dysentery. The doctor prescribes medications and the man recovers. His life, however, does not get back to normal so quickly.

Voodoo Explains the Problem

Unknown to the physician, prior to the man's illness, he had a fight with his wife about his frequent purchase and use of Mardi Gras beads (Of course!). The man's wife attends a séance with Marie Laveau, where a spirit tells her more about his mischief with a neighbor lady. In

anger, the wife shells out $50 for a spell, a hex, to make him sick. So, of course the man falls ill until the wife's anger is satisfied, several weeks later.

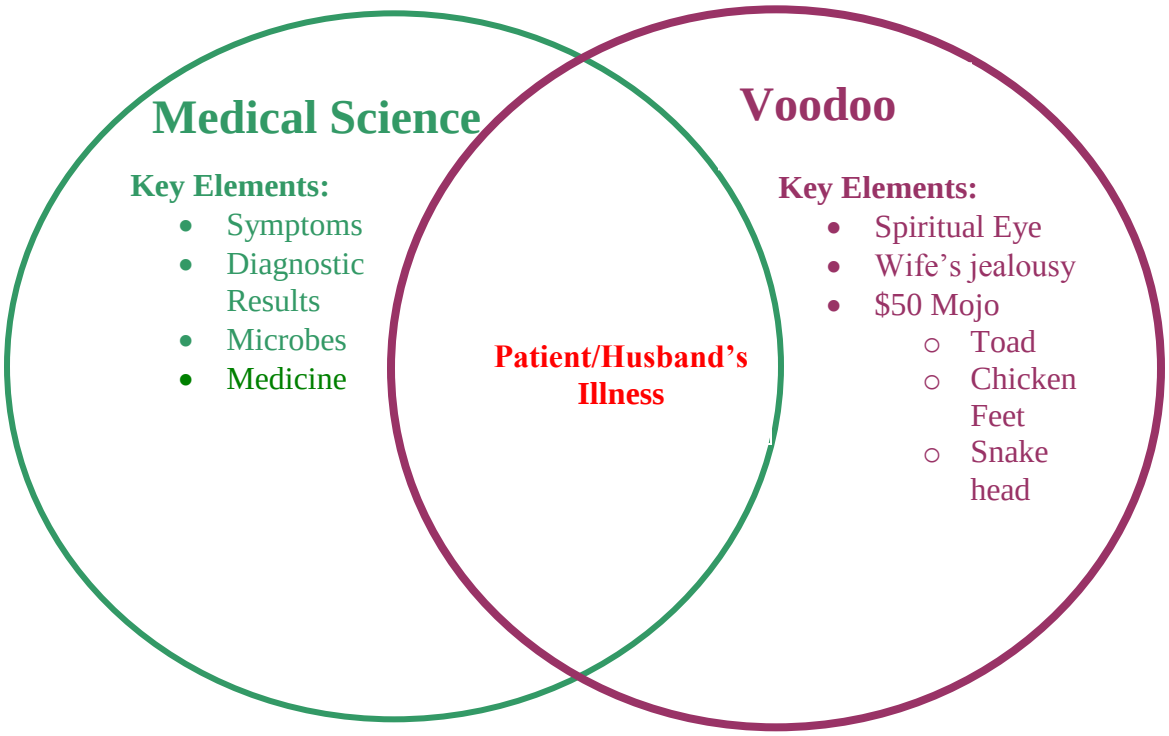
Witchcraft and the Theoretical Problem of Outcomes

While medical science can easily discern the presence of culprit microbes in the man's stool, there is almost no way that it could have predicted the timing of his unfortunate infection. The specific timing of his illness is central to the claims of voodoo (as well as the $50.00 fee). Of course, the physician's bill has not yet arrived, but these 'facts' are 'epiphenomenal' (i.e. irrelevant) to the practices of medical science. Meanwhile the adherents to voodoo reject scientific tenets, including the use of randomized, double-blind experiments. The world to them is not random, but controlled by very specific spirits; random experimental selection would ignore that essential cosmology. Cosmology and reality are simply defined differently for each. Put differently, the range of relevant facts about which there is an explanation to be had, are completely different. Two different metaphysical games are being played out over what only appears to be the same concerns. They are not.

In this case, the domains of witchcraft and medical science intersect, but do not include the same sets of facts or phenomena for be explained. As Alasdair MacIntyre might say, "the response to a forward pass is a lob over the net." As Ludwig Wittgenstein would easily note: medical science and voodoo are different games, with different rules, though remedial efforts at failed practices in both domains have essentially the same logical structure. Both theories lend themselves to a "logic model' of implementation, though with different levers of manipulation for different purposes. The superiority of one theory over the other, using Lakatos' criteria, however, is problematic. Lakatose' criteria cannot be applied because the phenomena involved in each scenario is only partially common to both 'logic models' and theories of how the world works.

The Venn diagram in Figure 4 illustrates the comparability problem with regard to voodoo and medical science.

Figure 4: Comparing Medical Science with Voodoo



Theory A (medical science) cannot subsume Theory B (voodoo) because there are phenomena that Theory B explains that cannot be explained by Theory A. Specifically, medical science cannot explain why the man became ill after the ***mojo*** was administered and not before. Medical science may account for the presence of bacteria in the food he tasted; however, it cannot explain why there was not bacteria in food he tasted before this event, or why he became ill ***after*** insulting his wife (so she thinks). Likewise, voodoo cannot explain the presence of the bacteria; why not salmonella? Voodoo is silent.

These factors are 'epiphenomenal' to medicine. That is, they fall outside the domain of phenomena 'that matter' to medical science. Some might even say that they are irrelevant to science. On the other hand, the same may be true of voodoo's view of medical science, which could only explain the way the man fell ill, not 'why.' Medical science says nothing of the man's return to fidelity. The physician fails to even address that question as he releases the patient from intensive care unit.

It is important to remember in the above scenarios, that it may be months after the ***mojo*** that the man falls ill. And it may require several doses of antibiotics before the man recovers fully from the disease. In both cases, the effectiveness of the practices are subject to certain vagaries owing to incomplete control and/or information, or so the defenders of each theory would allege. Neither has a knock-out punch to the other. People still pay the witchdoctor, just as they do astrologers, which in the topic of our next discussion, on Sir Isaac Newton.

The Ugly: Why Newton Studied Astrology – And Quit

Sir Isaac Newton is credited with inventing the notation used in calculus, a notation used even today. He is also considered one of the most important figures in the history of science. In fact, it is Newton's physics, not Einstein's, that put man on the moon. For all of his brilliance and achievement, Newton's physics and his notations for calculus are best remembered by most people. Lesser known is the fact that Sir Isaac Newton kept copious notebooks on **astrology** (not **astronomy**, which is the modern study of planetary movements).

This fact would not be a surprise to anyone attending the university when Newton was alive. Astrology was an essential part of the curriculum for most, if not all, European universities at the time, going back to the very founding of universities. Newton's experience with astrology is instructive in a variety of ways (see http://www.phys.uu.nl/~vgent/astrology/newton.htm). The most important aspect of the collapse of astrology is that it was not "beaten" by astronomy, though many adherents may have moved in that direction through their familiarity with certain data points. The key to astrology's demise has more to do with how satisfying it was to astrologers themselves, with the ideas that they were on to something, that they were making progress and the answers to essential questions about astrology were about to be answered. They weren't. It is a problem that really involves astrologers more than astronomers (see http://www.aplaceinspace.net/Pages/WillTarticle.html).

Why bad theories survive: Ideologies and Politics

One of the most frustrating aspects of being an evaluator or policy analyst is that most people have already formed opinions and standard explanations about how the world works which may or may not correspond to reality, and politicians in particular, like to perpetuate self-serving explanations, or explanations that provide cover for their political agendas. Sometimes bad theories, combined with politics, produce truly tragic results.

Lysenko's Theory of Acquired Attributes

Trofim Denisovich Lysenko was a Soviet-era biologist who was convinced that plants acquired traits and that those traits could be transferred to the next generation (e.g. the seeds from heavily fertilized wheat would grow strong in unfertilized land). His theory rejected standard genetics in favor of 'practice.' Joseph Stalin, combating his own ideological opponents, quickly supported Lysenko against the intellectuals. Lysenko's theory was put into practice across the entire Soviet Union. Millions of people died from starvation as a direct result of poor crop management, attributable in part to Lysenko's doctrines. Lysenko was not officially discredited until the 1960s. So horrible were the results that Stalin once made a casual observation that, "One death is a tragedy, a million deaths is a statistic."

Lysenko's theoretically absurd assertions were protected from any testing by political bosses. When the boss, Joseph Stalin, died, things turned ugly for Lysenko. The damage, however, took a generation to repair. In the Communist state, suspension of disbelief was essential. Lysenko was part of a more elaborate charade, one that would not, could not tolerate honest evaluation. Typically, political interests tend to corrupt the pursuit of truth. Truth usually wins in the end.

Both practitioners and theorists have abandoned communist theories (and voodoo), not because of the pressures from outside, but because the goods that the theory was supposed to provide, as the Marx's theory predicted, did not materialize, literally. Communist theory failed to produce the anticipated results. Like astrology, communism failed on its own terms, for its own adherents, who abandoned it themselves. Newton's frustrations with astrology were similar to those anyone would experience trying to use a theory that does not cohere or provide useful predictions.

Beware of the Cutting Edge of New Ideas: Old Theories May be Better

As we can see, the cost of applying a bad theory or the wrong theory can be severe. Nicolò Machiavelli (1469-1527), was a gifted theorist who used data wisely. Based on his research, Machiavelli warned leaders against involvement in the civil wars of other countries and the employment of mercenaries, based on numerous historical examples (*Discourses,* Chapters XX and XV). Unfortunately, good theories are only useful for those who bother to learn from them.

As Georg Wilhelm Friedrich Hegel noted, "We learn from history that we do not learn from history." Unfortunately, many American presidents have learned the hard way that Machiavelli was right and that involvement in foreign civil wars is not advisable (e.g. The Mexican Revolution (1910-1919), The Siberian Intervention of 1918-19, the Chinese Civil War (1945-49), Korean War (1950-53), Cuban Revolution (1956-58), Vietnam War (1945-1975), and Nicaraguan Revolution (1920-1979). In none of the above engagements did the United States actually win (Korea was a draw, and an unhappy situation to this day). As we look to our role in the Middle East, perhaps we can apply what we should already know, what should be common knowledge.

Final Thoughts: The Inadequacy of a Good Theory

Obviously, bad theories can lead to bad policies. But being right is not enough. While there are examples everywhere of bad theories being implemented and causing harm, finding alternatives can be difficult, and even harder to implement.

Good theories are difficult to adopt when the politics intervene, as most public health officials will attest, getting people to wash their hands is hard enough. Good execution of practices grounded in evidence-based research can be difficult as well, as even washed hands reveal the same attention to cleanliness. Even a good theory can be poorly executed in practice. Public health officials are constantly reminded of this when it comes to patients who deviate from the regime of treatments and medication that have been prescribed, or have adverse reactions to medications because they mistakenly take the wrong dosage.

In the area of public policy, implementation and practice may be the key to knowing the difference between a good theory and a bad theory.

QUESTIONS FOR REFLECTION

- **What are the characteristics of a good theory?**
- **What are the problems with a bad theory?**
- **Why is astrology not on the university curriculum anymore?**
- **When is it time to quit using a theory that has problems?**
- **What is the theory of the business that operates in the domain you are evaluating?**

REFERENCES

A.J. Ayer (1910-1989) In his work, *Language, Truth, and Logic*, he coined the notion of verifiability, which asserts that scientific expressions must be verifiable to be meaningful. His confrontation with Mike Tyson is the stuff of legend. Ayer is also credited with making the exemplary statement of the "theory of emotivism" by Alasdair MacIntyre in *After Virtue* (see also "The Achievement of Alasdair MacIntyre" for clarification of the moral issues that Ayer raises).

Friedrich Ludwig Gottlob Frege (1848-1925) His key contribution was the notion of 'sense and reference,' that all meaningful concepts have these twin attributes relative to other concepts in a theory; the best known example is "the morning star and the evening star." When we speak of size, say "big," we must do so with a comparison, compared to what? The sense of big is size, the reference is to a standard of some kind (e.g. inches). The thrust of Frege's position has to do with precision in developing a theoretical concept (see Carl Gustav Hemple's *Fundamentals of Concept Formation in the Empirical Science*s for a good example of how good concepts should be defined. It is a very formal, logical outline.)

Kurt Gödel (1906-1978) Gödel's Incompleteness Theorem suggests that there is no logically complete system that can justify all of its assumptions internally. The implication is that some values are always imported. The implication of Gödel's Theorem, is that all theories have 'limiting questions' (see Polanyi below) that cannot be rationally challenged within the theory.

Werner Heisenberg (1901-1976) Coined the uncertainty principle, generalized to mean that there is always error in measurement (see also Hawthorne Effect)

Thomas Kuhn (1922-1996) Wrote *The Structure of Scientific Revolutions*, which popularized the idea of a "paradigm shift," as a seminal work in the sociology of knowledge. The main idea is that there are large "leaps" in understanding that shift completely the foundation of the area of inquiry (Ptolemaic vs. Copernican universes). This idea has been widely accepted, though it has attracted many critics, including Lakatos.

Irme Lakatos (1922-1974) became famous for his criteria for comparing the superiority of theories.

Michael Polanyi (1891-1976) coined the expression "the limiting question" which is where you end up when answering the question "Why?" *ad infinitum* to the point where "it

just is." At that point, the person has reached "the limiting question," thereby identifying the ultimate basis for their suppositions, or their basic metaphysical or epistimological assumptions.

Karl Popper (1902-1994) Author of the notion of falsifiability. Many adherents of Popper seek critical tests for theories, which is itself a contentious concept, given the speculative nature of theories and the exactness of experimental designs.

Bertrand Arthur William Russell (1872-1970) One of the analytical philosophers at Cambridge, for whom all real knowledge was based on logic and mathematical truth. This movement was intimately associated with logical positivism, which asserts that any truth must be empirically verifiable (e.g. A.J. Ayer) or at least falsifiable (e.g. Karl Popper).

Alfred North Whitehead (1861-1947) Coauthor with Russell of the *Principia Mathematica* on logic, with emphasis on scientific claims.

Max Weber (1864-1920) Defined rational as efficiency; purpose or effectiveness is a 'given.' Efficiently making spit-balls is rational (for whom?). Clearly, Weber offers a limited understanding of rationality. He might also be credited with one of the earliest formulations of the fact/value dichotomy as it is understood in public administration.

Ludwig Wittgenstein (1889-1951) Author of the Tractatus Logico-Philosophicus, which is considered a successor to the *Principia Mathematica* (*à la* Lakatos criteria*).* Wittgenstein's *Tractatus* was hailed as major achievement for defining, exhaustively, the standards of scientific endeavor, of 'truth' for the logical positivists. Then, in his posthumously published *Investigations*, he dismisses scientific truth as one of perhaps many different kinds (e.g. religious, etc.). For Wittgenstein, truth is defined by the 'language game,' nothing more. This is particularly bad news for people who think religion can answer scientific questions and for scientists who want to disprove religious doctrines.