

## Chapter 2

# Tension, Relaxation, and a Sleight of Hand

To the academic mind, the road leading from the magical to the mundane is determined through hypotheses and test that are fleshed out by the arcane arts and apparati of science, and remarked upon by journalese so laden with statistics and jargon it would do an alchemist proud. Common folks do not trod lightly in such matters, so it is best for them to wait it out until a summary pronouncement is made that broccoli is indeed good for you, that daily exercise helps the heart, and that all that stress is due to, well, ancient lions and tigers and bears.

To another sort of inquiring mind, magic is not transformed by the bludgeon of method, but is rather a cipher that pivots on an obvious fact that is unseen, the true and simple solution that is easily veiled through a visual or logical feint, or sleight of hand. Whether that feint is wrought by nature or man, the solution merely requires a slightly altered point of view. The solution demands a different sort of thinking, primed by skepticism, not belief, and a cognizance that often it is human cupidity, not stupidity, that bars true understanding. In other words, method is always married to motive, and thinking requires as much Sherlock Holmes as it does Descartes.

So how does this fit into our little argument regarding stress? On the surface, it should not be apparent, since science is built upon untangling facts, not untangling motives. Yet stress research demonstrates how the perfect methodology of science is slanted by the imperfect motives of scientists. As the following examples attest, scientists can fool others and even themselves by failing to ask simple questions, or worse, refusing to answer them. Either way, profound knowledge can be tethered to the simple truths a single question entails. And when that question is ignored or unnoticed, we are left with magic.

## The Magic Act of Science

It's all a matter of silent persuasion. In magic, the magician conflates mediating and incidental events with causal elements by making sure the audience is diverted from the true event that causes the rabbit to pop out of a hat. By a wave of his hand, all eyes are diverted to the incidental movement of his hands, hiding trap doors behind smoke, mirrors and shadow, and leaving the rabbit's sudden appearance to a false cause.

The magician doesn't want you to look where you otherwise would like, and persuades you by his confidence, his moves, and your willingness to be deceived. It is after all, an act, and you can leave knowing that there was a trap door involved in there, somewhere. Oftentimes science itself can be like a magic act, when mere sleight of hand causes the trap door to be ignored or concealed.



*can science be a magic act?*

The sleight of hand obscures the independent variable, the correlating and perhaps causal event that precedes the event that concerns us, or the dependent variable. Adjust the independent variable, and the dependent variable changes as well. Hide, underestimate, or even deny its obvious existence, and attention is directed elsewhere to unlikely or impossible causes that verge on magic.

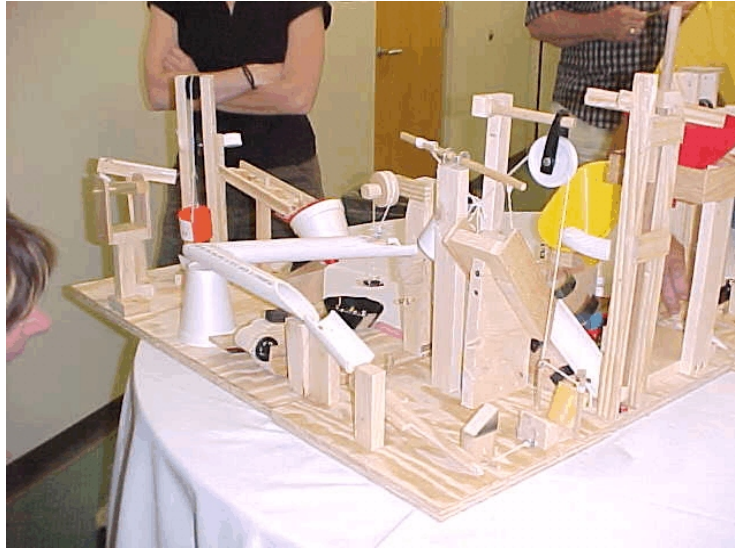
But magical acts can become a con, intentional or not, if one is not attentive to all of the independent variables that may correspond with a change, and most importantly, if one can perform the act without even mentioning them. It's easy to miss the truth if the truth is not necessary to understand a fact or use that fact in ordinary life, and it's even easier to bury it if the incentive is there to permanently ignore it.

Fortunately, for the disciplines that allow us to control and manage our physical and biological worlds, the magic trick has to be duplicated by one and all, and it is then that the rabbit does not pop so easily out of the hat. Design a car, a medicine, or a rocket ship, and as a prototype it will seem to work just fine, and the audience will be impressed that you can pull it all off, like our proverbial rabbit trick. But manufacture these things for a mass audience, and like leaving off a major bolt, the missing variable causes the car to break down, the medicine to cause fatal side effects, and the rocket ship to explode.

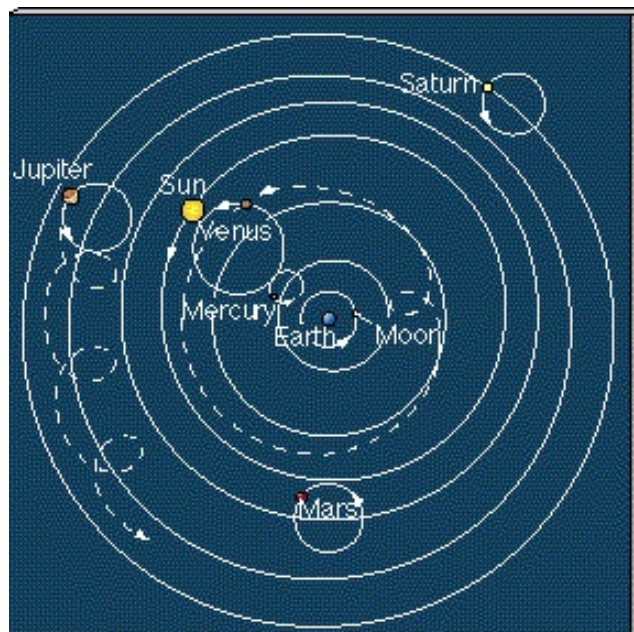
But what if they were still designed wrong, worked in practice, and the true independent variable is included in an incidental and non-obvious form? In this case, then the maker can get away with it, and with luck, perhaps get away with it for thousands of years. To illustrate, consider the plight of a bright Italian astronomer who lived in a time several hundred years ago in a society that was full of inquiring minds who wanted to know. During this self-styled 'Renaissance', the clockwork of the heavens was universally conceded to be a device of mutually enclosed crystal spheres, each affixed with planets and stars, and all revolving in celestial harmony about a quite stationary earth. There was of course reason to this rhyme, and Claudius Ptolemy was the man for the job. An astronomer who lived in the 2<sup>nd</sup> century A.D., Ptolemy made it all mathematical, and as workable as any absurd contrivance by Rube Goldberg. The planets and sun regressed and advanced, and even looped the looped in their courses. It was all predictable, so to speak, and to make the model complete and unerring, Ptolemy simply fudged his data. The Ptolemaic system in all its mathematical intricacy was handed down as workable dogma until Galileo saw the impossible logic hiding behind the fabric of the cosmos, and settled the issue with a telescope pointed to the planets. But of course, many of the learned folks at the time refused to look, sending Galileo in a paroxysm of anger, as he displayed in a letter to the equally distinguished astronomer Johannes Kepler:

*"We will laugh at the extraordinary stupidity of the crowd, my Kepler. What do you say to the main philosophers of our school, who, with the stubbornness of vipers, never wanted to see the planets, the moon, or the telescope although I offered them a thousand times to show them the planets and the moon. Really, as some have shut their ears, these have shut their eyes towards the light of truth. This*

*is an awful thing, but it does not astonish me. This sort of person thinks that philosophy is a book like the Aeneid or Odyssey and that one has to search for truth not in the world of nature, but in the comparison of texts."*



*A Wooden Model of the Stress Response as accepted today*



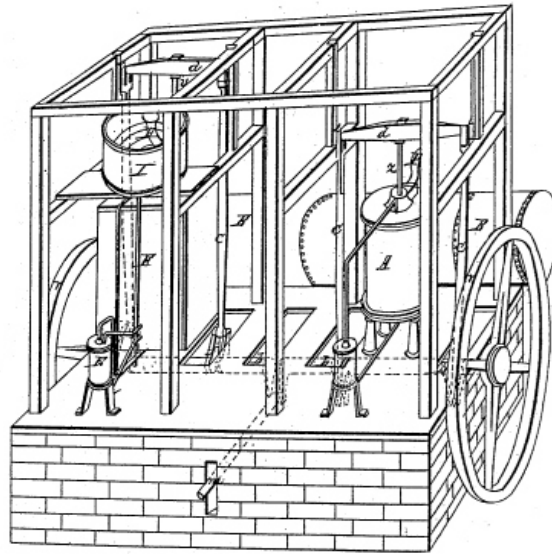
*Ptolemy's universal clockwork*

The con of course was on, and Galileo would have no part of it, and thus suffered banishment and censure. The matter would have rested there, and barring the telescope, Ptolemy's system would have continued unchallenged with its eccentric celestial metaphors and utility, cranking out with rough precision the motions of the heavens. The problem was, Ptolemy's system could predict the motions of the planets, but little else. The theory had no generality, and for those who simply wanted to predict planetary motions, there was no need to ascertain more elementary principles that underscored the movement of matter itself. Ultimately the hidden independent variable was not how the stars moved, but the hidden principles of physics, the laws of gravity and force that explained not only the solar system but the entire material universe. Given these new principles, formulated by Galileo and Kepler and formalized by Newton, even without a telescopic revelation the form and nature of the solar system and the universe that enveloped it would have to change. And with the advent of an Industrial Revolution that applied Newtonian principles of the dynamics of matter to planes, trains, and automobiles, it did.

## Gorrie and the Swamp Thing

Advance forward several hundred years to a similar problem, the cause and propagation of disease. This time we replace a physical theory with a biological one, namely the propagating cause of the disease of malaria. Until the late 19<sup>th</sup> century, everyone knew that the cause of malaria was implicit in the translation of its very name: bad air. After all, the disease did occur near swamps, lagoons, marshes, and other places where the air was dank and noxious, and these swamp or 'miasma' gases seemed to be the obvious cause of the dreaded illness. As a trained physician living in Florida during the 1840's, John Gorrie knew that the disease ebbed and flowed with the passage of the seasons, disappearing entirely in cold weather and unknown in wintery climes. Thus, it stood to reason, and he stood to profit from a device that could chill the air and thus relieve a scourge and provide a comfort to boot. So by hermetically sealing one's house and piping in the cold air, one could escape disease and sleep in air conditioned comfort. Gorrie's invention of the air conditioner was therefore an advance in medical technology, and the ability to make ice cubes and cool the house was icing on the cake.

*Fig: 1.*



*Gorrie's Air Conditioner*

Now we know in hindsight that Gorrie had it wrong, and that cold air was not a remedy or a preventative for malaria. The mosquito was the carrier of the disease, and by shutting

out and filtering the air, his air conditioning system also shut out mosquitos. Through no fault of Gorrie, the true independent variable, namely the mosquito, was hidden from the picture, and the entirely spurious cause of infectious swamp gas was accepted by an ignorant public. Of course, like Ptolemy's mechanical universe, the swamp gas theory worked, but it had no generality, and was superceded by modern biological explanations of disease that explained how it propagates through carriers like the mosquito. Moreover, like the Newtonian principles that authored the coming of the machine age, the mechanics of the biological world also permitted new and more powerful procedures, and rendered the swamp gas hypothesis into a mere curio of a more naive age.

As the physical and biological worlds surrendered their secrets to encompassing theories of generality and predicative power, the procedures that justified them became consigned to superstition and myth. Astrology, blood letting, demonic possession, and the like became supplanted with procedures that allowed mankind to command the independent

variables that were the true measure of our world, and with them allow us to understand and master the forces of nature. Of course, nature has not revealed all of her secrets, and only until recently has our own human nature been obliging to the inquiries of science. But as with Galileo and Gorrie, the progress has been halting, and often halted by a reluctance to see the obvious unless revealed by a brave and inquiring eye.

## Dr. Holmes and the Control Group Solution

Sherlock Holmes had an eye for independent variable and the clues that led to it. In hindsight it was all obvious, yet readers continue to find delight in being hoodwinked by the simple clues that only Sherlock could apprehend. Nonetheless, the motive as well as the culprit is the thing, and no matter how well hidden, a more prosaic cause doesn't quite thrill an audience. So, if Holmes pointed out that a slip on a tile caused the demise of a character rather than the butler, Dr. Moriarty, or some other shady character, it would somehow spoil the story. There is romance in attributing otherworldly, notorious, or otherwise unusual causes to the explaining the matter of fact attributes of the world. But if you consider reputation and money too, then divine clock makers, infectious swamp gas, and even the act of focusing on your belly button can be not only on the mark but on the money. That's was the problem that confronted Dr. David Holmes (no kin of Sherlock) when in a 1984 issue of the journal 'The American Psychologist' he confronted an age old mystery of not who done it, but what caused it.



*Holmes on the case*

It occurred simply, almost stealthily, and all in a closed room with nary a clue to spare. It was a climate that was quiet, distraction free. And the subject was preoccupied in a blissful stupor, silently pronouncing a single word in endless repetition. To paraphrase Sherlock, if all other explanations have been considered, then the last one, no matter how preposterous, must be considered true. And so it was. The blissful stupor, or a meditative state, had to follow like some a psychic knee jerk the repetition of a simple word in a quiet place. There could obviously be no other cause, as endless experimental recreations of the event seemed to prove. Holmes also recreated the scene of the crime, but *only* that. By instructing a group of subjects to simply eliminate distractive thoughts in a quiet place or rest, they became relaxed. Relaxation followed as easily the elimination of distraction, or rest, as it did when the focusing was added in. Focusing or attending didn't seem to count, Holmes assembled a wide range of confirming studies that found the same thing. Indeed across a score of physiological variables, the meditative state was no different from a state of rest.

And for the remainder of the studies that saw a unique cause in attention and even more unique result in meditation, Holmes simply noted that their error was elementary, namely that they did not separately control for distraction as well as focus. In other words, if 'meditative states' depend upon focusing in a distraction free environment, there were actually two independent variables that needed to be controlled for: focus and distraction. Indeed, if focus elicited relaxed states regardless of the degree of distraction, then the focusing we do while caught in traffic, figuring out our taxes, or staring blankly ahead during a boring lecture would be bliss. It isn't. Like poor Damocles nervously eating his meal with a sword dangling by a hair above his head, we can clear our mind but not our awareness of the world. And for achieving a state of relaxation, awareness counts.

Holmes argument was ultimately about *procedure*, not theory, as the scientific method requires the scientist as detective to control for variables. If not, then you can 'prove' that pigs fly, or for that matter, that unique meditative states exist. He simply and quite reasonably maintained that meditation studies, to be valid, must always include a comparison or experimental control group of folks who were simply instructed to rest.

The matter should have ended here, but it didn't. Holmes was roundly castigated for arguing against a time tested procedure, and that rest could not possibly be equivalent to the blissful state of meditation or elicit all the wonderful ascribed benefits to meditation, from curing disease to promoting world peace. And so, because Holmes could not be

refuted, he was ignored, and the meditation industry has chugged along to this day without need of such irritating control groups that could show otherwise.

The problem that Holmes confronted was that like Galileo's lack of a physical theory of matter, Holmes ventured no neuro-biological theory of rest nor of its opposite in the form of muscular tension. As we will see, because of this, like Gorrie's poor patients who had to spend the summer months sequestered away in air conditioned boredom to elude a non-existent malarial gas, meditating alone in a quiet space is still prescribed as common cure for stress.

As any magician would tell you, children and scientists are the easiest to fool because both have an ardent wish to believe. But whereas a youngster is fooled because of childish naivete, the scientist has the less forgivable sin of over bearing confidence. One of the reasons why a stationary earth, malarial gas, and meditative focusing seem so right is that they fit into common metaphorical schemes as to how the world works. For the simple world view of child, it is beyond his intellectual means to question how it would be otherwise; but for the sophisticated world view of a scientist, there is often no need to question, as his theoretical world view selects what is regarded as fact. The answer, as we shall argue next, must begin with one's mind open to, as a truly unprejudiced mind would have it, a consideration of just the facts. And, to begin our understanding of stress, we will begin with its opposite, namely the simple act of doing nothing.