

Finding Golden Needles Lost in the Biomedical Literature Haystack

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Our Journey

Our headlong rush into our own technological future has galvanized some of us, stultified some of us, and left still others far behind. Following are some musings that frequently visit me on quiet nights, as well as some exhortations for the profession at the risk of angry letters to the editor.

We think homo sapiens (us) can be dated back some 100,000 to 200,000 years; some say much further. The interesting part is that human history is recorded and known with gradually increasing certitude only for about 1.5 percent of that history - the past 3,000 years or so. Airplanes, the integrated circuit, quantum field theory, and the Internet, to name a few of the remarkable and more recent of our accomplishments, are all products of the past century, or 0.05 percent of human history. But that late start may only be the result of a twist of philosophical fate.

Consider that Aristarcos, in about 500 BCE (before the Common Era), theorized that the earth revolved around the sun. This heliocentric theory predated Copernicus' revelation by some 2,000 years. In fact, in the first edition of Copernicus' book, Aristarcos was referenced. He disappeared from future editions for some reason and all schoolchildren today learn that the concept was borne of the Renaissance.

Unfortunately for science, ancient Greek philosophers like Plato taught, with apparently sustaining authority, that all problems could be reasoned out of our minds *a priori*. Aristotle developed the notion that all things could be explained in this cosmic drama as the interplay of earth, wind, fire, and water. These teachings also were destined to survive for centuries, being largely abandoned - along with the clever but oh-so-wrong earth-centric solar system of Ptolemy. From the time of Aristarcos and his contemporaries to the time of the Renaissance, scientific revolution - at least from the concept we have of it today - made little progress. These were then aptly named Dark and Middle Ages, and they lasted from the fall of the Roman Empire to the Renaissance. Looking back to the time of Aristarcos, it tallies to nearly 2,000 years of zero progress. One wonders how things might have turned out if the scientific method had instead been encouraged and nurtured by the ancient influential thinkers.

Based on the timeline just described, that would put the first man on the moon roughly in the time of Jesus. But of course, things didn't work out that way. Richard Feynman said it all about philosophers when he stated, "I wonder why, I wonder why, I wonder why I wonder."

Bantering with a graduate professor of science philosophy in a moment of severe anguish, I asked him to complete this sentence: "Philosophy is important to us because without it we wouldn't have ____." Now try that with science. But I digress ... My dear old grandfather, also named Arthur, born in 1890, was a writer and book publisher, and at one time, president of McGraw-Hill. He died in 1975. During his entire lifespan of 85 years, the printing presses he used were the offset type, which is based on the original Gutenberg style of printing with movable type. In my lifetime, on the other hand, I have seen the development of personal computers, word processing and page layout

software, and the Internet, which was kindly provided to us by Al Gore. (Actually it was started by a group of clever physicists, but I couldn't resist the job.) These changes have fundamentally changed the world in a time span not of millennia, but of mere decades.

I remember when I was working on my master's thesis while living in Los Angeles in the 1980s. The process back then was incredibly tedious, and I think college students today actually have no concept of what it was like just 20-some years ago. It is an illustration of just how logarithmic the pace of progress has been. For instance, I would have to physically go to the biomed library at UCLA, fighting for the frustratingly scant available parking. Then I would have to manually search through the bookshelf-long Index Medicus. Those were arranged by year. The process took many hours. Then, when I had a list of papers I wanted to get, I would go to the stacks, pushing a big cart along, find the bound journals and add them to the cart with a little strip of paper indicating the pages to copy. Then, when I had all I could find or push - because wouldn't you know that some of the books were somewhere else in the library at the time, thanks to some other sedulous grad student - I would take the elevator down into the basement where the copiers were. Armed with a bucket of nickels, I would painstakingly copy every mind-numbing article, page by page, while other impatient grad students stood behind me with pained and impatient looks on their faces. Finally, it was back to the apartment to read the papers. Frequently the authors made reference to still other papers, which required additional trips to the library. This process was painfully iterative, but eventually, I was able to commit pen to paper. That's really how I did it then.

No self-respecting guy of my generation would have been caught dead in a typing class in high school, so handwriting was, for me, faster than the typewriter. It is, in fact, how I wrote my first textbook. My wife then dutifully typed the thesis on an IBM Selectric, and my graphs were hand-drawn. What if I wanted to delete a paragraph in the middle of the document after careful reconsideration? Forget it. I would then have had to ask my poor wife to retype the entire project from there on and would have had to renumber all of the remaining references. No, the saying of artists that, "Another stroke spoils the painting," is never more apt than in prolix and expositive writing. The entire thesis took the better part of the summer, as I recall. Then, realizing with some sadness that nobody other than my graduate advisor and a few referees would actually read the thesis, I condensed it down and submitted it to the *ACA Journal*.¹ Lifting me to Panglossian heights, but in truth with nothing more than beginner's luck, it won the Scientific Paper of the Year award. It's rarely that easy.

Revisions are a fact of life when submitting a paper to a professional journal. If the reviewers compel you to make certain changes - and they usually do - you may have to retype the paper a couple of times or more. Submitting the papers back then required three redacted copies to be sent through the mail to the editor's office, who then mailed them to the reviewers, who then mailed back their comments to the editor; who then mailed the consensus opinion back to the author. It was a long process, sometimes requiring two or three revisions, which meant that it often took two to three years to get published.

When we wrote our paper criticizing the Quebec Task Force on Whiplash-Associated Disorders, which was originally published in 1995,² our paper wasn't published until 1998 - three years later.³ And, unlike popular writers who write for the *Times* or *Outdoor Magazine*, there is no remuneration for this work. Worse still, I have spent thousands of dollars and many hours doing research that, in the end, we simply couldn't get published. What does this process of writing look like today? I walk into my home office, get online, go to PubMed, log on and do my search. Instantly I have what I need. I can read the abstract, decide if I want to order the articles, and request them to come by fax, snail mail, or e-mail as PDF files. This process is still iterative, but vastly simpler. And, as for writing, I am sitting/lying in bed typing this on my laptop, watching the

sun come up over the mountains and across the San Diego harbor, which is my backyard. (I have always been a Mark Twain fan, although I rarely smoke cigars in the bedroom.) Even my references are nicely managed for me with a reference manager software program. If I delete a paragraph containing some references, all remaining references are instantly and automatically renumbered. And, if one journal turns down the paper (and that is common), and I must submit to another journal that uses a different referencing system, no problem. I simply go into my reference manager, which is conveniently resident within Word, tell it to reorganize the references in whatever format is required, and poof! A task that before would have taken a couple of hours is done in a flash. When I submit papers these days, I submit them electronically. Even *JMPT* went to this system recently. All correspondence between editorial staff and reviewers and authors is via e-mail today. What a change. So much for the musings.

The Growing Haystack

While all of this enabling technology sounds terribly convenient and efficient, it is in some ways the undoing of modern informatics. I see this everywhere. How convenient, we say, that today we all have fax machines, computers, pagers, car phones, etc. We can be more productive, eh? Well, I beg to differ when I hear some poor wretch talking to his secretary from a stall in the men's room at the airport. Convenience? No. And, according to the General Accounting Office, Americans enjoy less leisure time today than we had in the 1960s. We work more hours, not less. The lie of technology is that it merely ups the stakes of the game. If I have a cell phone and you don't, I'm ahead. If you have one, it cancels out any advantage. In fact, if you get one, I have to get one to maintain my competitive advantage. In the good old days, if some great tragedy befell my clinic while I was playing golf, at least I could enjoy the rest of the game in blissful ignorance. Today my game - and everybody else's - will be interrupted. I used to feel like a pretty important guy when I first went into practice because I had a pager. (Cell phones in those days still looked like World War II walkie-talkies.) Now I see it completely different. The really important people can afford the luxury of being unreachable 24 hours a day (and in the men's room). I travel with my secretary, and she minds the cell phone - not me.

This technology that has enabled us has in other ways disabled us. Perhaps because the publishing process has become easier, there are now more than 30,000 papers published in English each month, and that's just in the biomedical field. There are so many that no specialist can read even a sizable fraction of the papers in his or her field. The consequence is that the most important papers tend to be forgotten quickly, if anyone paid attention to them in the first place. Chiropractors are hardly immune to this condition, in my experience.

There are dozens of extremely important papers that literally every chiropractor should have tucked away safely in a file folder. They demonstrate the effectiveness of spinal manipulation for a variety of conditions. They demonstrate in some cases the superiority of chiropractic care over traditional medical care in the workers' compensation arena for low back injuries. There are very large-scale studies demonstrating how and why inclusion of chiropractic benefits can actually save insurers money over time. One of the most important studies of the past few decades in that regard is the recent one by Legorreta, et al.⁴ (I actually thought it was so important that I asked one of the authors, Dr. Craig Nelson, to present at our annual SRISD Scientific Conference in November.) I believe someone also reported on this paper in *Dynamic Chiropractic*, but not everybody read it, I'm sure, and I'd wager that even fewer went to the trouble of getting the paper, reading it, and storing it safely away. And, if the names Nyiendo and Lamm; Ebrall; Jarvis, Phillips and Morris; Wolk; Meade, Dyer, Browne, and Frank; and Giles and Muller don't ring any bells, you are missing some extremely powerful ammunition in the war on chiropractic which is raging all around you. Without them, you are effectively hamstrung. And those are just the papers dealing (mostly) with

workers' compensation. I often wonder if we would have lost so much of our workers' compensation piece of the pie here in California if the legislators and our own political action squad would have been aware of this literature.

Then there is the personal injury side. So many doctors, besieged by the insurers' draconian claims handling, tell me that when they cite references in their reports and rebuttal letters, suddenly the agents become a bit less discommodious. We have two papers coming out this fall, one of which will assist in this issue of "no crash - no cash."⁵ Essentially, after a thorough meta-analysis of the existing literature, we are left with the conclusion that Allstate's MIST segmentation policy, an unfortunate canard that is being adopted by several other auto insurers, is virtually baseless. In an interesting twist of irony, this policy, which is used to impute fraud on the part of physicians treating whiplash victims, is itself fraudulent. But, will anyone take notice of this paper? Will anyone use it effectively? We can only hope.

So many of these and other studies are powerfully dispositive, but does the profession languish in ignorance of them? The frightening truth is that most field practitioners do not even know of these studies, much less how to gain access to them. When hostile politicians, other physicians, lawyers, or claims adjusters question the value of chiropractic care, poised, as the governor of Massachusetts is right now, to drop the axe on the profession, we must be prepared. Instead, too often our response is nonplussed, apoplectic. We have no *strategus riposte* or repartee to offer. Perhaps more frightening is the fact that most of our physician politicians and lobbyists also are largely unfamiliar with this literature. This is a common condition of many or most of the people on the state boards of chiropractic around the country and the folks running our state associations. This information, which has a nearly *sub rosa* existence, has wrongly been allowed to become the exclusive domain of the profession's academe. And they are rarely accessed or consulted by the politicians and power brokers of this profession, who more often seem to view themselves as the sole bootstrappers and champions, fully capable of handling the business of the profession. How much more effective we would all be with better balance and cooperation in this business.

I know there are exceptions to this, and many will argue that the CCGPP is one of those. And I do not argue that our leaders in this profession are all dyscompetent. Certainly most of these jobs are also nonpaying, and I am glad these folks are generous with their own time and willing to roll up their sleeves on my behalf. Nevertheless, I for one have only rarely been consulted by a professional organization or state board of chiropractic on the topic in which I consider myself to have some expertise. And I have often read the decrees and policies written by some of our state boards and state associations on issues in which they were clearly uninformed or misguided. It doesn't happen all the time, but it should only happen rarely. Usually, it is simply a lack of information. But, setting the matter of inciting angry letters to the editor aside, there is no question that my more erudite readers do catalogue and maintain important literature at arm's reach, and that they will use it effectively and with intellectual *recherché* and aplomb.

In the end, we really are embattled today, although perhaps no more than we have been in years past. One thing that has changed is the rules and tactics of warfare, to continue the metaphor, and I hope most of us are not too slow to learn that. Today, it is all about evidence. We hear the terms "best evidence synthesis" or "best practices." These are concepts growing out of research, science and knowledge, not opinion, dogma, and vitriol. Most importantly, it is not only the leaders, politicians, lobbyists, and policy-makers of the profession who must know and wield this powerful tool. On a day-to-day basis, every field practitioner can and must also use literature and science as their shield and buckler, unrequitedly, or surely it will become our Golgotha.

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