

The Harrison Spinal Model: A Chiropractic "Lightning Rod" for Criticism

Steve Troyanovich, DC

Dr. Robert Cooperstein presented his personal observations and critique of the Chiropractic Biophysics (CBP) technique and the principles upon which this method of patient care is based in the article, "Spinal Graffiti: The Rise and Fall of the Harrison Spinal Model" (Dynamic Chiropractic, Oct. 21, 1996;14(22)18,29).

For the past eight years I have had the privilege to teach CBP technique with and for Dr. Donald Harrison, the founder of CBP technique. I feel compelled to make the following remarks regarding Dr. Cooperstein's commentary.

For almost our entire 100 year history, chiropractic treatment has been based upon empirical experience and/or theoretical principles proposed by chiropractic innovators. One such theoretical proposal has been the use of a "theoretical normal" spinal model against which to compare the structural "health" of chiropractic patients. This is the approach that has been advocated by Dr. Harrison since the early 1980s. Dr. Harrison's theoretical "ideal normal" model is that part of such an approach that Dr. Cooperstein has chosen to emotionally attack in his Dynamic Chiropractic article.

There are at least two approaches used in the development of models. These approaches are known as the confirmatory and exploratory methods.

In the confirmatory method, one proposes the solution to a problem based upon logical assumptions from existing knowledge, in an attempt to arrive at a theoretically ideal answer to the problem at hand. This approach is often used by mathematicians and/or physicists who attempt to provide theoretical answers to complex questions where the collection of data is difficult or impossible, or when no reliable data exists. Later, when data collected from nature is available, the confirmatory model can be tested against such data to determine or "confirm" the model's validity or lack thereof.

In the exploratory method, data collected from nature is used to construct a model in the laboratory of the problem under study. This is the method most often used by clinicians to study body systems. For example, an exploratory model of the normal range of blood pressures in humans could be proposed by measuring and recording the blood pressures of a large sample of subjects. The mean or average value could then be determined and a range of values (usually plus or minus a specified number of standard deviations from the mean) could serve as the model of the normal range of blood pressures in human beings.

For the first 90 years of the chiropractic profession's history, virtually no scientific research existed upon which to base the care and treatment of our patients. That is, there existed a conspicuous lack of reliable data from which to propose treatment methodologies. Coupling this fact with Dr. Harrison's training in mathematics (bachelor and master degrees in mathematics, and currently working on his

PhD), he naturally chose to propose a confirmatory model of the "ideal" upright human spine based upon two major assumptions: The cervical lordosis is a circular arc, and the height to length ratio of the "ideal" cervical spine is 0.95 with a normal range of 0.94-0.96.¹

The result was the Harrison spinal model first proposed in the early 1980s. In reality, the Dr. Harrison's mathematical cervical spine model is a series of equations which describe the anatomical make-up of the cervical spine. These equations can be reduced to the single equation of $\sin \theta = \text{heightspine}/\text{lengthspine}$, where θ is one half the arc angle (in radians) of a circular lordosis extending from C1 to T1.^{1,2} Dr. Harrison's mathematical equations predict a number of values that can be measured clinically on radiographs for a family of circular lordotic arcs having a height to length ratio in the range from 0.91 (deeply lordotic) to 0.99 (almost military). One of those arcs predicted by Dr. Harrison's mathematical equations would have the magnitude of 63 degrees measured from C1 to T1, or 42.2 degrees measured from C2 to C7 (Ruth Jackson's angle) when the height to length ratio of the cervical spine is 0.95. This value is the mid-point in the range of "normal values" proposed by Delmas^{3,4} and represents the range that Dr. Harrison has chosen from the overall range of values as his confirmatory model of the cervical spine in the sagittal dimension.^{1,2}

The clinical values predicted by Dr. Harrison's equations were then compared to the average values measured from the lateral cervical radiographs of 400 subjects. The data was then divided into a number of subsets. Two of these subsets were individuals whose cervical spine measurements fell in the Delmas normal range; the other subset was that of individuals who presented with no history of cervicocranial symptoms.

Dr. Harrison's mathematical equations predicted the average values of the 400 subjects to an average error of about four percent; five percent for the subjects with clinical measurements in the Delmas normal range; and three percent for the asymptomatic subjects.

At this point it should be obvious to the reader that the subsets of subjects in the Delmas normal range, as well as those without cervicocranial symptoms, represent individuals whose clinical measurements can be used as data to propose both an exploratory model (the asymptomatic subjects) of the cervical spine, and as data to "confirm" or refute the Delmas normal range (i.e., the confirmatory model). We believe our data support the Delmas normal range as a valid model of the cervical lordosis. We state this in our Spine article.

For the record, the average lordosis measured between C2 and C7 in the total of 400 subjects was 34 degrees, 44 degrees in those subjects in the Delmas normal range, and 34 degrees in the asymptomatic subjects.

In a separate study of the geometric configuration of the cervical spine in an asymptomatic population of 200 subjects, authored by Gore, et al.,⁵ the average magnitude of the cervical lordosis measured between C2 and C7 was 21 degrees.

In our recently published JMPT article, "A Normal Sagittal Spinal Configuration: A Desirable Clinical Outcome,"⁶ we report all these values so that clinicians may decide what value (if any) they might choose to use as "normal." Some may choose to use the values determined along the lines of the exploratory method while others may adopt the values presented using the confirmatory method. It is

amazing to me that Dr. Cooperstein, an academician, either appears to lack the skills necessary to comprehend these facts from reading our work, or is simply so emotionally opposed to any scholarly work produced with Dr. Harrison's name attached that he chooses to sarcastically attack Dr. Harrison's approach and ideas.

In reality, Dr. Cooperstein should find at least a modicum of respect for what Dr. Harrison has chosen to do -- namely, critically evaluate his own theories through scientific research. Furthermore, the fact that Dr. Harrison is willing to alter some of his clinical theories and opinions based upon scientific discovery is a refreshing break from the dogmatic adherence to out-dated, unsubstantiated theory and opinion that have plagued our profession since its inception.

To the matter of Dr. Cooperstein's assertion that he has, "... never met a chiropractor who defended cervical kyphosis ..." as a normal variant, I can only speculate that Dr. Cooperstein has never found himself involved in the medicolegal arena where it is often alleged that kyphosis is "normal" by some chiropractic and medical "experts."

Dr. Cooperstein believes himself to be an expert in regards to Chiropractic Biophysics (CBP) technique by virtue of the fact that he authored an article for the journal Chiropractic Technique about the subject.⁷ One must wonder how Dr. Cooperstein could possibly be an expert in CBP when he continues to confuse the Pettibon spinal model of radius = chord = 60 degrees with the Harrison spinal model of $\sin 0/0 = \text{height spine}/\text{length spine}$, even though he was in attendance at Dr. Harrison's Washington, D.C. Chiropractic Centennial Celebration presentation of the model. One recommendation I could make to Dr. Cooperstein would be to stop quoting Dr. Harrison's old texts and update his understanding and knowledge by perusing the current CBP texts that he surely has, since he referenced these texts in his Chiropractic Technique article.⁷ By analogy, if Dr. Cooperstein were to write an overview of the NASA space agency, would he still state that the Mercury capsule and the Redstone rocket were the current model of space flight?

In addition, a recent response to a letter to the editor⁸ of Chiropractic Technique, authored by Dr. Cooperstein,⁹ demonstrates that he has read an additional article about CBP technique, of which I was the lead author.¹⁰ As such, Dr. Cooperstein is aware that he is distorting the truth when he proposes that spinal/postural configuration is the sole assessment of clinical success or failure in CBP technique. Furthermore, as a CBP instructor I have always emphasized that any chiropractic care recommendations made by any chiropractic practitioner are elective recommendations. As doctors, we serve the patient. After making our recommendations for treatment, the patient either hires us or fires us. I can only guess that Dr. Cooperstein believes that CBP practitioners have some special talent to mesmerize patients into coming to our offices for unnecessary, unsubstantiated, bogus treatment for years at a time. I can only say that I have yet to meet the patient who was that naive, malleable, or stupid!

The remainder of Dr. Cooperstein's article is a tirade against one of our recent projects that is in review at another scientific journal. It would be inappropriate of me to discuss our data from this project in this forum prior to its publication. So, I shall choose to ignore Dr. Cooperstein's emotional and sarcastic comments as unworthy of response.

Furthermore, I would like to point out the following facts about our recently published spinal model

study.² A) The study was published in *Spine*, only after peer review by biomechanics experts on the editorial review board. B) *Spine* is a biomedical journal that is internationally renowned for its excellence. C) Given facts A and B, isn't it a bit arrogant to attempt to discredit Dr. Harrison's work on the basis of personal dislike (I see no literature based criticism of Dr. Harrison's model anywhere in Dr. Cooperstein's article), when the editor and referees at *Spine* found the work to merit publication in their journal?

Given these additional facts, perhaps Dr. Cooperstein's article should have been titled, "The Rise, Refinement, and Scientific Validation of the Harrison Spinal Model." This more accurately depicts the evolution of Dr. Harrison's work.

In recent months, the research produced by Dr. Harrison's CBP nonprofit corporation has acted as a lightning rod attracting "hits" from a number of chiropractic "experts." One must wonder why this is so. Are these attacks motivated by professional jealousy at Dr. Harrison's success in researching and achieving publications in prestigious scientific journals? Are these attacks being launched because Dr. Harrison has been successful in writing, researching, and validating chiropractic methods? Or, are these attacks motivated by the fact that Dr. Harrison's ideas are in direct opposition to the personal beliefs of those in the profession who wish to abandon or destroy the traditional chiropractic concept of "abnormal spinal alignment" as a cause of a patient's loss of health?

In closing, I would like to challenge Dr. Cooperstein to lay aside his personal bias and at least try to appreciate the effort required to pursue the scientific investigation of chiropractic methods. It is easy to be critical when one is not actively involved in producing original research (i.e., something other than reviews of another's work) to advance our understanding of the science and art of chiropractic.

Emotional attacks and distortions of the truth are the last refuge of the desperate.

References

1. Harrison DD. *Spinal Biomechanics: A Chiropractic Perspective*. National Library of Medicine No. (WF 725H 318C) 1981-1994:33-42.
2. Harrison DD, Janik T, Troyanovich SJ, Holland B. Comparisons of lordotic cervical spine curvatures to a theoretical ideal model of the static sagittal cervical spine. *Spine* 1996;21:667-675.
3. Kapandji AI. *The Physiology of the Joints*. New York: Churchill Livingstone, 1974;VIII:20,39.
4. Delmas A. Types rachidiens de statique corporelle. *Revue de Morphophysiologie Humaine*, 1951.
5. Gore DR, Sepic SB, Gardner GM. Roentgenographic findings of the cervical spine in asymptomatic people. *Spine* 1986;6:521-524.
6. Harrison DD, Troyanovich SJ, Harrison DE, Janik TJ, Murphy DJ. A normal sagittal spinal configuration: a desirable clinical outcome. *J Manipulative Physiol Ther* 1996;19:398-405.
7. Cooperstein R. Technique system overview. Chiropractic biophysics technique (CBP). *Chiropr Tech* 1996;8:30-35.

Steve Troyanovich, DC
Normal, Illinois

DECEMBER 1996