Faulty Logic & Non-skeptical Arguments in Chiropractic

Joseph C. Keating, Jr., Ph.D., *Professor*
Los Angeles College of Chiropractic
16200 E. Amber Valley Drive, P.O. Box 1166
Whittier CA 90609 USA
(310) 947-8755, ext 633
E-mail: JCKeating@AOL.com

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OUTLINE:

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Introduction

Throughout the history of the profession, chiropractors have asserted that chiropractic involves a unique science (Keating et al., 1995; Martin, 1993, 1994; Palmer, 1897). Many chiropractic theories and hypotheses are couched in terms of operationally definable variables and potentially testable causal sequences, and therefore fulfill the minimum requirements for scientific investigation. Exemplary is the broad proto-theory that adjustments relieve or eliminate subluxations, which in turn is thought to significantly influence health and illness. Given the numerous variations on this theme (i.e., the abundance of clinical theories and techniques), chiropractic might be perceived as a very fertile field for meticulous, empirical study. Additionally, the chiropractic profession, like any discipline, is expected to exercise caution and thoughtfulness in applying its methods. The great privilege of the chiropractic healing art brings great obligation to its practitioners, both individually and collectively. Chiropractors are responsible for the science of chiropractic.

As many members of the profession now recognize, the science of chiropractic is very much in its infancy. Available experimental data justify assertions concerning the value of manipulative interventions only in circumscribed areas, such as for some low back pain and cervical disorders of a musculoskeletal nature. Moreover, explanations for the beneficial effects of manual methods of health care are still in the exploratory stage; the “hows and whys” of the adjustive arts are far from established. Nothwithstanding chiropractors’ century long affection for the concept of subluxation, and despite the recent consensual, conceptual definition of the traditiional chiropractic lesion offered by the presidents of North American chiropractic colleges (Association, 1996), there is still no established, validated operational definition for this supposed phenomenon (Keating, 1996).

This dearth of knowledge and understanding is not attributable to negative evidence, but rather to the minimal efforts devoted to scientific inquiry so far.

Among the stumbling blocks to the development of a robust science of chiropractic and a more scientifically oriented profession

Science vs. Scientific

Table 2: Chiropractors' epistemological (ways of knowing) strategies for determining what works or does not for patients (theories and clinical methods)

Strategy	Reasoning mechanism	Example(s)

founder's authority	founder of chiropractic (D.D. Palmer) or his son (B.J. Palmer) or some other guru says so, therefore it's true; truth by fiat	"D.D. Palmer discovered the chiropractic principle"; "chiropractors since D.D. Palmer have been finding and removing the cause of disease"
spiritual inspiration	knowledge based on privileged communication with supernatural source	D.D. Palmer learned of chiropractic principles from spirit Dr. Jim Atkinson (Palmer, 1910); author of a "chiropractic philosophy" text describes himself as a "scribe" for Innate Intelligence, the true author (Barge, 1987)
a priori truth	empirically testable but untested proposition is accepted/asserted to be incontrovertible	as proof of the meaningfulness of subluxation: "It just makes sense that if your have interference to your nervous system, you can't be totally healthy nor reach your full potential"; "anyone who doesn't believe in subluxation has no business at a chiropractic college"; "chiropractic is just naturally right"
uncritical rationalism; "deductive science"	validity of theories and effectiveness of clinical methods thought to be established by consistency with (or derivability from) more fundamental "truth" (e.g., basic science knowledge)	"Chiropractic principles are as old as the vertebrata"; "we know chiropractic works because the nerve system is the master switchboard of the body"; "we know it works because it makes sense in terms of anatomy and physiology"; basic science research offered as "proof" of clinical utility; deductibility of chirotheory and technique from some "first principle" (e.g., tone, subluxation or Innate Intelligence) taken as proof of validity (Stephenson, 1927)
over-generalization	embellishment; evidence in support of some derivative or sub-hypothesis is taken as proof of a broader theory or clinical method	AHCPR's endorsement of spinal manipulation for patients with low back pain offered as proof that "chiropractic works, just like patients and chiropractors have known all along"; a single experiment involving changes in T-cells taken as evidence that "chiropractic has a profound effect on the immune system"
selective evidence	denial; refusal to consider theories or data which conflict with favored theory	articles selected for a review of the literature omit and/or minimize unfavorable studies and emphasize favorable information
private empiricism	knowledge from unpublished, personal experience or clinical legend	"I've seen it proven everyday in my office for 20 years!!"; "B.J. Palmer proved chiropractic at his Research Clinic"
uncritical empiricism	non-critically reviewed and/or weak data given as "proof" of the validity of theory or technique	"research" is published in trade magazine without scholarly critique or evaluation; anecdotes, testimonials and non-experimental data (e.g., descriptive clinical trials and case reports) offered as substantiation of a clinical procedure
appeal to ignorance	absence of research offered as validation of chiropractic "principles"	"Chiropractic has never been disproven"
repetition	none; frequent re-assertion of a claim for chiropractic	"Chiropractic works!"; "it works, it gets results, that's what counts"; "it just works"; "it REALLY works"
non-sequitur	irrelevancy offered to justify assertion	"If there were no such thing as subluxation, there'd be no reason for chiropractic"
clinical science	hypotheses drawn from basic science knowledge, prior clinical research and/or clinical experience, but strong conclusions based on experimental tests (e.g., controlled clinical trials)	the contents of the periodicals listed in Table 1; "Kaminski model" of technique evaluation (Kaminski et al., 1987)

On the other hand, the federal Agency for Health Care Policy & Research's (AHCPR's) recent guidelines for patients with low back pain endorsed chiropractors' primary treatment method,

spinal manipulative therapy. A cost-effectiveness study of chiropractic services commissioned by the Ministry of Health for the Canadian province of Ontario strongly endorsed chiropractic management of low back pain (Manga et al., 1993). Federal funding for scientific research conducted at several chiropractic colleges has recently overwhelmed the historic barriers against chiropractic science, with research grants awarded to the Los Angeles College of Chiropractic, National College of Chiropractic, Palmer College of Chiropractic and the Western States Chiropractic College.

What is one to think? Is chiropractic science or humbug? Little help in resolving this confusion comes from chiropractors themselves, who are still a long way from consensus about their identity, their scope of clinical practice and their relationship to other health professions.[1] The standard humor within the profession offers a first principle: for every "DC" (doctor of chiropractic) there is an equal and opposite DC. Although chiropractors seem to be united in their belief that chiropractic is a science, they vary greatly among themselves in terms of their understanding of the nature and responsibilities of science.

After 12 years of teaching and research at several chiropractic colleges, I can say with confidence that chiropractic is both science and anti-science. Yes, there is a meaningful science of chiropractic, but just as surely there is an anti-scientific mind-set and even a cult within chiropractic (for example, the cult of B.J. Palmer, son of the founder of chiropractic). Moreover, if University of Connecticut sociologist Walter Wardwell, Ph.D. is correct (Wardwell, 1992), the belief systems of a majority of DCs lie somewhere between these two poles: chiropractic as science vs. chiropractic as unscientific, uncritical dogma and circus. Perhaps a consideration of the nature of science will aid in understanding how the chiropractic profession does and does not approximate the rigors of science.

Concepts of Science

Our culture offers many notions about the nature of science. For some, science means perfect or near perfect predictability and control. This image is reinforced by the spectacular success of some of the more visible technologies: space flight, computers, transplant surgery. However, if the accuracy of predictions were an essential characteristic of science, then fields like meteorology and vulcanology would have to relinquish any claim to scientific status, as would many areas of health care. Reduction of error is certainly a goal for any scientific discipline, but perhaps only mathematicians, who do not ordinarily trouble themselves with actual observations of the natural world, can claim to achieve the exactness suggested by this image of science. Some chiropractors deploy this notion of science (near perfect predictability) as an easily defeated "straw man" with which to refute the meaningfulness of medical science.

A Hollywood vision of science is sometimes implied by the criticism that chiropractic has produced no discoveries to rival those of Louis Pasteur or Jonas Salk. This concept involves the belief that science means dramatic breakthroughs in knowledge. The reality of most scientific research, however, is far less glamorous, though no less important. Moreover, if this criterion of "science" were applied uniformly, many disciplines (for examples, podiatry, psychology, physical therapy) would not measure up. Yet these fields are generally considered "scientific," and genuine scientific research is conducted in all of them. Nor can it be said that the chiropractic profession

has not contributed, however minimally, to the scientific data-base bearing on manipulation and musculo-skeletal disorders.

The chiropractic profession is sometimes portrayed as lying outside of science on the grounds that "the chiropractic theory" has never been proven, and may have been disproven (e.g., Crelin, 1973). These assertions imply that there is only one theory of chiropractic and that the legitimacy of a profession may stand or fall upon the validation of a single theory. Critics of chiropractic have repeatedly pointed to the century-old hypothesis that diseases are caused by nerves which are pinched in the spaces between the bones of the spinal column, and suggest that this idea is bogus. They may be correct, but there are, in fact, many theories about spinal lesions (Gatterman, 1995; Leach, 1994), or what chiropractors refer to as "subluxation." (Osteopathic theorists seem to be referring to similar presumed clinical entities, which they name "somatic dysfunction" or the "osteopathic lesion.") The problem with most of these theories is not that they have been disproven, but that they have not been adequately tested; we don't yet know which is chaff and which is wheat. We have reason to believe that spinal manipulation reduces low back pain, but whether this is due to removing subluxations, or increasing circulating endorphins, or other factors or some combination thereof is not yet known. To further confuse the issues, there probably are many musculo-skeletal problems with symptoms that mimic organic (internal) disease (Nansel & Szlazak, 1995). It's not hard to imagine that some sincere but naive chiropractors have accepted incorrect medical diagnoses of internal disorders (or incorrect reports of diagnoses from patients), and when symptoms have cleared up following manipulation, the DCs believe they have cured serious internal disorders.

Chiropractors certainly have been remiss in failing to adequately study the variety of subluxation theories they have proposed, but this does not detract from the research that has been conducted. Nor does this shortfall in hard scientific data for subluxation disallow the meaningfulness of a science of chiropractic. We would not reject psychiatry as science on the grounds that Freud's theory of anxiety, repression or the unconscious have not been adequately tested. We do not reject the meaningfulness of a science of medicine on the grounds that most medical procedures have not been experimentally validated. Nor should we apply such standards to chiropractic as a determiner of its scientific viability.

An operational definition of chiropractic as science has been offered (Keating & Mootz, 1987) which suggests that the scientific status (or lack thereof) of chiropractic (or of any profession) can be recognized by the presence or absence of the activities of science. Another way of saying this is that chiropractic may be considered science if chiropractors engage in the work of scientists. Among the activities common to all sciences are: 1) systematic observation and description of natural phenomena, 2) making and testing predictions (hypotheses), 3) experimentation (controlled analyses of cause/effect relationships among natural phenomena), and 4) publication of findings derived from these activities in scholarly journals where theories and data may be subjected to critical review by any interested party. By these criteria, the existence of a science of chiropractic seems unmistakable, as evidenced in the pages of several periodicals (see Table 1). Although the volume of research in chiropractic remains minimal, there is legitimate scientific activity, the scientist's "right stuff."

Table 1 about here

Yet another way of judging the meaningfulness of chiropractic as science is to consider the attitudes held by chiropractors concerning the acquisition of new knowledge. These attitudes, also called epistemologies, are quite diverse among chiropractors, but a particular, "scientific" attitude is reasonably well established among clinical scholars and investigators in other fields, and can be found among a subset of chiropractors.

Epistemologies in Chiropractic

Epistemology is that branch of philosophy which deals with the nature of knowledge, or how we know whatever we think we know. With respect to health care, epistemology addresses questions about how we may learn about health and illness (e.g., basic science) and about how we may determine the validity of theories of treatment and prevention and about the effectiveness of clinical procedures for restoring and maintaining health (e.g., clinical science). At the practical level of the health care practitioner, epistemology deals with questions such as: which method(s) of healing will help which patients with which problems under what circumstances, and how can we make such determinations?

Throughout human history healers have relied, implicitly or explicitly, upon a variety of epistemologies in choosing their methods. Among the most common and familiar have been the various dogmas derived from or incorporating such strategies as spiritual inspiration, unchallenged precedent, casual personal experience, rationalism and the scientific method. Often the differences among these ways of knowing "what works" have been embedded in cultural variations, such as the mysticism of the Orient vs. the skepticism and "natural philosophy" of Western science. In other cases several distinct epistemological strategies may be evident within a single profession, and may serve to indicate a paradigm shift within the discipline. As an example of the latter, consider the evolution of western medicine away from a purely descriptive science and toward an experimental orientation at the dawn of the twentieth century (e.g., Martin, 1993, 1994). Ironically, as medicine moved away from the descriptive epistemology of nineteenth century science, the emerging field of chiropractic adopted the old ways of knowing, and perpetuated a non-experimental, uncontrolled system of gaining new knowledge.

Frequently, these differences in epistemology are accompanied by variations in theoretical propositions and/or by disputes over therapeutic methods, such as was evident in the osteopathic profession during its early decades (Gevitz, 1982). Typically, a tension among the members of the profession is in evidence, and continues until the shift in philosophical orientation is more or less complete. Perhaps less frequently, a profession may be locked in a state of seemingly perpetual conflict over epistemological, theoretical and practical (technical) issues. An example of this phenomenon is found among chiropractors, who have argued among themselves for decades about such fundamental issues as who they are, what they do, what they don't do, the nature of science and even the value of the scientific method (Keating et al., 1995). Members of the profession offer a wide variety of strategies for determining the effectiveness of the methods they use (see Table 2), all but one of which are antithetical to the wider scientific community. Although a few members of the profession have adopted a genuinely scientific attitude toward clinical practice, many (perhaps a majority of) chiropractors offer up a great deal of what might be considered the "wrong stuff" for a science.

Table 2 about here

Although individuals may employ any one or any combination of these epistemological methods (Table 2), perhaps the most frequently encountered rationale for believing that "chiropractic works" involves a combination of uncritical rationalism and private, uncritical empiricism. A doctor will argue that chiropractic theory and practice are consistent with *Gray's Anatomy* (which "proves that the nerve system controls all parts of the body") and that s/he has seen repeated "proof" of effectiveness on a daily basis in her/his clinic. These assertions are often supplemented with a litany of anecdotes about "miracle" cases, by uncontrolled reports of clinical outcomes, or by incorrect or inflated assertions about research findings (e.g., Frigard, 1994).

In recent years this uncritical rationalism/uncritical empiricism has been bolstered by the proliferation of pseudo-science journals of chiropractic wherein poor quality research and exuberant over-interpretation of results masquerade as science and provide false confidence about the value of various chiropractic techniques. These periodicals expand upon the uncritical attitudes and unproven claims for chiropractic that have long been made in the magazines published by the national membership societies of chiropractors in the United States. It is practically impossible to read any of the trade publications within chiropractic without encountering unsubstantiated claims.

Co-existing with the obvious and ubiquitous anti-scientific and pseudo-scientific reasoning and rhetoric in chiropractic (Skrabanek, 1988) are the genuinely critical, skeptical attitudes of the still quite embryonic research community in this profession. The clinical science attitude (see bottom of Table 2) has been growing slowly among DCs during the past two decades. Some see the 1975 conference on spinal manipulation sponsored by the National Institutes of Health (Goldstein, 1975), which brought together chiropractors, osteopaths, medical doctors and PhD scientists, as the moment of birth for a genuine science of chiropractic (e.g., Gitelman, 1984). Others would date the birth of chiropractic science to the first publication of the *Journal of Manipulative & Physiological Therapeutics (JMPT)* in 1978, or to *JMPT's* first inclusion (in 1981) in the National Library of Medicine's *Index Medicus*, or to the publication of the first randomized, placebo-controlled clinical trial of chiropractic adjusting (Waagen et al., 1986).

I prefer to date the birth of chiropractic science to a long since forgotten commentary in the *JMPT* entitled "Notes from the (chiropractic college) underground" (DeBoer, 1983). In this 13-year old article Kenneth F. DeBoer, Ph.D., then an instructor in basic science at Palmer College in Davenport, Iowa, revealed the power of a scholarly journal to empower faculty at the chiropractic schools. DeBoer's opinion piece demonstrated the faculty's authority to challenge the status quo, to publicly address relevant albeit sensitive issues related to research, training and skepticism at chiropractic colleges, and to produce "cultural change" within the chiropractic schools so as to increase research and professional standards. I view DeBoer's paper as a rallying call for chiropractic scientists and scholars.

To further our understanding of chiropractic as simultaneous science, dogma, showmanship and marketing, it may be well to look inside the chiropractic colleges: at their visible elements, their facades and their undergrounds.

Skepticism and Chiropractic Education

Chiropractic colleges vary considerably in terms of their faculties' and administrators' commitment to critical reasoning, skepticism, science and scholarship. At one end of the

spectrum lies Life College (situated outside Atlanta), whose founding president, Sid Williams, D.C., is also a former president and former chairman of the board of the International Chiropractors' Association. With a student body in excess of 4,000, Williams is proud of having built the world's largest chiropractic institution. Although he speaks of the "science of chiropractic," he is notorious for his anti-scientific attitudes and unsubstantiated claims; examples of his rhetoric include:

> God spoke to me in very clear language on three different occasions during a five-month period telling me to commence this work.
>
> These conspirators would convince us that the "scientific approach" to chiropractic is the only approach acceptable to the public community, the professionals, the legislatures.
>
> To hell with the scientists. They haven't proven a bumble bee can fly.
>
> If you got an improved homeostasis, what damn difference does it make what diseases you gonna be encountering. The whole germ theory comes crashing down from its tower.
>
> Rigor mortis is the only thing that we can't help! (American Chiropractic Association, 1994).

At the other end of the ideological continuum one finds schools such as the National College of Chiropractic (situated outside Chicago), the Los Angeles College of Chiropractic (LACC) and several others. Now celebrating its ninetieth year, the National College has been a leader in scientific and scholarly development within the profession. This commitment is particularly apparent in its founding (in 1978) of the *JMPT,* and more recently of the *Journal of Chiropractic Humanities.* Members of the LACC's faculty and administration have been frequent contributors to the scientific literature, and collaborators with the RAND Corporation in developing systematic, evidence-based guidelines for the practice of spinal manipulation for specific health problems (e.g., Shekelle et al., 1991). The above-average commitment to scholarship and critical thinking of the LACC and the National College are further reflected in each school's initiative in developing problem-based learning for chiropractic students. Skeptical eyebrows may be raised by some of the hypotheses entertained at these schools, but a closer examination will reveal that a healthy skepticism is also present.

Other chiropractic colleges represent various points between the philosophical poles represented by Life College vs. National College and the LACC. Yet within all of these institutions may be found individuals (faculty, administrators, students) whose epistemologies and commitment to skeptical inquiry are at odds with their institutions. The writer suspects that all of the reasoning mechanisms listed in Table 2 can be found at any of the chiropractic schools.

There are multiple factors to account for the variety of anti-scientific attitudes found at chiropractic institutions. Many of these ideologies are embedded within the historic battle between chiropractors and organized medicine (Keating & Mootz, 1989). This diversity of epistemologies is partly attributable to the traditional isolation of chiropractic schools from the mainstream of higher education in the United States. Owing to exclusion from universities and teaching hospitals and to the preference for isolation among some leaders, the faculties and students of chiropractic schools have rarely enjoyed the camaraderie of regular daily encounters with clinician-scholars, scientists and critical thinkers in other health care disciplines. Cut off from the wider health science community, the gobbledygook so often encountered among chiropractors has usually gone unchallenged within chiropractic institutions. The habits of skeptical inquiry and

critical challenge of ideas that characterize the scientific process have not until recently been part of the fabric of chiropractic education.

The hundred years war between medicine and chiropractic has fostered an extreme sensitivity and resistance to criticism among DCs. Confronted with professional extermination, as embodied in the American Medical Association's commitment to "contain and eliminate" chiropractic (Chapman-Smith, 1989; Wardwell, 1992), many DCs perceive any and all criticism (even from within their own ranks) as carrying the threat of annihilation (Keating & Mootz, 1989). The conflict between MDs and DCs has also produced a penchant for marketing slogans in lieu of scientifically testable propositions. The classic example of this is the mindless reiteration that "chiropractic works," a vacuous claim which lacks specificity and is not amenable to experimental testing. However, confronted by charges that chiropractic is quackery, chiropractors have responded by insisting that *"Chiropractic Works!,"* and have rallied satisfied patients to convince legislators and policy makers of the validity of their methods and the justness of their cause. Slogans like this are endlessly repeated not only to the public, but among DCs themselves (and to chiropractic students). To challenge the notion that *chiropractic works* is considered heresy in most corners of the profession. Rather than skepticism and critical thinking, traditional chiropractic education has sought to instill strong belief in chiropractic (Quigley, 1981) among successive generations of students. In so doing the schools have strengthened the "anti-intellectual" (Coulter, 1990) traditions in the profession.

Anti-scientific attitudes are also reinforced by the financial realities of a century of self- and externally imposed segregation from higher education. Although federally recognized accreditation of chiropractic colleges is now in its third decade, only one of the fifteen chiropractic schools in the United States is housed in a university. And though a few states provide capitation funds for chiropractic training (Illinois, Texas), there are no state-university-based chiropractic colleges in this country[2]. Training opportunities for chiropractors in the teaching hospitals of the nation are almost non-existent. Chiropractic education in America is overwhelmingly tuition-based, and 80+% tuition-dependence for a college's annual operating budget is common if not predominant. The educational consequences of this poverty are profound.

Entrance requirements for chiropractic colleges are low in comparison to those of other doctoral-level, health care professions, and competition for admission to chiropractic school doesn't occur to any appreciable extent. Although schools may place a ceiling on the number of students that current facilities will permit, applicants are more likely to be placed on a delayed admissions list than to be rejected. Unlike health professional training in medicine or clinical psychology, the chiropractic colleges do not enjoy the luxury of choosing only the cream of the crop. Many of the schools are magnets for New Agers, theosophists, magical, mystical thinkers, and those attracted by the low admissions standards and the lure of a lucrative private practice. Since almost anyone who can accumulate 60 semester credits of undergraduate liberal arts college work[3] will be admitted to these schools, almost anyone can become a chiropractor. Moreover, since the largest chiropractic colleges tend to have the strongest commitments to dogma, fuzzy thinkers are likely to fill the chiropractic ranks for decades to come.

Some chiropractic college leaders are aware of and concerned about these serious problems for scientific development and disciplined practice. However, even those courageous college

administrators who are willing to challenge the status quo are unable to implement major change because of financial limitations. Unless and until the states see the wisdom of incorporating chiropractic education within the mainstream of state universities and the teaching hospitals of the nation, the tuition-dependent chiropractic institutions will continue to have their hands tied behind their backs. Chiropractic students will continue to graduate with uncritical attitudes, enormous debts (typically between $50,000 and $80,000 per student), and little or no access to the mainstream health care system (from which referrals derive). This seems like a recipe for quackery, health fraud and student loan defaults. Students and new graduates are less likely to practice skepticism when the pressing concern is to earn.

Then too, many college leaders would resist the incorporation of private chiropractic colleges into state-supported universities. Fear of medical domination and of loss of "distinctiveness" presumably disincline many college boards of trustees and administrations from considering the loss of institutional control inherent in amalgamation with universities. There is an understandable paranoia born of decades of persecution (justified or not) by organized medicine. In this sense, chiropractors' professional xenophobia extends well beyond organized medicine, and helps to perpetuate non-skeptical attitudes.

Conclusions

Chiropractic is confusing because it simultaneously encompasses science, anti-science and pseudo-science. Although available scientific data supports the effectiveness of chiropractors' principal intervention method (manipulation for patients with low back pain), the doubting, skeptical attitudes of science do not predominate in chiropractic education nor among practitioners. Members of the profession, for the most part, have not yet struck that delicate balance which characterizes the "practitioner-scientist" (Keating, 1992): open-mindedness in the development of theory and techniques, but caution in drawing conclusions and making claims. Nonetheless, there is also a research community within chiropractic, and a sprinkling of skeptics throughout the profession.

The bonesetter's art is an ancient and valuable contribution to healing. In the United States, chiropractors are the overwhelmingly most frequent providers of these services. Yet, chiropractic has evolved as an estranged child among the other health care disciplines, and its culture has nurtured anti-scientific and pseudo-scientific attitudes and activities. Meaningful change, including growth of science within chiropractic, will require external support, greater integration and wider appreciation of the diversity of values and epistemologies among chiropractors.

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Table 1: Several scholarly journals of chiropractic

Journal title	Editor(s) and editorial address	Publisher and publisher's address
Chiropractic Journal of Australia (formerly the *Journal of the Australian Chiropractors' Association)*	Mary Ann Chance, D.C. and Rolf Peters, D.C., P.O. Box 748, Wagga Wagga NSW 2650, Australia	Chiropractic Association of Australia (subscription inquiries to editors' address)
European Journal of Chiropractic	Simon M. Leyson, D.C., 16 Uplands Crescent, Swansea SA2 OPB, Great Britain	Blackwell Scientific Publications, P.O. Box 87, Oxford, Great Britain
Journal of the Canadian Chiropractic Association	Alan Gotlib, D.C., 1396 Eglinton Avenue West, Toronto, Ontario M6C 2E4, Canada	Canadian Chiropractic Association, 1396 Eglinton Avenue West, Toronto, Ontario M6C 2E4, Canada
Journal of Manipulative & Physiological Therapeutics	Dana J. Lawrence, D.C., *Professor*, National College of Chiropractic, 200 E. Roosevelt Road, Lombard IL 60148 USA	Williams & Wilkins, Inc., 351 West Camden Street, Baltimore MD 21201 USA
Topics in Clinical Chiropractic	Robert D. Mootz, D.C., D.A.B.C.O., *Associate Medical Director for Chiropractic,* State of Washington Department of Labor & Industries, P.O. Box 44321, Olympia WA 98504 USA	Aspen Publishers, Inc., 7201 McKinney Circle, Frederick MD 21701 USA

Table 2: Chiropractors' epistemological (ways of knowing) strategies for determining what works or does not for patients (theories and clinical methods)

Strategy	Reasoning mechanism	Example(s)
founder's authority	founder of chiropractic (D.D. Palmer) or his son (B.J. Palmer) or some other guru says so, therefore it's true; truth by fiat	"D.D. Palmer discovered the chiropractic principle"; "chiropractors since D.D. Palmer have been finding and removing the cause of disease"
spiritual inspiration	knowledge based on privileged communication with supernatural source	D.D. Palmer learned of chiropractic principles from spirit Dr. Jim Atkinson (Palmer, 1910); author of a "chiropractic philosophy" text describes himself as a "scribe" for Innate Intelligence, the true author (Barge, 1987)
a priori truth	empirically testable but untested proposition is accepted/asserted to be incontrovertible	as proof of the meaningfulness of subluxation: "It just makes sense that if your have interference to your nervous system, you can't be totally healthy nor reach your full potential"; "anyone who doesn't believe in subluxation has no business at a chiropractic college"; "chiropractic is just naturally right"
uncritical rationalism; "deductive science"	validity of theories and effectiveness of clinical methods thought to be established by consistency with (or derivability from) more fundamental "truth" (e.g., basic science knowledge)	"Chiropractic principles are as old as the vertebrata"; "we know chiropractic works because the nerve system is the master switchboard of the body"; "we know it works because it makes sense in terms of anatomy and physiology"; basic science research offered as "proof" of clinical utility; deductibility of chirotheory and technique from some "first principle" (e.g., tone, subluxation or Innate Intelligence) taken as proof of validity (Stephenson, 1927)
over-generalization	embellishment; evidence in support of some derivative or sub-hypothesis is taken as proof of a broader theory or clinical method	AHCPR's endorsement of spinal manipulation for patients with low back pain offered as proof that "chiropractic works, just like patients and chiropractors have known all along"; a single experiment involving changes in T-cells taken as evidence that "chiropractic has a profound effect on the immune system"
selective evidence	denial; refusal to consider theories or data which conflict with favored theory	articles selected for a review of the literature omit and/or minimize unfavorable studies and emphasize favorable information
private empiricism	knowledge from unpublished, personal experience or clinical legend	"I've seen it proven everyday in my office for 20 years!!"; "B.J. Palmer proved chiropractic at his Research Clinic"
uncritical empiricism	non-critically reviewed and/or weak data given as "proof" of the validity of theory or technique	"research" is published in trade magazine without scholarly critique or evaluation; anecdotes, testimonials and non-experimental data (e.g., descriptive clinical trials and case reports) offered as substantiation of a clinical procedure
appeal to ignorance	absence of research offered as validation of chiropractic "principles"	"Chiropractic has never been disproven"
repetition	none; frequent re-assertion of a claim for chiropractic	"Chiropractic works!"; "it works, it gets results, that's what counts"; "it just works"; "it REALLY works"
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Notes:

1. There are at least four national, general professional associations of chiropractors in the United States: the American Chiropractic Association, the International Chiropractors' Association, the National Association of Chiropractic Medicine and the World Chiropractic Alliance.

2. In Canada, on the other hand, recommendations for medically integrated chiropractic education date at least to 1916 (Biggs, 1989), and the University of Quebec has recently established a chiropractic college at its Three Rivers campus. State supported, university-integrated chiropractic education is also found in Australia, Denmark and South Africa.

3. Of the 60 semester credit hours required for admission to chiropractic college, there must be at least six credits each of general (inorganic) chemistry, organic chemistry, physics and biology, all with laboratory. Credits in the social sciences and the humanities are also required. Cumulative grade point average must be at least a "C" (2.0 on a 4.0 scale); see McNamee (1994) for more detail about admissions requirements for particular schools. Minimum admission requirements are higher at some chiropractic schools.

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April 16, 1996

Kendrick Frazier, *Editor*
The Skeptical Inquirer
944 Deer Drive NE
Albuquerque NM 87122-1306
FAX: (505) 828-2080

Dear Mr. Frazier,

Enclosed please find three copies of my paper, "Chiropractic: science and anti-science and pseudo-science, side by side," which I submit for your consideration to publish in the *Skeptical Inquirer*. This manuscript has neither been published nor submitted for publication elsewhere.

Please let me know what additional information, if any, may be needed.

Thank you.

Sincerely,

Joseph C. Keating, Jr., Ph.D.
Professor

July 30, 1996

Kendrick Frazier, *Editor*
The Skeptical Inquirer
944 Deer Drive NE
Albuquerque NM 87122-1306
FAX: (505) 828-2080

Dear Mr. Frazier,

Several months have passed since my submission to you of "Chiropractic: science and anti-science and pseudo-science, side by side" for consideration to publish in the *Skeptical Inquirer.* I did receive a postcard from you indicating that the manuscript had been received, but have not heard further.

Would you please advise me about the status of the paper?

Thank you.

Sincerely,

Joseph C. Keating, Jr., Ph.D.
Professor

September 16, 1996

Kendrick Frazier, *Editor*
The Skeptical Inquirer
944 Deer Drive NE
Albuquerque NM 87122-1306
FAX: (505) 828-2080

Dear Mr. Frazier,

Some five months have passed since my submission to you of "Chiropractic: science and anti-science and pseudo-science, side by side" for consideration to publish in the *Skeptical Inquirer*. I did receive a postcard from you indicating that the manuscript had been received, but have not heard further. I wrote to you on July 30, asking for feedback concerning the status of my paper, and received a telephone message from your secretary indicating that you would contact me shortly.

The courtesy of a reply is requested.

Thank you.

Sincerely,

Joseph C. Keating, Jr., Ph.D.
Professor

October 24, 1996

Kendrick Frazier, *Editor*
The Skeptical Inquirer
944 Deer Drive NE
Albuquerque NM 87122-1306
FAX: (505) 828-2080

Dear Mr. Frazier,

Some six months have passed since my submission to you of "Chiropractic: science and anti-science and pseudo-science, side by side" for consideration to publish in the *Skeptical Inquirer*. I did receive a postcard from you indicating that the manuscript had been received, but have not heard further. I wrote to you on July 30 and again on September 16, each time asking for feedback concerning the status of my paper, and received a telephone message from your secretary in early August indicating that you would contact me shortly. I am at a loss to understand why you have not yet communicated with me.

The courtesy of a reply is requested. Messages can be left at (310) 947-8755, ext. 633. My home phone is: (310) 690-6499. My e-mail address is: JCKeating@aol.com

Thank you.

Sincerely,

Joseph C. Keating, Jr., Ph.D.