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A Model for Understanding the Difference Between Mythology, Theory, and Science

By Daniel C. Seemann, Ph.D.

It took man 30000 years for man to go 12 mph,
In 1913 he flew 120 mph,
In 1957 he flew 1200 mph,
And in 1967, 17000 mph.

In a period of only 54 years, man increased his speed by almost 150 fold. The history of science closely parallels man's history of flight. Until man was able to observe and predict the behavior of the universe, relatively little was understood about the universe. Approximately ninety percent of all we know that is scientific has been accumulated the past 50 years.

The purpose of this paper is to discuss the different levels of understanding that we have about the truths of the universe. The paper will also present some tools that are available to understand more about the scientific process.

Levels of Understanding

Figure 1 illustrates a model for understanding the difference between mythology, theory and science. Our level of

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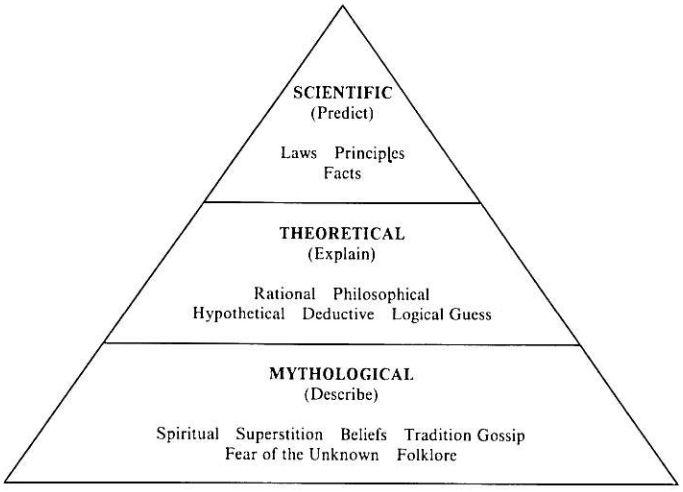

Figure 1
Levels of Understanding from the Mythological to Scientific. (Seemann, 1984)

1987 Advances in Bioengineering

Three-Dimensional Computerized Modeling of the Occipital-Atlanto-Axial Spine

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A specific method for constructing graphical models of the upper cervical spine was developed and carried out by combining the technologies of computerized tomography and computer aided design. The models developed depict the complicated outer structures of the mating spinal vertebrae. These models provide useful information for spinal analysis techniques.

INTRODUCTION

As a result of a recent increase in the availability of comprehensive computer graphical techniques as well as "new generation" of computerized tomography scanners, it has become possible to construct a model of the human spine which considers both external and internal anatomical geometric features. The purpose of this study is to develop and apply a standard procedure for scanning spinal samples and arranging the data such that complete computer graphical model representations can be made of the spine. These models can be constructed in such a way as to accommodate modern three-dimensional structural, kinematic, and clinical analysis techniques for evaluating cervical spinal injuries.

Early structural models of bone were constructed and analyzed by Wolfe (1) and Koch (2). Two-dimensional discrete parameter models of the spine were developed by Schultz and Galante (3) to aid in a mechanic study of the vertebral column. Belytschko et al (4) developed three-dimensional models for spinal analysis using the finite element method. Levy and Raftopoulos (5) proposed that a series of scans could be used to generate sufficient geometrical data such that a structural model of bone could be developed. Whereas modeling by other spinal researchers has focused on the orientation of spinal vertebrae and to a

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A Model for Understanding the Difference Between Mythology, Theory, and Science

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understanding at the mythology level is limited. For an example, at the mythology level, we can only describe behavior. This means we do not understand the behavior. This is how a primitive civilization would operate. A clap of thunder would signify that the "gods" were angry and that some sort of sacrifice was necessary to appease them. The fear of the unknown led to various descriptions of behavior such as superstition, folklore, spiritual, tradition, gossip, and beliefs. The true meaning of the behavior was not fully understood which in many cases led to more fear about the unknown. And if the reader feels that this kind of fear cannot occur in a civilized society one only has to observe how people behave when a disease such as AIDS or a celestial event occurs. As the primitive tribes became more sophisticated and the level of understanding increased through cognitive efforts the quality of the understanding improved.

The focus on mythology began to wane with the emergence of the early philosophers such as Plato, Aristotle and Galen who attempted to explain the universe in a logical manner. Deduction became a major tool in arriving at conclusions. Deductions were based on premises which were not required to be directly observed. All authority was based on the rational, logical powers of the philosophers and church fathers. Theories were developed to explain the universe. The theories whether in physics, biology or psychology were based on a set of concepts and hypotheses that provided a perspective on some aspect of the universe. Sometimes philosophers did not want to know the truth. At Paqua, Italy the logicians refused to look through Galileo's telescope for fear they would see something which would conflict with the scriptures. Galileo was jailed for challenging the notion that the earth was the center of the of the universe.

To summarize the theoretical level, the tools of the philosophers were deduction, logic, rational processes. At best, behavior was predicted 50% correct. The essential ingredient missing was the philosophers could not actually observe the behavior and if the behavior could not be directly observed it could not be measured, and if it could not be measured it could not be predicted.

After the constraints of the Middle Ages were finally broken the effects of the scientific thrust began to be felt. The hard sciences such as physics, chemistry and geology got a head start on the soft sciences, sociology, psychology, and anthropology because they could measure quantifiable data. The soft sciences had more difficulty because it was difficult to quantify emotions such as feelings, emotions, etc.

At the scientific level, a standard was established that in order that any form of behavior to be considered scientific, it must be predictable at least 95% of the time. Guess work, opinion, even theory was not acceptable if it could not predict to this standard.

The important difference between mythology, theory and science is that scientific behavior must be factual which requires the behavior to be observed, measured and predicted. Both mythology and theory need not be observed or predicted.

Another way to remember the model is to equate mythology with emotional, theory with rational and scientific with fact. The closer a question can get to the facts, the less room for disagreement in the solution of a problem. For an example, there is a dilemma in chiropractic because a wide gap exists over how to reduce a subluxation. The solutions range from the emotional to the rational and less seldom the scientific. Those with an emotional point of view are usually quite defensive and attack other systems not really knowing much about the other system. Or a group will not understand a particular procedure and will then deny that it is possible to use the procedure. Many in chiropractic who still call themselves chiropractors have fled to quasi-medical procedures because they see nothing in chiropractic that is scientific. The writer feels that many have fled pure chiropractic because of the heavy reliance on a philosophical agenda rather than a scientific agenda. Until chiropractic can get on a scientific base there will always be a disagreement on how to reduce the subluxation. A first order of business would be to consider a measurement system and some statistical tools.

A Measurement System

There are four basic measurement systems: the nominal, ordinal, interval and ratio. The nominal system merely denotes a difference between things. It does not tell us if something is larger or smaller. It might tell us if something is green or yellow or male or female but nothing else. An ordinal system will tell us if something is greater or lesser than another object. It will tell us in a horse race who is first or last but nothing more. The interval scale will tell that each interval of measurement is equal but we do not know where on the scale the unit fits. For an example, a ruler with the bottom broken off say starts at 2¼ but has no zero. When measuring a distance we have no idea what the true measurement is. With the ratio scale we do know what true zero is and this allows us to compare other distances with the same frame of reference. We can say something is three times greater than something else.

The implication for chiropractic is there is no common ground for measurement. The notion for example that palpation is just as accurate as marking x-rays using a rotatory measurement system is nonsense. At best, palpation could only be an ordinal system whereas, a rotatory measurement system with an absolute zero would be a ratio scale. The recent Jackson study (1987) and the previous Seeman study (1986) should lay to rest the premise that you cannot get high inter and intra examiner reliability. Chiropractic needs to get on with exploring areas of agreement rather than let a few who are afraid to look into the telescope dominate this important issue.

Blind and Double Blind Studies

Blind and double blind studies are popular in the design of research studies especially in the health fields. There are two

basic reasons why you would use the blind and double technique. The first is to minimize the bias of the experimenter. The experimenter unconsciously may influence the outcome of a study especially if the experimenter has a stake in proving a point of view. The mechanics of the design would be not to allow the experimenter to know if the subject received the treatment or the placebo. The other reason for the double blind design is the measurement system is soft (usually nominal or ordinal). The dependent variable (the patient's behavior) is difficult to quantify. If the scale was either interval or ratio, the need for the double blind design would be minimized.

Descriptive Statistics

When we talk about descriptive statistics we talk about measures of central tendencies and measures of variability. The measures of central tendency are the mean, median and the mode. Most everyone knows what a mean is but fewer know what a median is. A median is found by arranging an array of data from low to high, i.e., the shortest people to the tallest. The median would be the mid point in the array of data. The median is used when the data is skewed at the top or bottom of the data. If there is a skewing the median will be much more accurate than the mean. The mode is simply the largest category in the array of data. It also could be called the trend in an array of data. The mean, median and mode are all located at the same location on a normal curve.

The normal curve is found in Figure 2. The curve is separated into unequal parts. And with any normal curve, whether it is flat or thin the distribution of the parts within the curve will always be the same. Plus or minus one standard deviation will include 68.28% of the curve. Plus or minus two standard deviations will include 95.44% of the curve. Plus or minus three standard deviations include almost the entire curve. When predicting anomolous behavior, such as the number of gifted in the population one safely can predict around 2½% of the population.

Understanding the normal curve helps when discussing standard deviation. The standard deviation is a measure of variability. It basically tells how the data clusters around the mean. If the curve is flat, it tells us there is considerable variability around the mean. If the data is clustered around the mean, this suggests less variability. An example of how this information can be useful would be in learning a skill. If the standard for a skill was say, 10 and there was a wide variance of those learning the skill, say the SD was 5 when the agreed upon standard was 3, we either would crank up the instructor or the students to meet the standard.

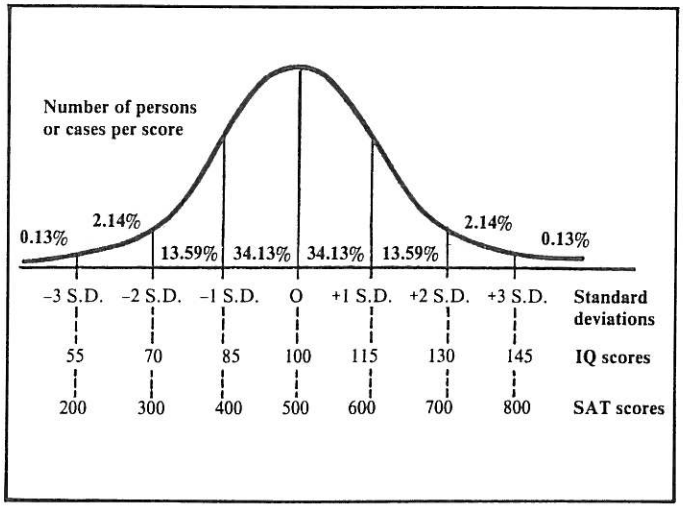

Figure 2
Example of the Normal Curve (Morris)

An understanding of both the mean and SD is necessary when comparing the difference between two samples to determine whether the difference is statistically significant. See Figure 3. For example, if we are comparing the difference between the height of men and women statistically it would be done by comparing the means and SD of the two populations. The data would be referred to a table which would indicate significance or not.

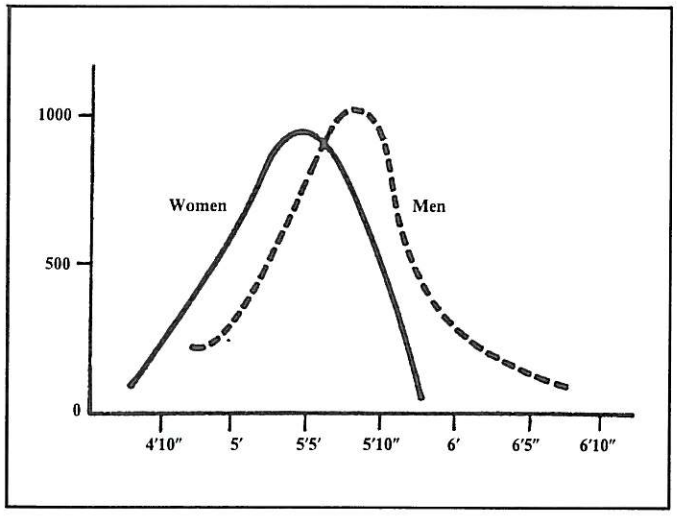

Figure 3
Comparison of Two Populations.
Between the Height of Men and Women.

Correlation Coefficient

A correlation coefficient is used to determine the degree of relation between two variables. For an example, is there a relationship between IQ and grades in college? or is there a relationship between height and weight? One of the major reasons to know is that if we know one of the variables it will help predict the other variable. If we know someone's shoe size it might help us guess how tall the person might be. It is difficult to predict perfectly (which would be either a +1.00 or a -1.00) but an index greater than .50 either + or - is considered a strong relationship.

Is is important to remember that a correlation does not answer the question why, but only that a relationship exists between two variables.

A special form of the correlation is an index called the reliability coefficient. It is used when attempting to determine the consistency between two or more examiners reading x-rays. The index will show to what extent one examiner is reading an x-ray the same way as another.

Downie and Starry (1977) have indicated that reliability coefficients of .50-.70 as moderately high and a .80 as being a high positive correlation. Both the Jackson and Seemann studies showed that inter-examiner reliabilities were .90 or better.

Conclusion: Some Scientific Myths

Lest the reader become lulled into the notion that all is well if a behavior meets the test of the "scientific court," one only has to examine the reality of the moment to notice there are myths which exist in the scientific realm. For an example, the causes of alcoholism are generally thought to be a disease and the treatment is basically abstinence. Yet there are no clear evidences supported by research that abstinence is the most appropriate cure for alcoholism. A study by the Rand Corporation (1976) suggests that some recovering alcoholics could probably drink socially given some coping skills. Yet the topic is so emotional with groups like the AA which has a religious base and the hospitals who like people to come to their place for 28 day stays, it is unlikely that much will happen to improve the plight of the alcoholic in the near future.

It is also happening in chiropractic. One of the most detrimental things has been the line drawing issue with the radiologists. Their position is that lines drawn on x-rays cannot be measured, consistently because of the magnification and the distortion problems. And they are very aggressive in attempting to dissuade doctors from marking x-rays, even to publishing biased articles promoting their theory. This myopic position in the opinion of this writer, has managed to set the progress of chiropractic back as much as anything that is occurring in chiropractic today.

Another myth the careful reader must be aware of is this deference to the "refereed journal". It is the writer's perception of many "experts" in the chiropractic field that if a study is not peer-reviewed and in a refereed journal, the work is probably not worthy of reading. What is even worse is if the article gets published in a refereed journal we can assume it is the definitive study and the "truth". The truth is the statistics or charts look great but the substance and the methodology of the research is very shaky, i.e., too few subjects, experimental bias, and faulty conclusions.

A particular worrisome problem is the topics for research. There are very few articles written about the subluxation and its reduction. It is very difficult to research the subluxation unless the researcher is an adjuster. Ph.D. researchers such as the writer, must work very closely with someone who can successfully reduce the subluxation, because the researcher does not know what questions to ask. That is why most of the researchers who do not adjust will concentrate their research on the analysis, or the neurological aspects of the subluxation. The myth here is that we can analyze with computers, quantify, interface and construct algorithms but until we find ways to reduce the subluxation efficaciously, we are a long way from hearing the fat lady sing.

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lesser extent on the individual structure of each member, this study focuses on the geometrical construction of the occipital condyles, the atlas (C-1), and the axis (C-2)/

METHODS

An intact human cadaver cervical spine oriented into the upright-standing-position was properly prepared for this analysis. Initial data for the model construction of C-0 through C-2 was generated by computerized tomographs taken such that the most comprehensive body of data could be acquired. The thickness of the scans on C-1 and on the condyles of occiput were 1.5 mm and the scans were taken in increments of 1.5 mm, resulting in contiguous scans. The thickness of the scans on C-2 were 3.0 mm and the scans were taken in increments of 3.0 mm, again resulting in contiguous scans.

For the surface of the occipital condyles, representing C-0, scans were taken parallel to the transverse anatomical plane starting at the base of the skull and extending up 15.0 mm for a total of 10 scans. For C-1, scans were taken parallel to the sagittal anatomical plane starting from the far left transverse process and traveling to the end of the right transverse process. This method allowed 51 scans to be taken spanning 76.5 mm. Scans for C-2 were taken in much the same manner as those for C-1 producing 21 scans while extending 63 mm.

The scans were then enlarged with a comparator and more than 2,000 points were digitized and fed into a computer-aided design system. (The isometric view of the points representing C-1 are shown in Figure 1.)

Fig. 1
Digitized points used to construct the geometrical model of C-1 shown in an isometric view.

James F. Palmer
Addressing Covention

Cancellous and cortical bone boundaries were then defined for each scan along with the Hounsfield number for each region of bone. Cubic splines were then constructed about the points which define bone regions for each scan. B-spine surfaces were then constructed about the series of spline. These surfaces represented the outer surface as well as the inner cancellous cavity of each cervical vertebrae. The B-spline surfaces and the average Hounsfield numbers for each region represent the total three-dimensional models of the upper cervical vertebrae. (Figure 2 shows an isometric view of the cubic splines used for the construction of C-1. Figures 3 through 5 show the graphical models of C-0 through C-2. Figure 3 shows an isometric view of C-0, Figure 4 shows a transverse-plane view of C-1, and Figure 5 shows a frontal-plane view of C-2.)

RESULTS AND DISCUSSION

The results of this study show that by using a large quantity of computerized tomography scans taken under a standard procedure, accurate representations of spinal vertebrae can be produced by computer graphical tech-

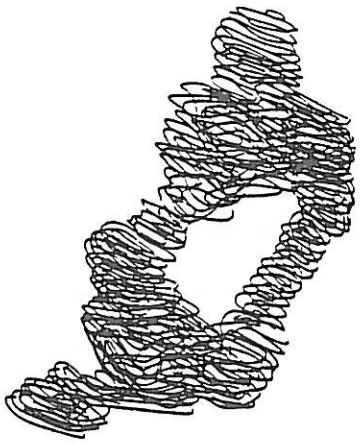

Fig. 2
A series of cubic splines which are used to construct C-1 model also shown in an isometric view.

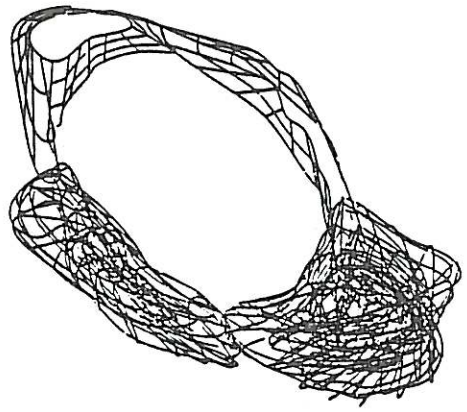

Fig. 3
Computer graphical model of C-0 shown in the isometric view.

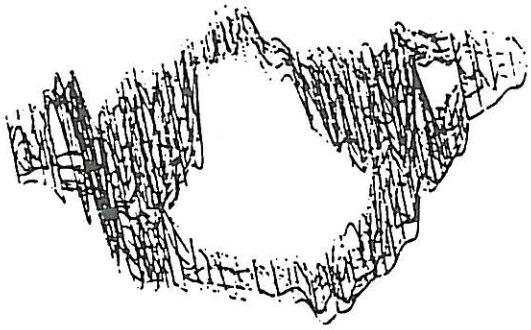

Fig. 4
Computer graphical model of C-2 shown in the transverse plane view.

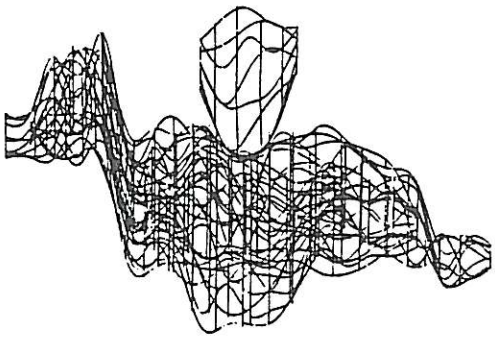

Fig. 5
Computer graphical model of C-2 shown in the frontal plane.

niques. The combination of the cancellous bone boundary and the average Hounsfield number work together to create a comprehensive model of the inner structure of the spinal cavity.

As can be seen in Figures 3 through 5, the models produced in this analysis depict a large amount of the complicated geometry in the area in question.

Short-term research efforts focus on geometrical/inertial properties of the individual upper-cervical spinal elements; these properties include cross-sectional areas, surface contours, orientation of principal axes, location of centroidal axes, moments of inertia, and products of inertia. Representative values for populations differing in age and sex should be obtained for these properties. Long-term research should focus on a complete biomechanical model of the upper-cervical spine.

ACKNOWLEDGEMENTS

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The Evolution of the NUCCA Adjustment

by Ralph R. Gregory, D.C.

BACKGROUND

The adjustment of the C1 Subluxation Complex has slowly evolved over the years. As it emerged step by step, the objective constantly sought was to simplify the performance of this motor skill for the adjuster, reduce force to a minimum, eliminate as much as possible the depth required to correct vertebral misalignments, obtain greater accuracy of direction when adjusting, and create a better state of biomechanical integrity.

Simplification of the adjustic performance became necessary because too many chiropractors experienced considerable difficulty in obtaining vertebral corrections. Greater control of adjustic force was essential because too little force resulted in loss of corrections and too great a force produced detrimental changes in vertebral positions. Vascular accidents also were possible when too great a force was used. Greater accuracy of direction of adjustic force was of primary importance because it reduced the amount of force necessary to correct the misalignment factors of the C1 subluxation. These reasons made continued testing of the C1 adjustment imperative.

A vertebra must misalign before it can subluxate; that is central, the bottom line. Removal of the subluxation's misalignment factors is the only purpose for applying force (adjustment) to the misaligned vertebra(e). Because misalignments cause subluxations it is imperative that they be restored or corrected to their normal positions. Restoring them to normal position requires a very accurate direction in the application of the force, a force delivered along a predetermined pathway as computed from the film analysis. If misalignments were not a crucial part of the subluxation, adjustments would be contraindicated. Some other form of energy—chemical, electrical, thermal—would remedy the subluxation. To apply indiscriminate force to misaligned vertebra makes no more sense than attempting to move any object to a specified point without regard to the line of direction and the application of force.

For 45 years some upper cervical chiropractors have established vectors—a quantity specified by a direction and a magnitude—from their x-ray analyses of the subluxation, based on the abnormal deviations of the vertebrae into planes of motion. First, the Horizontal Resultant (Figure 1) was established which incorporated the distance from the transverse process of the rotation vector. At right angles to the rotation vector line, the nasium vector was erected which included the elements that determined the height required in that adjustment and taken from the nasium film. A right angled triangle was established, the hypotenuse of which became the Horizontal Resultant to which the adjuster aligned his/her body at right angles and established a base of support at the distal end of the Horizontal Resultant.

The Horizontal Resultant, however, was not sufficiently accurate because of the different builds of chiropractors.

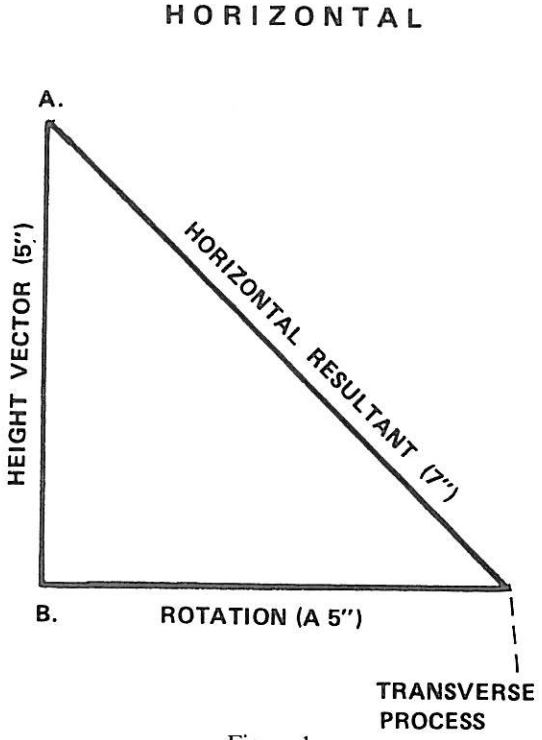


Figure 1
Horizontal Resultant

Measurements from the episternal notch to the pisiform bone of contact wrist of different adjusters ranged from 16 to 24 inches when they were in position to deliver the adjustment. This difference changed the point in space from which different adjusters would adjust the same subluxation listing. Consequently, the Notch-Tranverse Resultant, or Reduction Pathway, was developed which computed the exact point in space for a given adjuster's episternal notch, the point from which he/she must deliver an adjustic force according to his/her episternal notch-pisiform bone distance. The adjustment then became an individual process.

An adjuster with a 20 inch episternal-notch-pisiforn distance who is addressing a High 5, Anterior 5 subluxation should work out a pattern as shown in Figure 2. A vertical right angled triangle is established by squaring the 20 inches and squaring the 7 inch Horizontal which is the approximate base of the vertical triangle. The 49 is subtracted from the 400, leaving 351. The square root of 351 is 18.7 or approximately 18 and ¾ inches, the altitude side of the vertical triangle. Another 18 inches is added because the average patient's transverse process when on the adjusting table is about 18 inches from the platform on which the table rests, and the adjuster is standing. The distance from the apex of the triangle, the point at which the adjuster's episternal notch is located, to the patient's transverse process (contact point) is the line along which the adjustic force must travel to make a subluxation correction. This is the final resultant, the Notch-Transverse Resultant, the Reduction Pathway, and should be worked out in every listing. The adjuster's action lines must be coplanar with this final resultant. In this example, the adjuster with the 20 inch episternal notch-pisiform bone distance would have an episternal notch 36 and ¾ inches from the platform top on

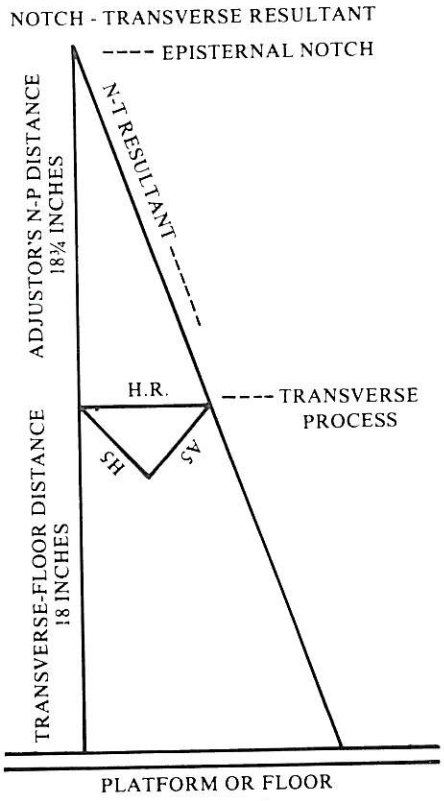


Figure 2

The reduction pathway (N-T Resultant) computed from x-rays and the adjuster's episternal notch to transverse distance for a C-1 subluxation requiring vertical and horizontal vectors of 5 inches.

which he/she stood for this subluxation listing.

The measurement of the procedures from the film analysis through the adjustment process by upper cervical practitioners and their known distortion effects on the body validates observation and experimentation which is the essence of the scientific method. Experimentation based on measurement is more objective, and being able to predict the results of the adjustic action is a scientific procedure.

METHODS OF ADJUSTIC MEASUREMENT

Over the years, NUCCA devised several methods and tools to test the performance of the adjustic motor skill. The oldest and best test is the comparative x-ray (post) immediately following the adjustment. It is conclusive as to its findings. It verifies the system of analysis and its correctness, and indicates the skill of the adjuster. Further, it protects the patient against errors of analysis and possible adjustic faults, against excessive force and depth, incorrect placement of the patient's head, wrongly computed vectors, etc.

The distances that C1 moves right or left of the occipital condyles or rotates in the transverse plane is usually small. Great force and depth therefore may be harmful. Sometimes the cervical spine moves as a unit into one of the frontal planes quite extensively, increasing the resistance that must be overcome and causing rotation of the vertebral segments below C2, proportionate to the frontal plane movement of the cervical spine. However, the tendency by practitioners to use too much force in the adjustment is too frequently employed. NUCCA, therefore, conducted a study to determine ifthe rectilinear adjustic force is expressed as it should be for any given subluxation.

The devices used in these tests were the coordinator (Figure 3) and a harness that could be attached to the adjuster's body from which protruded two small spotlights at his/her episteranl notch and pelvic center of gravity.

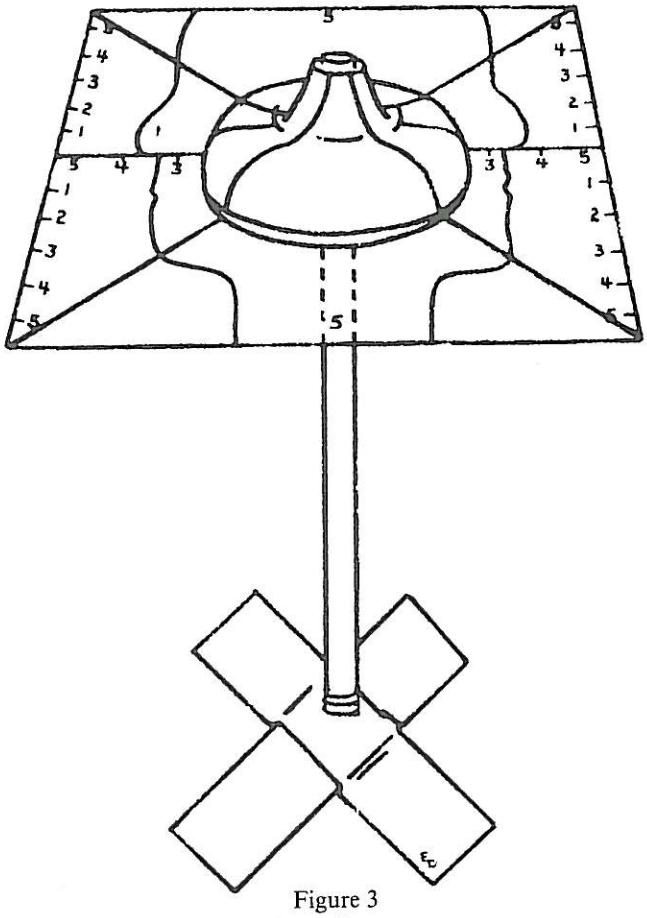


Figure 3
Coordinator

These spotlights guided the adjuster in a dimly lit room while he/she went through the steps of the adjustment on the coordinator. A visual feedback clearly showed when the adjuster made an error in any of the steps of the adjustment, and if he/she were in proper alignment with the Notch-Transverse Resultant when adjusting.

As expected, the adjuster was not performing as he/she thought they were. Deviations of the light from the Notch-Transverse Resultant were the rule rather than the exception. This meant that had the adjuster been actually adjusting a case, the post x-rays would disclose lack of correction of the vertebrae; in fact, another adjuster watching the light-coordinator performance could foretell what the outcome as seen on an actual case's post x-ray would have been (Figures 4, 5, and 6 show examples of the deviation of the adjuster's action lines; compare with Figure 7 which is normal).

Adjustments in which the force emanated from the elbows were found to produce the least control of the adjustic force and the greatest deviation of the action lines from the final resultant. The adjustment using the triceps brachii pull showed much control alignment with the final resultant provided the other adjustic steps were performed correctly.

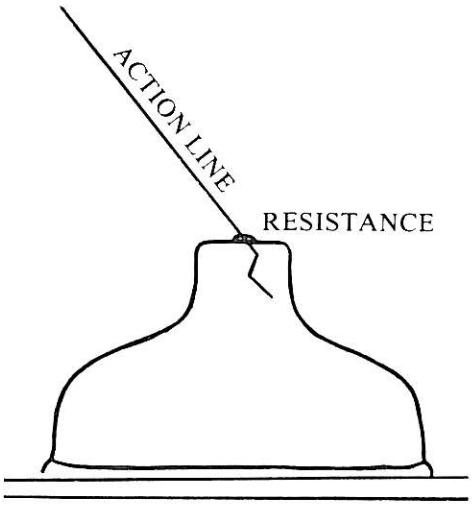


Figure 4

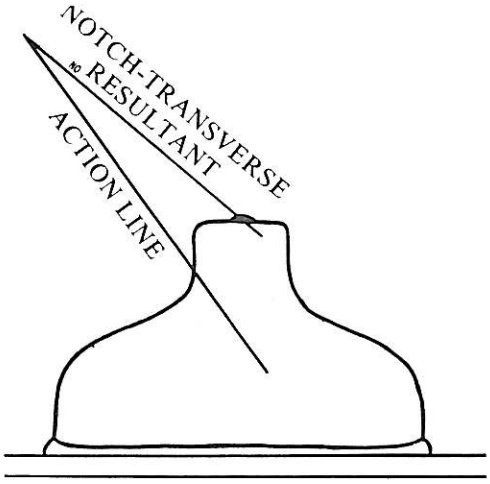


Figure 5

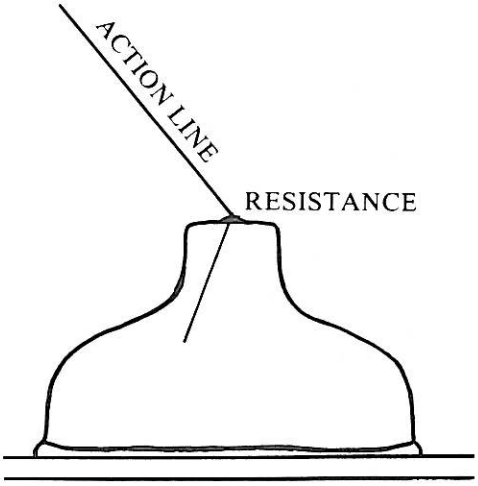


Figure 6

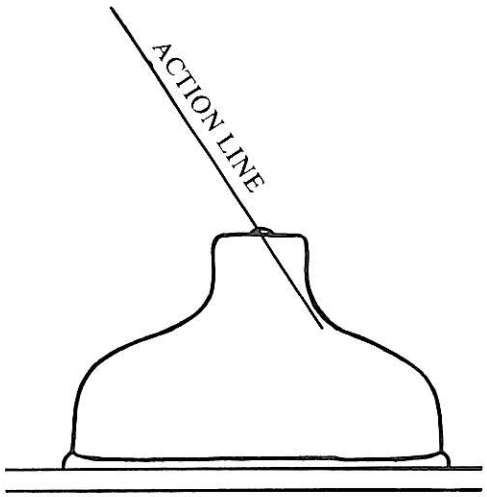


Figure 7

In the triceps brachii pull the muscular contraction is initiated from a point about one inch below the glenohumeral joints. This muscular action accentuates shoulder girdle contraction, to be desired, and is a reversal of the usual function of the triceps brachii, known as functional reversibility. The reversal function is aided by the locking of the roll-in hand on the contact arm wrist causing the effort of the muscular action to be concentrated on compressing the shoulder girdle. The line of the muscular pull is a straight line between the insertion of the triceps brachii in the olercranon process of the ulnar bone and the long head of the muscle in the infraglenoid tuberosity of the scapulae (Figure 8).

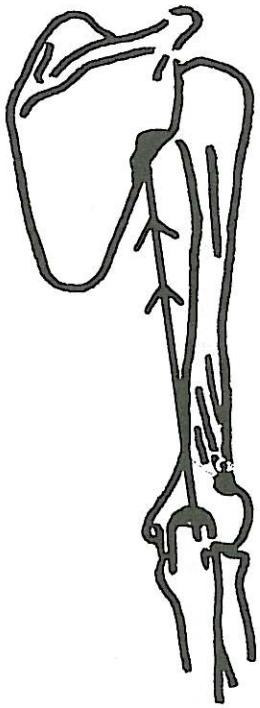


Figure 8
Line of Pull

Video-tape provided another test for analysing the expression of adjustic direction and force. Because a review of a tape can be "frozen" at any point, a close scrunity and study can be made of the adjuster's performance of all the adjustic steps. The exact direction of the effect of the adjustment as it moves the coordinator can be evaluated.

Even though the triceps brachii pull system of adjusting proved the most effective and efficient, the problem still existed that many practitioners had difficulty in mastering the final step of the adjustment—the actual delivery of the adjustic force. Because this problem has existed for years, work was begun on modifications of the final phase. After nearly two years, a system replacing the final phase was released that proved even more efficient and easier to do than the previous triceps brachii pull. It is still called the triceps brachii pull. A description of it follows:

After completing all the previous steps of the adjustment, the adjuster, having contacted the C1 transverse process and completed his/her roll-in and checked to make sure that the pisiform of roll-in wrist is securely locked in the anatomic fossa of contact wrist, pulls back toward the shoulder on the side of contact arm and at the same time holds the pisiform bone of roll-in against the anatomic fossa of contact wrist so as to prevent contact arm from pulling upward. (Do not exert any pressure against the patient's neck)

The resistance between the fossa of contact wrist and the pisiform bone of roll-in wrist steadily increases as the backward pull of contact arm and the resistance by roll-in arm increases. This resistance compresses the adjuster's shoulder lever, forcing his/her scapulae inward toward the spine and extending the episternal notch toward the Notch-Transverse Resultant.

As the adjuster's shoulder lever compresses, and to the degree it compresses, a force is generated in the adjuster's body which, after reaching the degree required to overcome the resistances of the subluxation will correct the misalignment factors. (Figure 9).

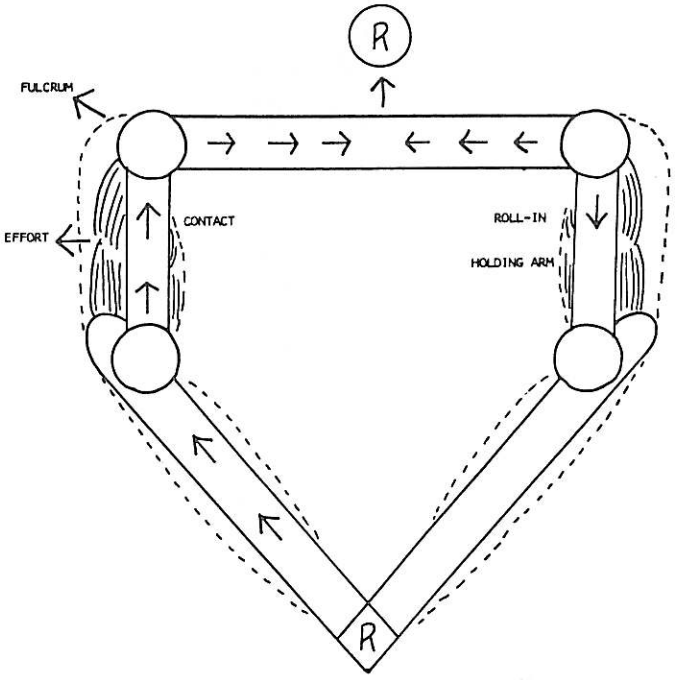


Figure 9

To date, no one has computed the amount of adjustic force tha that is required to correct the subluxation being addressed. This can vary by several pounds. In the triceps brachii action just discussed, the exact amount of force necessary to correct the subluxation is withheld in the adjuster's body until the resistances of the subluxation are overcome, making adjusting safe for the patient and the use of indiscriminate force unnecessary.

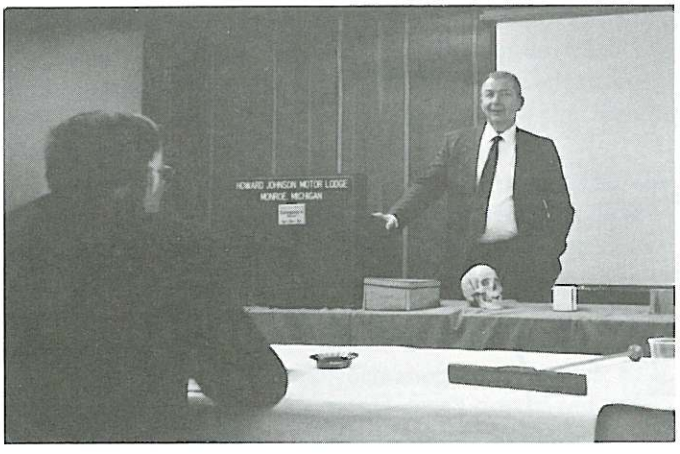
The sole function of the roll-in arm is to hold the backward pull of the contact arm. This action practically eliminates the use of depth. Further, it retains the exact amount of adjustic force within the adjuster's body (compression of the shoulder girdle) until the subluxation's resistances are overcome. At that moment the misalignment factors of the subluxation realign themselves to normal or the vertical axis of the patient's body utilizing the exact degree of force required to overcome the resistances for that particular subluxation. The inertia of the adjuster's body is also overcome.

Dr. George Hess Addresses NUCCA Convention

Doctors and students attending the 1988 NUCCA Convention and Educational Conference greatly enjoyed a most informative and entertaining lecture on Sunday, May 1, 1988. The address was given by Dr. George Hess from the Palmer College of Chiropractic, Davenport, Iowa. Dr. Hess is the Palmer Director of Clinics.

Future plans for the Palmer Clinic were discussed by Dr. Hess which, among other matters discussed, was of great interest to the doctors and to the students. Dr. Hess was present at the NUCCA Convention for a day and a half during which time he was able to observe some of the lectures and hands-on procedures.

NUCCA was most pleased to have Dr. Hess as a guest and as a lecturer.

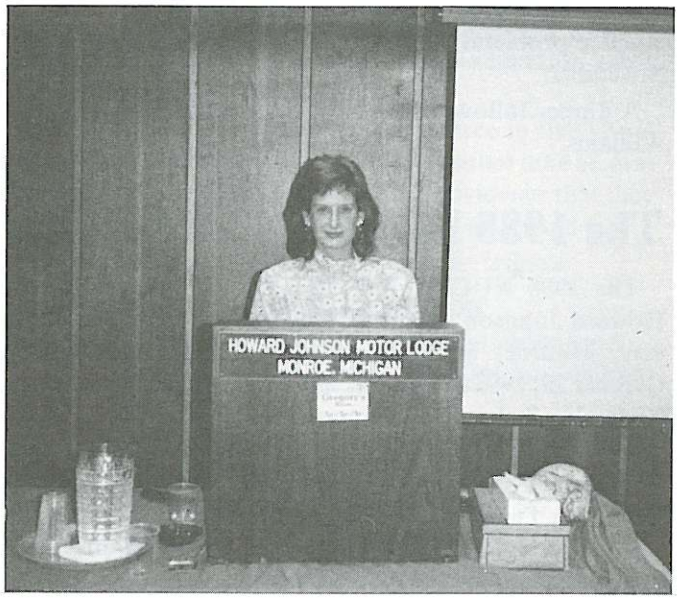


Dr. George Hess
Director of Clinics at Palmer College

The 1988 NUCCA Convention and Educational Conference

The 1988 NUCCA Convention and Educational Conference was held at the Howard Johnson Motor Lodge, Saturday, April 30th through Tuesday, May 3rd. It was the largest Convention-Conference held by NUCCA to date.

The convention was opened with an inspirational address by Dr. Teresa Palmer who reviewed NUCCA-NUCCRA activities for 1987. A highlight of 1987 was the research of the Occipital-Atlanto-Axial spine conducted by James F. Palmer, Toledo University Professor and NUCCRA research consultant, and Michael Levy, Design Engineer of Howmedica. Both researchers presented a paper at the Winter Annual Meeting of the American Society for Mechanical Engineers in Boston, Massachusetts in December, 1987, entitled *Three Dimensional Modeling of the Occipital-Atlanto-Axial Joint* (A copy of the article is printed in the current Monograph). The research was funded by NUCCRA.



Dr. Teresa Palmer

Dr. Palmer stated in her opening address that the NUCCA system has been approved by the Palmer College as an elective. She also reported on the coalition started by Upper Cervical Practitioners at Marietta, Georgia, and hosted by Dr. Sid Williams, President of Life College.

Dr. Palmer's comments on the current attitude of the profession toward NUCCA-NUCCRA, perceived as esoteric, because of its complexities and NUCCRA's research in biomechanics and neurophysiology to eliminate complexity and further simplify, were well received.

Dr. George Hess, Director of Clinics at the Palmer College, was accorded a special welcome in Dr. Palmer's address.

The Educational Conference was supervised by Dr. Daniel C. Seemann, University of Toledo Professor and Executive Director of NUCCA. He was assisted by Drs. K. E. Denton, A. A. Berti, T. A. Palmer, M. Dickholtz, Sr., Lloyd Pond, Lonnie Pond, Ed Stein, Glenn Cripe, L. Schrock, and R. R. Gregory.

Color-coded participants were rotated from one station to another. Each station had certified instructors. Subjects taught were film analysis, adjusting techniques, patient x-ray placement, biomechanics, patient placement on adjusting tables, and leg checking. Doctors were permitted to choose which stations they needed help in.

Students from several colleges were in attendance as were doctors from throughout the United States and from Canada.

A banquet was hosted by NUCCA on Sunday evening, May 1. Professional entertainment was provided.

Doctors and students at 1988 NUCCA Convention and Educational Conference.

L to R seated: Dr. A. Berti, M. Dickholtz, Jr., M. Dickholtz, Sr., G. Cripe, K. Denton.
Second Row: M. W. Clark, Lloyd Pond, T. Palmer, Lonnie Pond, D. Fedeli, L. Schrock, D. Seemann.
Back Row: Ed Stein, R. R. Gregory.

Donors To NUCCRA Research

NUCCRA Research is dedicated to searching for solutions to the many existing problems regarding the subluxation and its correction—The Restoration Principle. Non-chiropractic institutions are involved in NUCCRA research with their expertise. While thousands of dollars have been contributed, more is always needed to finance further research.

Contributors wishing to assist may donate directly to NUCCRA or to the Ruth O. Gregory Memorial Fund. This Fund was established by the NUCCA Directive Board following Mrs. Gregory's death in 1982, and is to exist in perpetuity in memory of Ruth O. Gregory who devoted her time, money, and effort so unselfishly to NUCCA-NUCCRA that chiropractic could become more scientific and of greater benefit to the patient, the practitioner, and the profession.

All contributions are tax deductible.

Listed below are the most recent donations to NUCCRA and the Ruth O. Gregory Memorial Fund. NUCCRA extends its heartfelt thanks to all who have so kindly contributed.

Mr. Bert Kizer	Illinois
Mrs. Nita Orth	Indiana
Dr. M. Wayne Clark	Oklahoma
Mrs. Marynelle Shields	Indiana
Dr. & Mrs. M. Dickholtz, Sr.	Illinois
Dr. Steven MacDonald	California
Mrs. Lasca Stephens	Oklahoma
Dr. Gerald E. Martin	Arizona
Dr. Al A. Berti	Vancouver, Canada
Dr. L. Vinson	Alabama
Mr. Donald A. Miller	Michigan
Dr. Ralph R. Gregory	Michigan

Notice of Price Increase

Due to increased cost of production and increases in postal charges, the educational pamphlets sold by N.U.C.C.A. will be increased from $20.00 per 100 to $27.00 per 100. If pamphlets are purchased at a seminar, the cost will be $25.00 per 100.

N.U.C.C.A.'s status as a non-profit organization requires that pre payment on all items must be received before shipping can occur.

The Upper Cervical Coalition

Room 301 at Life Chiropractic College, Marietta, Georgia, was the scene of a meeting of Upper Cervical chiropractors on April 16, 1988. The meeting was hosted by Dr. Sid Williams, President of the College. Several doctors met to form what was to known as the Upper Cervical Coalition, an organization for the advancement of chiropractic in accordance with the Restoration Principle, and for the advancement through research and education the knowledge about the reduction of the upper cervical subluxation complex.

The meeting was opened by Dr. Sid Williams, followed by Dr. John D. Grostic and chaired by Dr. D. C. Seemann, Executive Director of NUCCA. Present and participating in the discussion were: Drs. T. Burnett, K. Robinson, T. O. Humber, K. Humber, J. McAlpine, J. Palmer NUCCA consultant), C. Laney, H. Crowe, K. Denton, and R. R. Gregory.

The Upper Cervical Coalition will serve to present a united front, achieve commonalty research problems and provide open discussions concernanalytical problems and practice problems. The next meeting is tentatively set for November.

A dinner following the meeting was hosted by Dr. Sid Williams.

The 1988 NUCCA Fall Seminar

The 1988 NUCCA Fall Seminar will be held at the Howard Johnson Motor Lodge, 1440 North Dixie Highway, Monroe, Michigan 48161. It starts on Saturday, October 29, 1988 at 8:00 a.m. and runs through Wednesday, November 2nd until 12:00 noon.

The educational program will be under the supervision of Dr. Daniel C. Seemann, University of Toledo and NUCCA Executive Director. Coordinating the work will be Mr. James F. Palmer, M.S., also from the University of Toledo and consultant to NUCCA-NUCCRA.

Instructors will be Dr. K. E. Denton, Dr. G. Cripe, Dr. Lloyd Pond, Dr. Lonnie Pond, Dr. M. Dickholtz, Sr., Dr. A. A. Berti, Dr. T. Palmer, Dr. L. Schrock, Dr. E. Stein, And Dr. R. R. Gregory.

Subjects will be film analysis, both basic and advanced, anatometer studies, leg-checking, headpiece placement, biomechanics, adjusting exercises, and patient placement on x-ray. There will be a doctor's choice observed.

The deadline date for accepting applicants will be September 1st.

Fees for professionals are $400.00; for doctors in practice for less than two years, $250.00. Students are admitted for $150.00. A deposit of $50.00 must accompany each application form.

All monies above expenses will be used for research.

Further information may be obtained by writing NUCCA, 217 West Second Street, Monroe, Michigan 48161.

NUCCA CERTIFICATION

A certification program has been initiated by the National Upper Cervical Chiropractic Association, Inc. (NUCCA). The purpose of the program is to NUCCA-qualify doctors in the NUCCA work. Doctors who successfully complete the program will be eligible to conduct and teach basic classes. A certification committee will be established from the initial group of doctors first certified. Examinations will be given at NUCCA seminars and conventions.

Doctors who wish to be NUCCA-certified must meet the following prior conditions: (1) be in practice for a period of at least three years, (2) have possession of, or access to, equipment and instrumentation recommended by NUCCA, and (3) permit NUCCA inspection of their office facilities. The entire examination must be completed in two years. Certificates will be issued successful candidates.

Doctors who have not engaged in practice for three years but who have attended NUCCA seminars are eligible to take the examination which covers a two-year period. A fee is charged each candidate. In the event of failure of the examination, or any part thereof, the candidate is re-examined in the part of the examination he failed without paying an additional fee, provided re-examination takes place within the two-year period.

Certification will be evaluated every three to five years, and certified doctors will be requested to either take an oral examination on updated data or provide evidence that they have attended a NUCCA seminar at least once each year.

The examination is in three segments, as follows:

1. X-RAY AND INSTRUMENTATION
   - A. Understanding of x-ray alignment procedures
   - B. Theory about distortion, magnification, collimation
   - C. Produce ten sets of cervical films suitable for analysis
   - D. Examination on x-ray procedures
   - E. Submit a set of x-ray alignment films
   - F. Examination on instrumentation

2. FILM ANALYSIS
   - A. Knowledge of osseous structures
   - B. Read ten sets of cervical spinal x-rays with an inter-observer reliability of .90
   - C. Examination of film analysis

3. ADJUSTING
   - A. Submit ten sets of consecutive pre and post cervical x-rays. The post x-rays presented to the examining board be those taken after the initial adjustment. Reductions in the height and rotation vectors to be evaluated at the discretion of the examining board.
   - B. Oral examination in which the candidate is given various listings for which he is to explain reduction procedures.
   - C. Written examination on adjusting. 100 questions with a passing grade of 85.

In Memoriam

It is with deep regret that NUCCA learned of the death of Dr. Henry L. Stephens of Holdenville, Oklahoma who passed away last January.

Dr. Stephens, a member of NUCCA, was also a member of The International Chiropractors Association, The Chiropractic Association of Oklahoma, The American Legion, The Elks, and The First Christian Church.

Born in Honey Grove, Texas on September 12, 1913, he moved to Davis from Texas at the age of four in a covered wagon. In World War II, he served in the United States Army and was in the invasion of North Africa.

Following the war, Dr. Stephens graduated from The Palmer College of Chiropractic, and entered private practice in Okmulgee, Oklahoma. Two years later, he moved to Holdenville where he practiced until retirement in 1985.

Dr. Stephens was married in Oklahoma City on February 14, 1976 to Lasca Franklin Walker.

Survivors include the widow, three step-daughters and husbands, Mr. & Mrs. Ronnie McCarley of Arlington, Texas, Mr. & Mrs. Barney Arthur, Euless, Texas, and Mr. & Mrs. Jeff Bowman, Alverado, Texas; two step-sons and wives, Tommy and Tracy Wood, Decatur, Texas, Mr. & Mrs. Raymond Walker, Aubreg, Texas; three sisters, Opal Thomas, Leila Lake, Texas; Ruby Bauer, Lakewood, Florida, and Lorene Beach, Lubbock, Texas.

Dr. Stephens will be sadly missed by his many friends and colleagues. Our sincere sympathies are extended to his wife, Lasca, and members of his family. NUCCA has lost not only a friend and supporter but a fine practitioner.

NOTICE

The NUCCA Board of Directors has decided to make the NUCCA collection of video tapes available to members. The price for tapes has been set at $100.00 per classroom hour. Available titles include:

Osseous Structure Identification (45 min.) ..... $ 90.00
This tape depicts the various bony structures involved in the NUCCA x-ray analysis. Included are structures that present analytical problems. X-rays of live and dry specimens are used.

NUCCA X-ray Analysis (60 min.) $100.00
Step by step procedure of the NUCCA analysis using X-rays of live specimen.

Leg Check and *Headpiece Placement* (45 min.) ..... $ 90.00
Leg Check describes the planes of reference and how to align the examiner's body for accurate checking. Models and patient used. Errors are discussed. *Headpiece Placement* briefly describes the biomechanics of the correction of the four basic types. Center of Gravity of the skull and its placement on the three types of headpieces is shown.

Adjusting the A.S.C. (3½ hrs.) $300.00
Step by step procedures used to align the adjustor's body in addressing the various A.S.C.s. Includes the most common errors in each phase. Outline of video follows early *Monographs*, Vol. 1 No. 3 through Vol. 2 No. 4. Film includes various steps for posterior rotations and low vector listings.

Errors in Adjusting the A.S.C. (2 hrs. $200.00
Compliments *Adjusting the A.S.C.* This tape describes errors in adjusting, what causes them, and how to correct them.

Patient Placement For X-ray (45 min.) $90.00
Precision placement of the patient for the lateral, vertex, and nasium views are discussed.

X-ray Alignment (45 min.) $90.00
Step by step procedure used to align cervical x-ray equipment to N.U.C.C.A. standards. To be used with the N.U.C.C.A. X-ray Alignment booklet.

Biomechanics of The Four Basic Types (1 hr.) $100.00
Detailed discussion of the production and correction of The Four Basic Types of A.S.C.S. Headpiece placement and lever system shown in detail.

Questions And Answers, A Self Evaluation For Adjusting The A.S.C. (1 hr.) $100.00
Follows Monograph Vol. 3, No. 9 and No. 10. A chronological order as a guide for the adjustor when practicing the C-1 or triceps pull adjustment. By self-questioning, based on this tape, the adjustor is alerted to the adjusting steps he/she may have neglected or does not know, and the order in which the steps should be performed.

High quality video tapes have been used for reproduction, which carry a lifetime guarantee. Please specify BETA or VHS. Allow 4-6 weeks for delivery. Prices are subject to change with cost of reproduction.

Five patient education pamphlets are now available from NUCCA. The cost is $27.00 per hundred which includes postage and handling. All pamphlets must be paid in advance due to our non-profit status.

1. *A Patient Guide,* (yellow), explains step-by-step office procedure to new patients.

2. *Questions and Answers,* (yellow), answers questions most frequently asked.

3. *A Patient Guide,* (green), explains what every patient should know.

4. *The Adjustment and the Patient,* (blue), explains the adjustment and how it works.

5. *The NUCCA System of Chiropractic,* (white), for patients, doctors and students, explaining the NUCCA system.

Two new booklets have been published by NUCCA. The first booklet details the NUCCA x-ray analysis procedure in detail: *The NUCCA Basic Course: X-Ray Analysis.* The second booklet, *The NUCCA Advanced Course: Biomechanics,* explains the biomechanic characteristics of the Atlas Subluxation Complex. Each booklet sells for $15.00.