Modeling Chiropractic Concepts: Health - Subluxation - Adjustment

Vertebral Subluxation Modeling for Research

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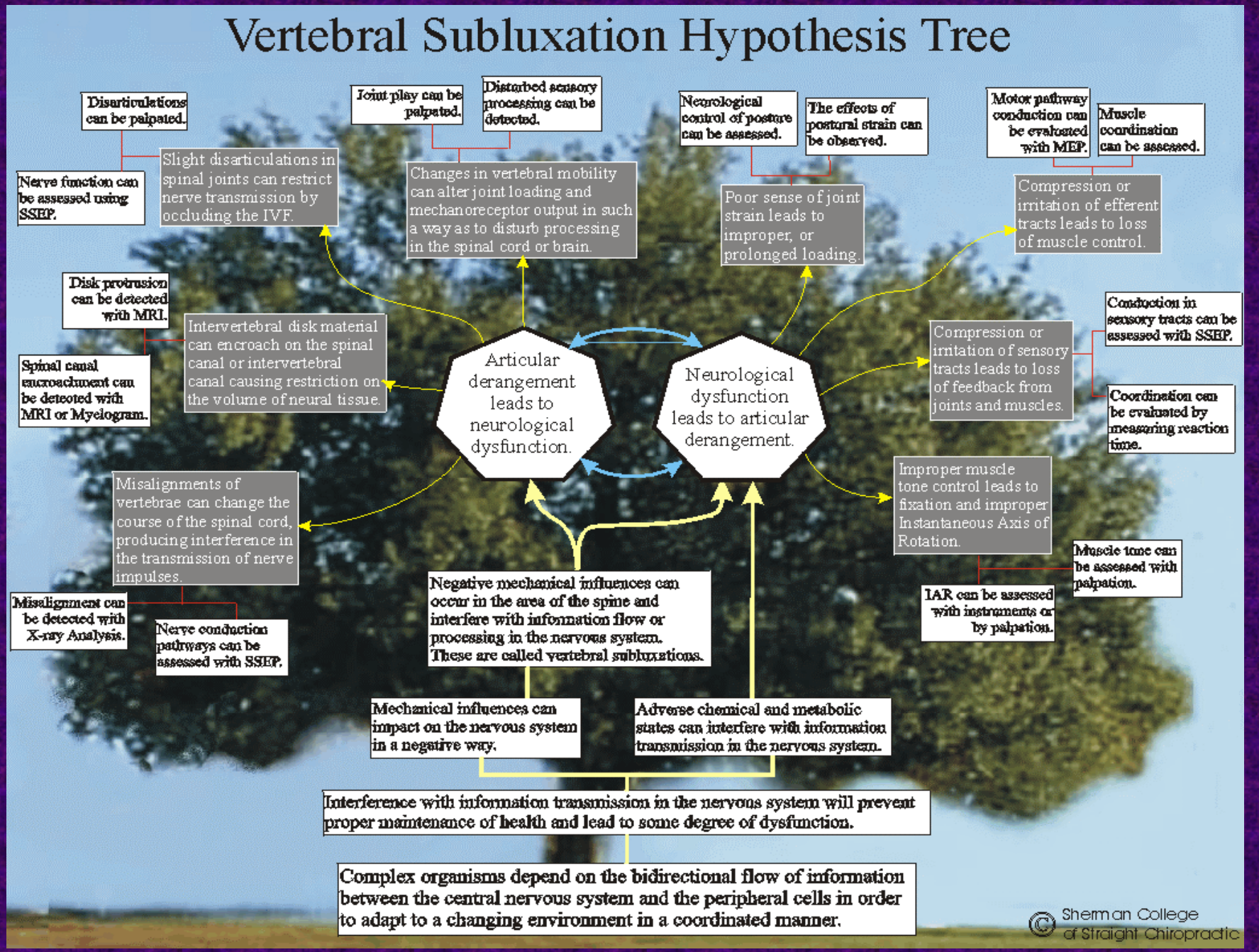
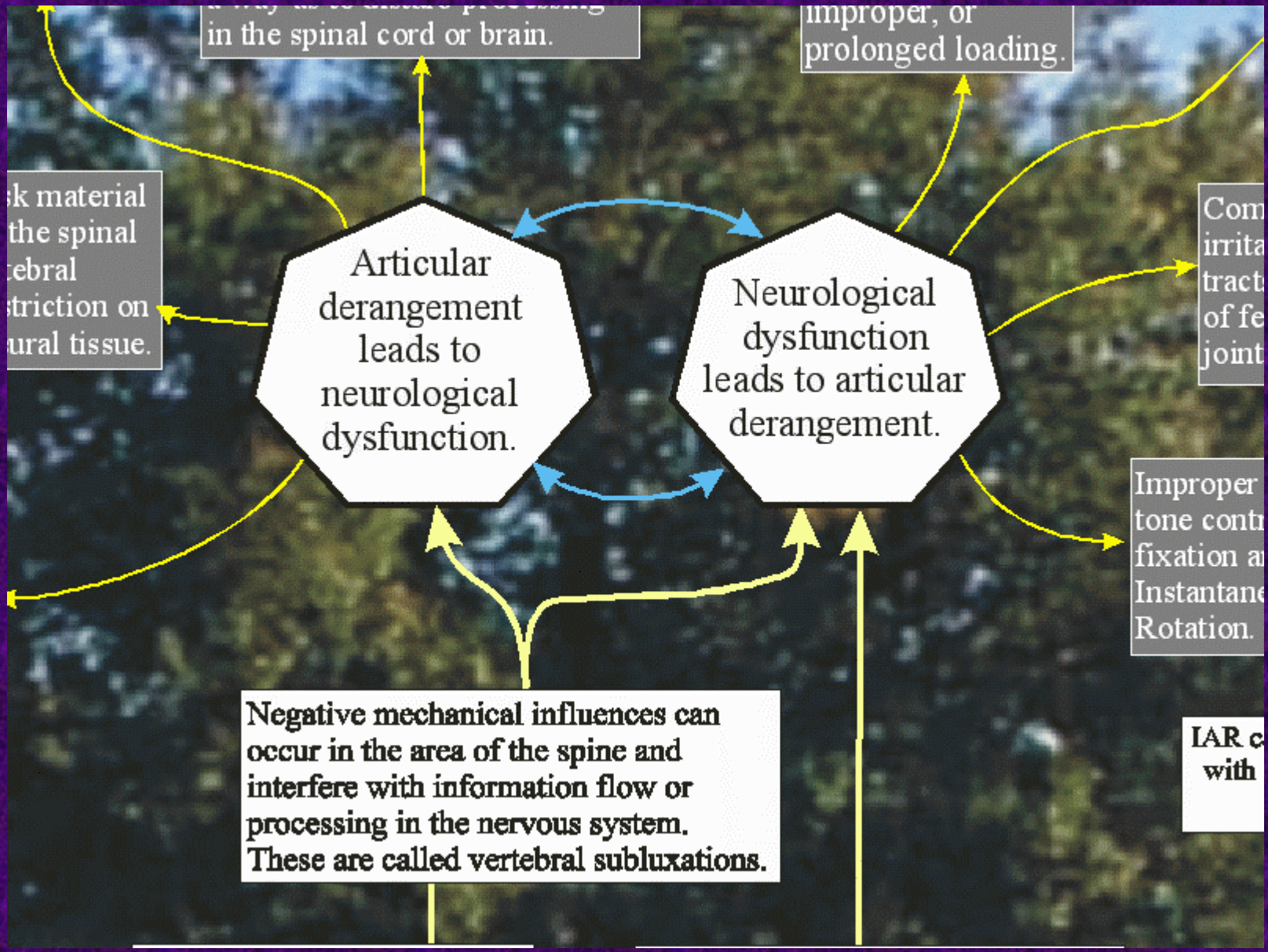
RAC-IV Presentation

- Practice Models
  - Musculoskeletal pain relief
  - Subluxation care for disease control
  - Subluxation care to prevent degeneration
  - Subluxation care to promote health

Vertebral Subluxation Hypothesis Tree




in the spinal cord or brain.
improper, or
prolonged loading.
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joint
Articular derangement leads to neurological dysfunction.
Neurological dysfunction leads to articular derangement.
Improper
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Rotation.
Negative mechanical influences can occur in the area of the spine and interfere with information flow or processing in the nervous system. These are called vertebral subluxations.
IAR c
with

Measures of Neurological Involvement

- Value of structural correction
- Neurological Functions
  - Conductivity - continuity
  - Processing speed - efficiency
  - Information content

Neurological Effects of Adjustment

- Reasonable working models
  - Reflex theories
  - Pain relief theories
- Insufficient evidence to consider them valid

Haldeman, JMPT 2000

Criteria for Research

I. Consistent clinical results under controlled conditions

II. Specific effect on musculoskeletal system

III. Specific effect on nervous system

IV. Beneficial effect on abnormal function

JMPT

Changes in Brain Function after Manipulation of the Cervical Spine

Frederick R. Carrick, D.C., Ph.D.

ABSTRACT

Objective: To ascertain whether manipulation of the cervical spine is associated with changes in brain function.

Design: Physiological cortical maps were used as an integer of brain activity before and *after manipulation of the cervical spine in a large* (500 subjects), double-blind controlled study.

Setting: Institutional clinic Participants: Adult volunteers

Intervention: Five hundred subjects were divided into six comparative groups and underwent specific manipulation of the second cervical motion segment. Blinded examiners obtained reproducible pre- and postmanipulative cortical maps, which were subjected to statistical analysis.

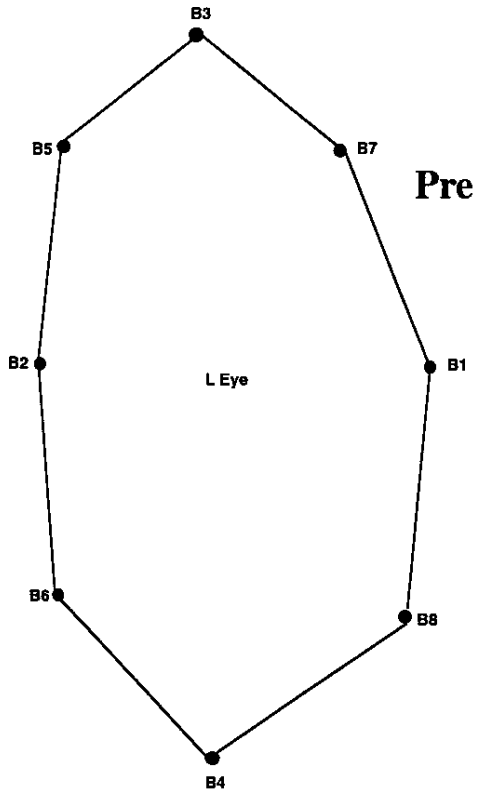
Main Outcome Measures: Brain activity was demonstrated by reproducible circumferential measurements of cortical hemispheric blind-spot maps before and after manipulation of the second cervical motion segment. Twelve null hypotheses were developed. The critical alpha level was adjusted in accordance with Bonferroni's theorem to .004 (.05 divided by 12) to reduce the likelihood of wrongly rejecting the null hypothesis (i.e., committing a Type I error).

Results: Manipulation of the cervical spine on the side of an enlarged cortical map is associated with increased contralateral cortical activity with strong statistical significance ($p < .001$). Manipulation of the cervical spine on the side opposite an enlarged cortical map is associated with decreased cortical activity with strong statistical significance ($p < .001$). Manipulation of the cervical spine was specific for changes in only *one cortical hemisphere* with strong statistical significance ($p < .001$).

Conclusions: Accurate reproducible maps of cortical responses can be used to measure the neurological consequences of spinal joint manipulation. Cervical manipulation activates specific neurological pathways. Manipulation of the cervical spine may be associated with an increase or a decrease in brain function depending upon the side of the manipulation and the cortical hemisphericity of a patient. (J Manipulative Physiol Ther 1997; 20:529–45).

Key Indexing Terms: Cervical Spine; Chiropractic Manipulation; Thalamus; Brain

Pre Manipulation R C2



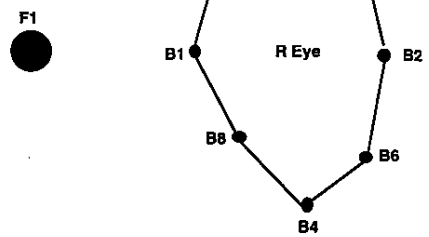
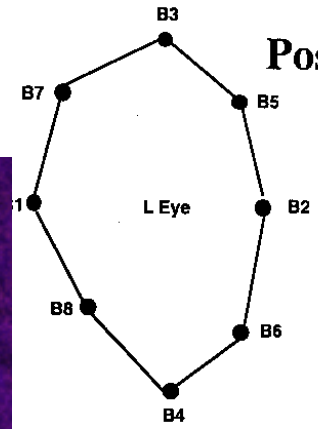
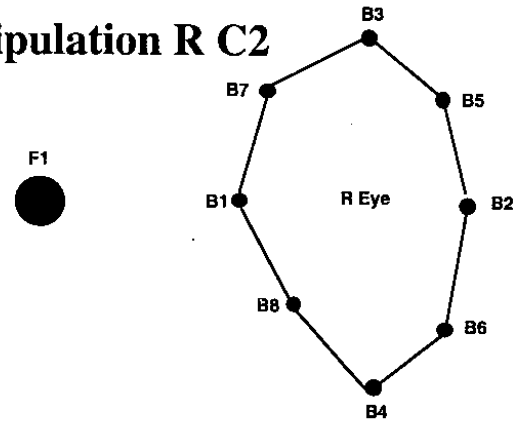


Fig. 10 *Premanipulation right C2.*

Post Manipulation R C2





st-manipulation right C2.

JMPT

Use of a Mental Rotation Reaction-Time Paradigm to Measure the Effects of Upper Cervical Adjustments on Cortical Processing: A Pilot Study

David D. Kelly,[a] Bernadette A. Murphy, DC, PhD,[b] and David P. Backhouse, DC[c]

ABSTRACT

Objectives: To investigate the potential usefulness of a mental rotation paradigm in providing an objective measure of spinal manipulative therapy. To determine if cortical processing, as indicated by response time to a mental rotation reaction-time task, is altered by an upper cervical toggle recoil adjustment.

Design: Prospective, double-blind, randomized, controlled trial.

Setting: Chiropractic college clinical training facility.

Participants: Thirty-six chiropractic student volunteers with clinical evidence of upper cervical joint dysfunction.

Intervention: Participants in the experimental group received a high-velocity, low-amplitude upper cervical adjustment. A nonintervention group was used to control for improvement in the mental rotation task as a result of practice effects.

Outcome measures: Reaction time was measured for randomly varying angular orientations of an object appearing either as normal or mirror-reversed on a computer screen.

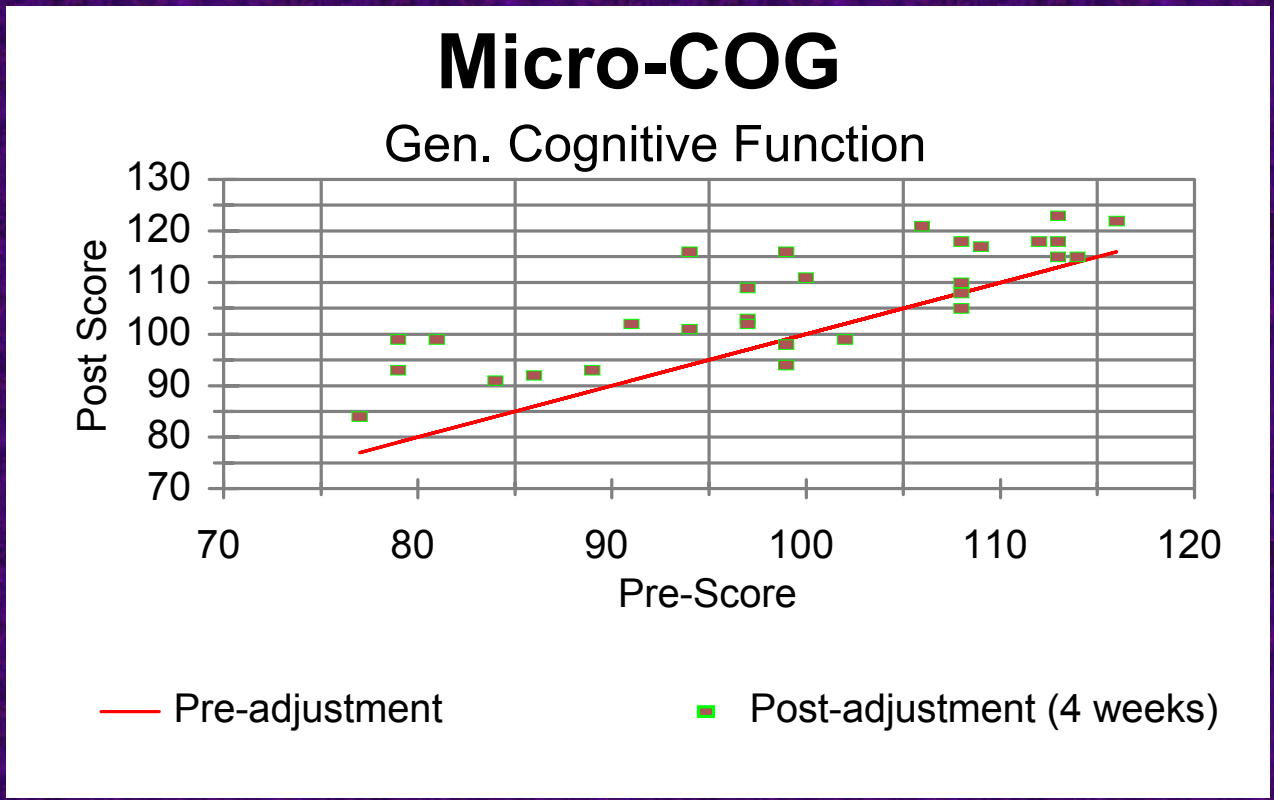
Results: The average decrease in mental rotation reaction time for the experimental group was 98 ms, a 14.9% improvement, whereas the average decrease in mental rotation reaction time for the control group was 58 ms, an 8.0% improvement. The difference scores after the intervention time were significantly greater for the experimental group compared with the control group, as indicated by a one-tailed, 2-sample, equal variance Student *t* test, ($P < .05$).

Conclusion: The results of this study have demonstrated a significant improvement in a complex reaction-time task after an upper cervical adjustment. These results provide evidence that upper cervical adjustment may affect cortical processing. (J Manipulative Physiol Ther 2000;23:246-51)

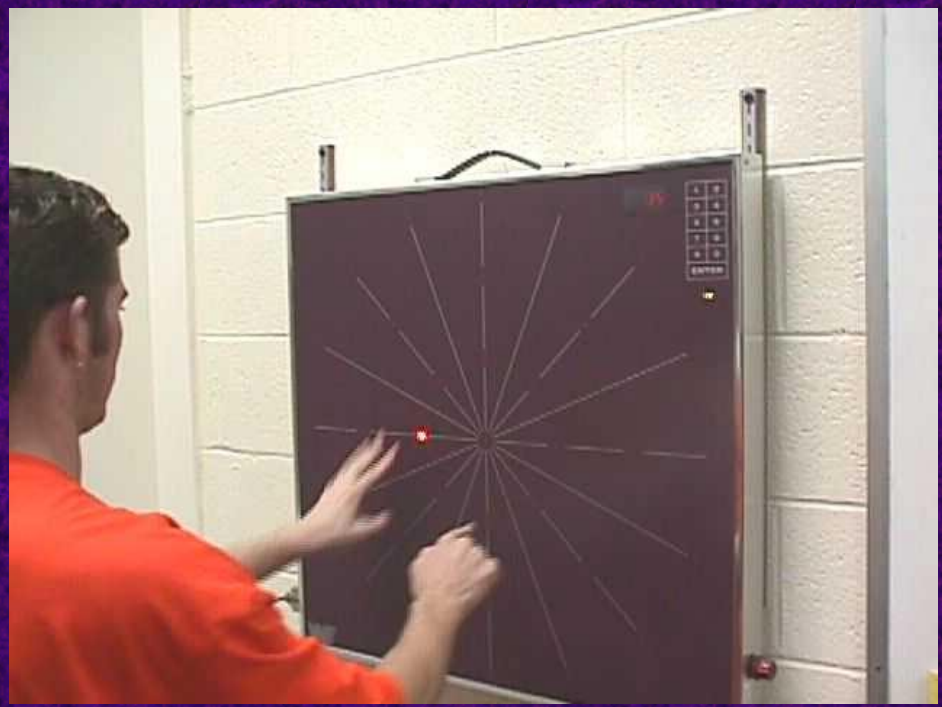
Key Indexing Terms: Chiropractic; Manipulation; Mental Rotation; Reaction Time; Cerebral Dysfunction; Cervical Spine Dysfunction

STIMULUS PARITY	0°	45°	90°	135°	180°	225°	270°	315°
Normal	R	R	R	R	R	R	R	R
Reverse	Я	Я	Я	Я	Я	Я	Я	Я

Kessinger R, Boneva D. The Influence of Upper Cervical Subluxation on Mental Function. 7th Annual Subluxation Conference, Oct 1999.



Saccadic Fixator
Hand-eye coordination



Talking Points

- Standard as well as experimental tests do exist and have shown positive changes in cortical function in clinical studies.
- A gulf exists between basic science and clinical research regarding the neurological effects of adjustment.