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## Increased Balance, Movement & Kinematics as a Result of Chiropractic Care

By Mark Studin and William Owens | July 2010

"Much chiropractic research has been devoted to determining the effects of chiropractic care on various symptoms and disorders such as low back pain, neck pain, and headaches. In addition, some basic science research demonstrates that these disorders (particularly low back pain) are related to perceptual and behavioral changes in individuals ranging from reduced proprioception to changes in muscle recruitment patterns to altered kinematics" (Smith, Dainoff, & Smith, 2006, p. 257).

**"Proprioception** (pronounced /ˌprɒpɹi.əˈsɛpʃən/*PRO-pree-o-SEP-shən*), from Latin *proprius*, meaning "one's own" and perception, is the sense of the relative position of neighbouring parts of the body" (Wikipedia, 2010, <http://en.wikipedia.org/wiki/Proprioception>).

"Proprioception doesn't come from any specific organ, but from the nervous system as a whole. Its input comes from sensory receptors distinct from tactile receptors — nerves from inside the body rather than on the surface. Proprioceptive ability can be trained, as can any motor activity" (Anissimov, 2010, <http://www.wisegeek.com/what-is-proprioception.htm>).

"Without proprioception, drivers would be unable to keep their eyes on the road while driving, as they would need to pay attention to the position of their arms and legs while working the pedals and steering wheel. And I would not be able to type this article without staring at the keys. If you happen to be snacking while reading this article, you would be unable to put food into your mouth without taking breaks to judge the position and orientation of your hands" (Anissimov, 2010, <http://www.wisegeek.com/what-is-proprioception.htm>).

**"Kinematics** is the study of motion and the forces required to produce it. This includes the different forces at work during the movement of a single part of the body, and more complex movements such as running and climbing" (NASA, 1999, [http://spaceflight.nasa.gov/history/shuttle-mir/references/glossaries/science/sc-gloss-g\\_m.htm](http://spaceflight.nasa.gov/history/shuttle-mir/references/glossaries/science/sc-gloss-g_m.htm)).

"Chiropractic research has looked mainly at movement control from neurophysiological and biomechanical perspectives. This research has shown that chiropractic affects several factors that influence movement control. For example, reductions in resting muscular tone (quantified by surface electromyography in prone posture) have been documented following adjustments, as have improvements in muscular strength. In addition, reaction times to a complex mental rotation task have decreased with adjustments. A recent review of the neurophysiological effects of spinal manipulation identifies experimental evidence that spinal manipulation influences proprioceptive primary afferent neurons from paraspinal tissues. Spinal manipulation also affects how pain signals are processed, possibly by altering the central facilitated state of the spinal cord. In summary, the available biomechanical and neurophysiological data indicate that spinal manipulations can affect the motor control system" (Smith, Dainoff, & Smith, 2006, pp. 257-258).

"Kinematic changes following chiropractic have also been noted. . . findings by Smith also indicate that coordination and balance changes result from chiropractic adjustments. A recent study using magnetic resonance

imaging has shown that spinal adjusting produces movement at the zygapophyseal joints of the spine, thus revealing biomechanical effects of chiropractic" (Smith, Dainoff, & Smith, 2006, p. 258).

In designing a model for studying human movement time (MT), we look at accepted scientific principles and laws for standardization of evaluation. "There is at least one immutable rule for interface design and movement that we know about, and it's called Fitts's Law. It can be applied to software interfaces as well as Web site design because it involves the way people interact with mouse or other pointing devices. Most GUI platforms have built-in common controls designed with Fitts's Law in mind. Many Web designers, however, have yet to recognize the powerful little facts that make this concept so useful" (Microsoft Corporation, 2010, <http://msdn.microsoft.com/en-us/library/ms993291.aspx>).

"The basic idea in Fitts's Law is that any time a person uses a mouse to move the mouse pointer; certain characteristics of objects on the screen make them easy or hard to click on. The farther the person has to move the mouse to get to an object, the more effort it will take to get to. The smaller the object is, the harder it will be to click on...It means that the easiest objects to locate and target are the ones closest to the mouse's current position and that have large target spaces. Fitts wrote several papers describing these findings, with significant mathematical rigor, expressing in formulas how you can measure the impact of different velocities, distances, and target sizes on a user's ability to click on objects" (Microsoft Corporation, 2010, <http://msdn.microsoft.com/en-us/library/ms993291.aspx>).

### **Results of Chiropractic and Movement Time**

"All participants in the experimental group had significantly improved movement times following spinal adjustments compared with only 1 participant in the the control group. The average improvement in movement time for the experimental group was 183 ms, a 9.2% improvement, whereas the average improvement in movement time for the control group was 29 ms, a 1.7% improvement" (Smith, Dainoff, & Smith, 2006, p. 257).

### **Implications of Increased MT Time Based on Chiropractic Care**

MT is one of the most important variables influencing the way we control our movements. It can affect athletes, Parkinson's patients, and balance disorder patients. It can increase productivity at work and influence every other facet of our lives that increased movement can help. What business wouldn't want a 9.2% increase in work productivity where movement of your body is required for production? What balance disorder patient wouldn't want a 9.2% increase in balance? What sprinter wouldn't want 9.2% of their time taken off without the use of performance enhancing drugs?

While many see chiropractic as an effective modality to relieve back or neck pain, this study along with many others, see chiropractic as the solution to many interrelated issues in health, work, sports, rehabilitation and the workplace. This study along with many others concludes that a drug-free approach of chiropractic care is one of the best solutions to increasing your body's ability to function better.