*DELTA LIFE SKILLS*sm

EMOTIONAL FREEDOM IS IN YOUR HANDS with REBsm

Integral Energy Psychology

Phillip W. Warren, B.A., Ph.C., Zetetic Scholar, Professor Emeritus

4459 52A St., Delta, B.C., V4K 2Y3 Canada

Phone and voice mail: (604) 946-4919

EMail: phillip_warren@telus.net

Website: www.rebprotocol.net

U.S. mailing address: P.O. Box 1595, Point Roberts, WA 98281-1595

Δ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞xΔ∞x

PART ONE: THE RADIANT ENERGIES BALANCE (REB)sm PROTOCOL: PHILOSOPHY/RESEARCH/THEORY BACKGROUND©

Section:

16.8. THE CEREBELLUM AND INFORMATION PROCESSING of Bergmann (1999), Leiner and Leiner, Schumahmann

The Publisher's description of the 1997 volume edited by Schumahmann, The Cerebellum and Cognition, reads "Cerebellar function has traditionally been understood as being confined to the control of voluntary movement. Recent research revises this narrow view and suggests that the cerebellum is critically involved in a number of nonmotor behaviors and cognitive operations. The Cerebellum and Cognition is a comprehensive work that defines this emerging field of investigation into the nature and extent of the cerebellar involvement in nonmotor processing, including thought, language, memory, and mood. Authoritative and in-depth discussions by a preeminent group of authors who have helped shape this field of inquiry..." Some relevant chapter titles are:

D.J. Reis 'Autonomic and Vascular Regulation.'

M. Molinari, M.G. Leggio, and M.C. Silveri 'Verbal Fluency and Agrammatism.'

J.D. Schmahmann and J.C. Sherman 'Cerebellar Cognitive Affective Syndrome.'

J.M. Bower 'Control of Sensory Data Acquisition.'

H.C. Leiner and A.L. Leiner 'How Fibers Subserve Computing Capabilities: Similarities between Brains and Machines.'

J.R. Bloedel and V. Bracha, 'Duality of Cerebellar Motor and Cognitive Functions.'

J.D. Schmahmann 'Therapeutic and Research Implications.'

16.8.1. THE CEREBELLUM: THE TREASURE AT THE BOTTOM OF THE BRAIN by Henrietta Leiner and Alan Leiner 1997a (quoted in it's entirety)

"One of the most impressive parts of the human brain, named the cerebellum, has been underestimated for centuries. Located at the lower back of the brain, it is a fist-sized structure whose function is now being reappraised. Formerly this structure was thought to have only a motor function, which it performed by helping other motor regions of the brain to do their work effectively. But during the past decade [1987-] a broader view of its function has emerged as a result of new research, and now the cerebellum is regarded as a structure that can help not only motor but also nonmotor regions to do their work effectively. In fact, the cerebellum has been compared to a powerful computer, capable of making contributions both to the motor dexterity and to the mental dexterity of humans, both of which are required for the emergence of fluent human language."

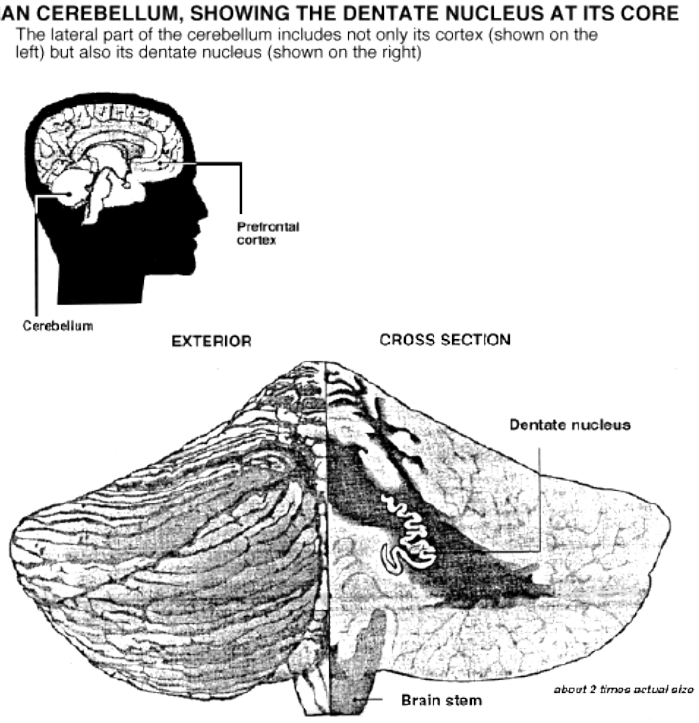

Figure 16.6.

"This powerful mechanism at the bottom of the brain, which every person inherits as a birthright, is immature at birth but develops through childhood and adolescence, reaching its full structural growth by the 15th to 20th year of life. Perhaps the reason why it has traditionally been underestimated is its low-level location in the brain, which contrasts with the high-level location of the structures that are thought to subserve higher mental functions. Such locations in the brain become irrelevant, however, when a structure is regarded as a computer because a computer's processing power depends not on where it is but on what it contains and to what it is connected."

"Judged by what it contains and by its external connections, the human cerebellum is an enormously impressive mechanism. First of all, it contains more nerve cells (neurons) than all the rest of the brain combined. Second, it is a more rapidly acting mechanism than any other part of the brain, and therefore it can process quickly whatever information it receives from other parts of the brain. Third, it receives an enormous amount of information from the highest level of the human brain (the

cerebral cortex), which is connected to the human cerebellum by approximately 40 million nerve fibers. To appreciate what a torrent of information these 40 million fibers can send down from the cerebral cortex to the cerebellum, a comparison can be made with the optic fibers in the human brain. The optic tract contains approximately one million nerve fibers, which transmit to the brain the visual information that a human receives via the eyes. Forty times that much information can be sent from the cerebral cortex down to the cerebellum, including information from sensory areas of the cerebral cortex, from motor areas, from cognitive areas, from language areas, and even from areas involved in emotional functions."

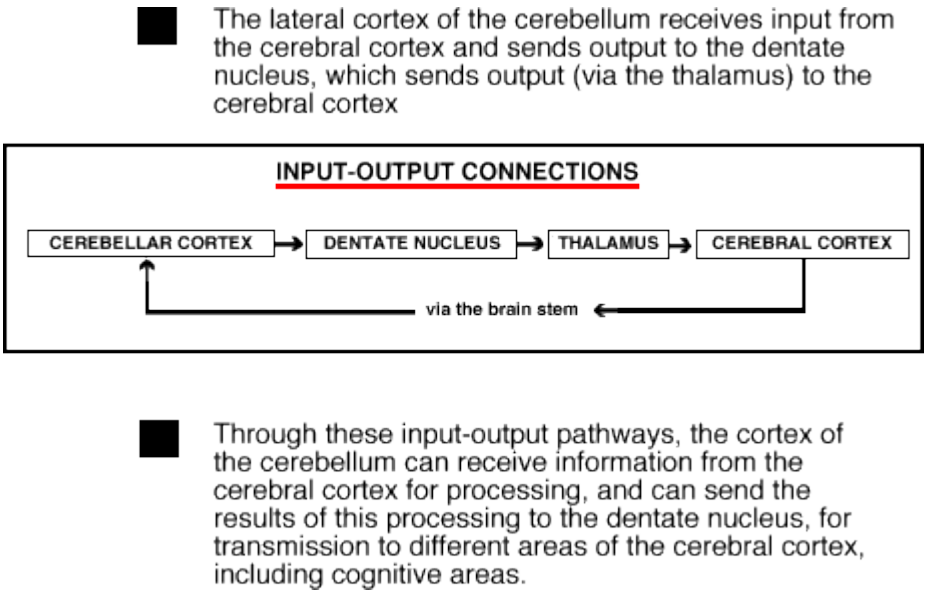

Figure 16.7.

"As this torrent of information continues to pour into the cerebellum from many other parts of the brain, and as the cerebellum continues to process this information within its neural mechanism, a flow of output information is produced by it which it can send to various other regions of the brain, telling them what to do and when to do it. How can the cerebellum convey such messages? A clue is provided by its internal structure and its output connections, which bear a remarkable resemblance to the design that is employed in organizing modern computing machines."

16.8.1.1. RESEMBLANCE TO COMPUTING MACHINES

"In computing machines the processing of information is accomplished by both the hardware in the system (its circuitry) and by the software (the messages transmitted between the various parts of its circuitry). Together the hardware and software can produce a versatile information-processing system, capable of performing a wide variety of functions, including motor, sensory, cognitive, and linguistic ones. Such versatility of function is achieved by organizing the computer hardware in the following way: The basic components are assembled into modular packages that contain similar circuitry, and large numbers of such similar modules are organized into parallel processing networks. This structural organization is exemplified also in the cerebellum: It consists of longitudinal modules containing similar neural circuits, which are arrayed in parallel zones throughout the entire extent of the structure."

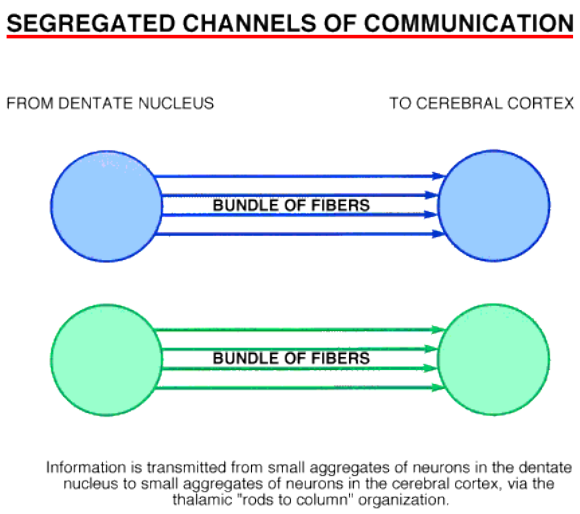

Figure 16.8.

"On the basis of this known cerebellar 'hardware,' it is possible to investigate the 'software' capabilities of such an organization of modules. In investigating the part of the cerebellum that is greatly enlarged in the human brain, investigators found that each module in this part of the cerebellum (the lateral part) is able to communicate with the cerebral cortex by sending out signals over a segregated bundle of nerve fibers. This is a particularly powerful way of communicating complex information. It is exemplified also in computing machines, where the 'fibers' (i.e., the wires connecting the modules) also are organized into segregated bundles. The benefits of such bundling of fibers are linguistic; such organization enables the cerebellum to communicate with the cerebral cortex at a high level of discourse, by using internal languages that are capable of conveying complex information about what to do and when to do it." [emphasis added]

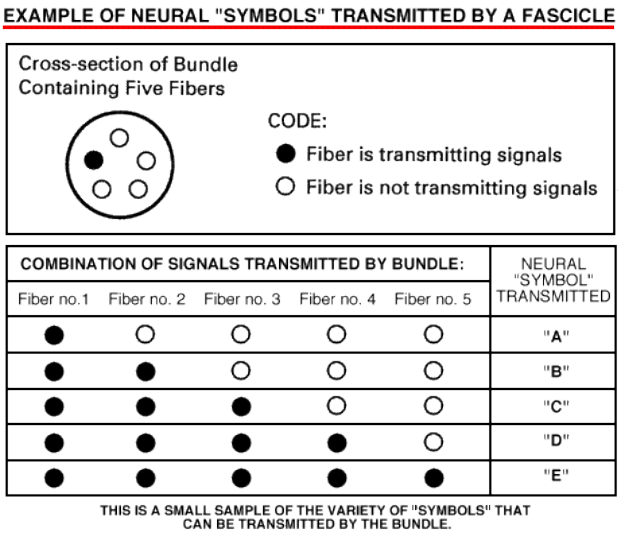

Figure 16.9.

16.8.1.2. FUNCTIONS OF THE CEREBELLUM

"Given that the cerebellum seems well organized to convey complex information to many other regions of the brain, where does it actually send this information? Each module of the cerebellum seems to be uniquely connected, both through its input and output connections, with different regions of the brain. Modules in the middle of the cerebellum (in the medial part) receive different input and send information to different output targets than do the modules in the lateral part of the cerebellum. Despite such differences in input and output, however, the circuitry within each module seems to be similar to that in every other module. For this reason, the basic processing that every module can perform on the incoming information would seem to be similar, no matter whether this incoming information represents motor, sensory, cognitive, linguistic, or any other kind of information."

"What does this basic processing do? More specifically, what computations are performed by the similar cerebellar circuits in each module, and to what use are these computations put when the results are sent to the different target structures in the other regions of the brain? Many theories about such cerebellar functions are under investigation, but definitive answers are not yet available. They await further research."

"Although many of these theories are considered controversial at present [1997], it seems possible that each of them may be at least partially correct and that the present controversies can therefore be reconciled in the future. The present [1997] proposals encompass not only the traditional view that the cerebellum is involved in skilled motor performance but also the broader view that it is involved in skilled mental performance, and is also involved in various sensory functions including sensory acquisition, discrimination, tracking and prediction. A recent theory that is broad enough to encompass all of these motor, mental, and sensory functions has proposed that the cerebellum does the following basic processing: It makes predictions (based on prior experience or learning) about the internal conditions that are needed to perform a sequence of tasks in other regions of the brain, and it sets up such internal conditions in those regions automatically, thus preparing those regions for the optimal performance of the tasks. By doing this, the powerful and versatile computing capabilities of the cerebellum would be used for providing automatic help to various other regions of the brain, helping them to do their work better."

16.8.1.3. THE ADVANTAGES OF AUTOMATION

"Experimental evidence has shown that the cerebellum is involved in the process by which novel motor tasks can, after some practice, be performed automatically. Through such automation, the performance can be improved: Sequences of movements can be made with greater speed, greater accuracy, and less effort. The cerebellum also is known to be involved in the mental rehearsal of motor tasks, which also can improve performance and make it more skilled."

"Because the cerebellum is connected to regions of the brain that perform not only motor but also mental and sensory tasks, it can automatize not only motor but also mental and sensory skills in the human brain. As with motor skills, several advantages accrue from learning to perform the other skills automatically, without conscious attention to detail."

"The skills involved in human communication, for example, require both motor and mental activity: the motor activity of speech or gesture, and the mental activity that formulates what is to be said. In the course of learning these skills, an individual's performance can be improved incrementally through practice so that the skills eventually can be performed without conscious attention to detail.

For example, in recalling words stored in the memory, the activity can be performed without conscious attention to the details of how the words are selected by the brain during the retrieval process."

"To the extent that an individual can perform some mental activities without conscious attention to detail, the conscious part of the brain is freed to attend to other mental activities, thus enlarging its cognitive scope. Such enlargement of human capabilities is attributable in no small part to the enlarged human cerebellum and its contribution to the automation of mental activities, which appears to have been a prerequisite for the emergence of human language. Because such language confers a unique and inestimable advantage on humans, the cerebellum can be regarded as an underestimated treasure submerged at the bottom of the brain."

The above approach is a major reason Educational Kinesiology says "Movement is the door to learning" and movement will facilitate integration of personal discoveries in psychotherapy. REB^{sm} involves cross lateral movements (squeezing and rocking (Module 3d) and blinking (Module 3e) as well as various head and eye movements (Module 6) all done while the client is tuned into the issue.

REFERENCES

Bergmann, U. (1996) "Speculations on the neurobiology of EMDR," Traumatology, v. 4, #1, Article 2, available at http://www.fsu.edu/~trauma/art1v4i1.html

Bergmann, U. (1999) "Further thoughts on the neurobiology of EMDR: The role of the cerebellum in accelerated information processing,"Traumatology, v. 6, #3, Article 4, available at http://www.fsu.edu/~trauma/v6i3/v6i3a4.html

Leiner, H.C. and A.L. Leiner (1997a) "The treasure the bottom of the brain," (the cerebellum) available at www.newhorizons.org/neuro/leiner.htm

Leiner, H.C. and A.L. Leiner (1997b) "How fibers subserve computing capabilities: The similarities between brains and machines," in J.D. Schmahmann (ed.) The Cerebellum and Cognition, vol. 41 of the International Review of Neurobiology, Academic Press

Schumahmann, J.D. (ed) (1997) The Cerebellum and Cognition, v. 41 of the International Review of Neurobiology, Academic Press