

HEMISPHERICITY AND BALANCE

IMPORTANT CONCEPTS FOR HEALTH AND LEARNING

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One of the biggest problems affecting a great number of people and causing numerous physical and neurobehavioral problems is Hemisphericity. The presenting symptoms are almost innumerable and include weakness to one side of the body causing knee pain, shoulder dysfunction, spinal deviations (scoliosis), groin pain (some women think that it is related to reproductive organ problems like ovaries), imbalance, dizziness and vertigo just to mention a few. Brain function and learning can be affected including memory, problem solving, attention deficit disorders and many other conditions.

So, what is hemisphericity? The brain is divided into two hemispheres generally called the right and left hemispheres. The term hemisphericity refers to the hemisphere that is working at a lower level than the other. Right hemisphericity, therefore, means that the right hemisphere is functioning at a lower level than its counterpart.

The hemispheres are united by a structure called the Corpus Callosum that not only unites but serves to communicate both hemispheres through the nerves crossing from one side to the other. For many years many have described various functions to these hemispheres. It has been generally understood that the right hemisphere deals with artistic functions, intuition, music appreciation, globalism and others. The left hemisphere on the other hand is associated to scientific thought, analysis, mathematics (calculating), and certain aspects of language such as the selection of words. Hence, mathematicians and most scientists are considered left brain people while poets and musicians are considered to be right brain people.

Throughout the years many strategies have been developed with the intent to balance the hemispheres. The purpose, it has been postulated, is to help the person be more perceptive and creative. The concept of hemisphericity takes into account these basic ideas, however it is much more than that and in fact it reflects the more contemporaneous findings in the field of Neuroscience. The impact that hemisphericity has on health, neurobehavioral disorders, cognitive processes, structural balance and visceral function is presently under scrutiny and much has already been discovered in these fields.

Understanding this phenomenon can be very enlightening in any field whether medical, psychological or educational. Many conditions which have baffled practitioners for many years can have the causative root in the neurology of the hemispheres and cerebellum. This knowledge is very useful in the field of Neuro Linguistic Programming and can be very helpful in getting the “client” to respond much faster and more completely to N.L.P. change techniques. In the field of Chiropractic where we deal with structure and balance this knowledge is paramount.

CAUSATIVE FACTORS FOR HEMISPHERIC IMBALANCE

There are numerous factors that can cause a hemispheric imbalance. I will present a few of them, however it is necessary to understand the subject's conditions and history to determine if his or her particular situation is caused by environmental, occupational, habitual factors and to determine if there are any other pre-existing pathologies that may be contributing to the problem.

Unilateral Activation/Afferentation

Hemisphericity occurs when there is poor or less activation to one hemisphere as compared to the other. In general terms most people tend to be more unilateral in their exercise of activities. This unilaterality will cause greater activation and further plasticity to the hemisphere being used.

Activation will cause increased synaptic connections and constant input will increase plasticity. Plasticity is related to the brain's ability to change and create strong neurological connections for any specific activity. You may create new connections while performing a new task but it requires constant activation for these connections to become strong and lasting, hence the term plastic. The classic N.L.P. model of Conscious Competence required for any activity to become automatic (unconscious competent) is resultant of plasticity. The ability to perform any task requires a whole network of neurological connections (synaptogenesis) but the ability to perform these tasks automatically requires plasticity. It is understood that the person's inability to perform any task is due to the lack of neuronal connections specific for the performance of this task.

Everything is difficult until it becomes easy and this is achieved once the strategy of performing the task is known and after the synaptic connections are created through the conscious competent practice of the task eventually creating the necessary plasticity to reach unconscious competence.

The function of the sensory system is to send messages to the brain (Afferentation) about the body's position (proprioception) or its environment and any other stimuli that may be acting upon or within the body. The function of the motor system, on the other hand, is to respond to the sensory information that is being perceived. Both sensory input and motor output can activate the brain. For example, moving the right arm will cause activation of the left hemisphere and perceiving light from the right side of the body will also cause activation primarily of the left hemisphere.

Let us consider a right handed person who performs most of his duties with his right hand. A typical right handed person will write with his right hand, brush his hair and teeth with the right hand, will probably masticate food with his right jaw and to make matters worse will probably drive an automatic vehicle in which he will accelerate and brake with his right leg. In this case, constant utilization of the right side of the body will activate primarily the left hemisphere. This will create greater plasticity and ipsilateral

dominance to the left hemisphere and weakness to the right. Right weak hemisphere is referred as right hemisphericity.

Hemisphericity is therefore a result of both unilateral physical activation as well as unilateral environmental sensory activation. A person working in an office for years where there are windows on one side of the room that cause excitation to one side of the brain can eventually contribute to hemisphericity.

In the book "Neurobehavioral Disorders of Childhood" por Robert Melillo y Gerry Leisman (2004 Kluwer Academic Plenum Publishers, N.Y.) the authors state that conditions such as ADD, ADHD, PDD (developmental disorder), OCD (obsessive compulsive disorder), Asperger and Autism syndromes are just a few of the conditions that can be grouped as part of the developmental disorder spectrum. They mention that the etiology is basically the same in all of these conditions and that the variation is in the primary anatomic area of dysfunction. The scientific evidence presented in this book support the following ten notions and they are:

1. "Bipedalism (the ability to walk on two limbs) is the principal reason for the development of the neocortex. The complex movements and sophistication of bipedalism is responsible for the advanced development of the human brain. This development is important in the evolution of cognition. Alteration to posture and the mechanisms of bipedal movement will alter both motoricity as well as cognition."
2. "Cognition evolves secondary and parallel to the evolution of motoricity" (especially bipedalism). Note: the book demonstrates the relationship between the sophistication of human movement and cognition and how they develop parallel to each other and consequent to each other.
3. "There is a close relationship between symptoms of cognition and motoricity." Those parts of the brain that have to do with movement and coordination (proprioception) are closely related to learning and understanding processes. Most developmental disorders are closely related to problems of coordination, movement and posture.
4. "The lack of thalamo-cortical stimulation and not the overstimulation is the fundamental problems of developmental limitations."
5. "A primary problem is the dysfunction of hemisphericity". A functional disconnecting syndrome is a primary cause for many of the neurobehavioral disorders. The variation is relevant to the areas affected and the degree of dysfunction.
6. "Most conditions in this spectrum of disorders are the result of a right hemisphericity... The right hemisphere is under-stimulated resulting in a slower temporal processing within that hemisphere, especially in the frontal lobe." Note: the right hemisphere has the executive functions of planning and critical thinking.
7. "Environment is a fundamental problem." Melillo and Leisman talk about the sedentary lifestyles that children lead with televisions and video/computer games as a primary factor for understimulation and unilateral stimulation.
8. "All these conditions are variations of the same problem. We conclude that most developmental disabilities are of similar etiology and are variations of the same underlying problem."

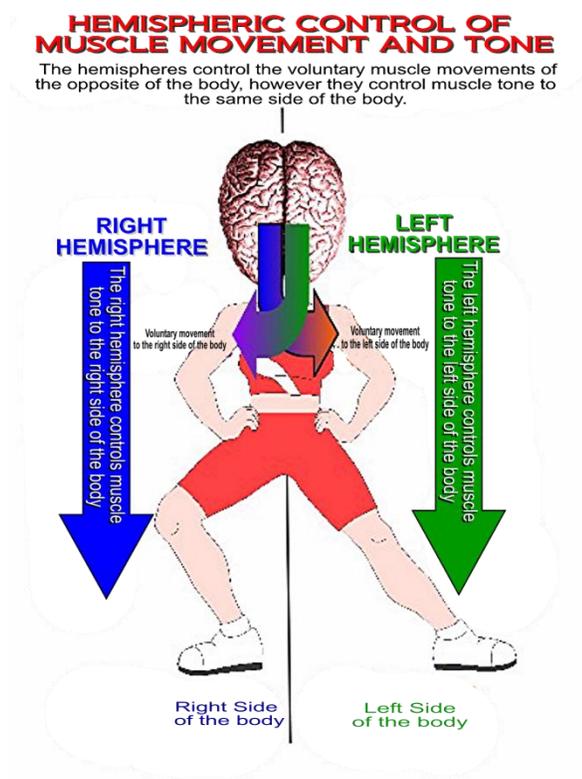
9. “These problems are correctible. As brain organization is plastic, many aspects of neurobehavioral disorders do not have to result in permanent impairment. Appropriate forms of environmental stimulation and behavioral modification can significantly improve or completely correct the underlying problem.”

The field of Neuro Linguistic Programming can embrace these findings and the strategies to help correct some of these problems. It seems to me that these are good news and the least we, who are involved in human performance technologies, should do is recognize these conditions and know what to do with them or where to refer our clients for further help.

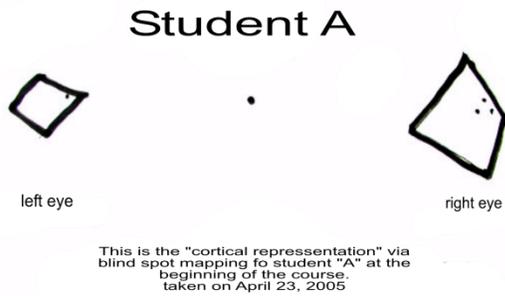
THE MECHANISM BEHIND HEMISPHERICITY AND BODY BALANCE

The right hemisphere controls voluntary movements to the left (opposite or contralateral) side of the body; however it controls relative muscle tone to the same side (ipsilateral). This is the reason why right handed people usually exhibit right hemisphericity causing soft paresis to the same side (right). This soft paresis is usually demonstrated by weakness, fatigueability and consequent instability to the feet, knee, coxofemoral joint (hip), low back, spine (including scoliosis), shoulder, neck problems and others. Numerous musculoskeletal health problems can be attributed to this basic problem, and usually a patient may present a number of related (but not obvious to the patient or clinician) conditions.

Another typical problem is the disruption of proprioception and the vestibular system causing vertigo, loss of balance, disorientation, visual and auditory problems as well as neck and shoulder problems. As may already be evident this also affects the autonomic nervous system (sympathetic and parasympathetic and all the visceral influences), as well as cognition (memory, learning etc.).



In our Advanced Learning Strategies course we have made various tests to prove the effectiveness of the numerous exercises performed to balance the hemispheres. Utilizing the blind spot method to determine cortical representation we have measured the difference in sizes between the blind spots.



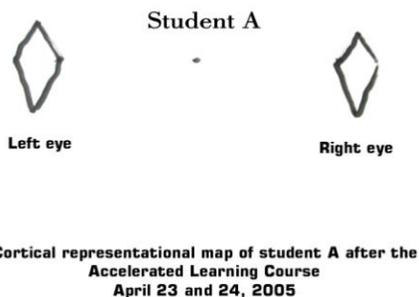
1-A

The following graph illustrates student "A" whose blind spot mapping clearly demonstrates hemispheric imbalance. Compare left eye blind spot representation to the right eye blind spot representation.

This exercise was done at the beginning of the course Saturday morning. It also serves as evidence procedure of the effectiveness of the various hemispheric balancing exercises performed during the course.

At the end of the course we repeated the mapping of blind spots. Note how in the illustration 1-B how the left blind spot became smaller and evened out very nicely with the right eye blind spot. This is a significant change, where student A's hemispheres balanced out during the weekend course.

It must be understood that this balancing is not permanent and it must be supported by



1-B

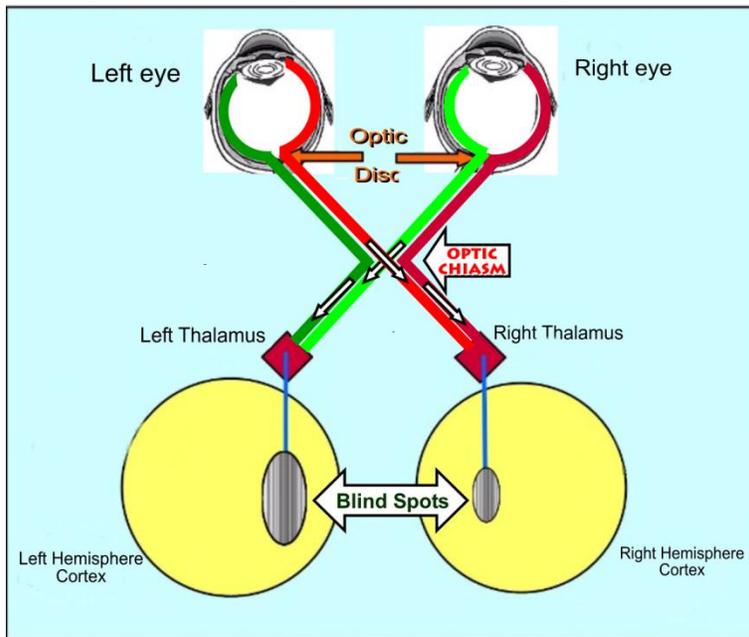
continued hemispheric specific exercises to maintain this balance and to counteract the original causes that caused the imbalance in the first place. N.L.P. courses properly structured should offer both content and a therapeutic environment where measurable changes can be observed.

Balancing the hemispheres not only improves learning and remembering but it enhances the student's ability to manage his states and eventually make other changes that support the belief system for learning.

CORTICAL PERCEPTION THROUGH BLIND SPOT MAPPING

Even though Blind Spot Mapping is a very useful tool to help determine cortical perception, we must remember that it is only one of many diagnostic tools that should be used to determine hemisphericity. Dr. F. R. Carrick, Chiropractic Neurologist and founder of the Carrick Institute for Postgraduates Studies in Neurology utilized blind spot mapping for his thesis in his book "Neurophysiological Implications in Learning". He points out in this book the importance of hemisphericity in patients with learning disabilities.

Cortical Representation of Blind Spot Mapping



An increase in the size of the blind spot means a decrease of cortical perception. Inversely a decrease in size means an increase in cortical perception. Increased cortical perception is the ideal state.

The medial (nasal) side of the right eye transmits to the left cortex (shown in light green) in the same way that the medial aspect of the left eye will transmit to the right cortex (shown in red).

Ideally the goal is to balance out the sizes of the blind spots by reducing the larger of the two. When this one is diminished in size cortical perception is improved and the effectiveness of the hemisphere.

On the other hand, two blind spots, even though large, but equal in size is a better situation than two asymmetric blind spots. The reason for this is that it has been shown that the

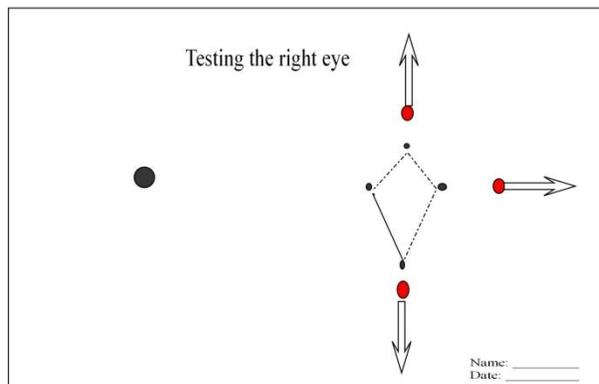
bigger the “difference” (hemispheric asymmetry) the more problems the person will tend to have. These problems may show up as learning difficulties, emotional problems, behavioral problems and a sure neuro-musculo-skeletal problem.

During the Advance Learning Strategies Course, the students are taught to do the blind spot mapping to each other. It has to be noted that lack of precision due to the “first time” experience has to be taken into account. Sometimes at the end of the course the blind spots even out but appear larger than the first test. In most cases this has been due to lack of precision in placing the student being tested at the right distance from the paper where the map is drawn. In this weekend course, we then, place more emphasis on the spots becoming more symmetrical than on making them smaller. In the clinical setting, the emphasis should be placed on both making the spots of even and on doing this by diminishing the size of the bigger one.

Blind Spot Mapping Technique:

Remember all the presupposed requirements of being in a resourceful state, and doing the process before actually doing it by explaining it in detail to your “client” prior to actually doing it. Remember that people will follow your instructions easily if they know what is expected beforehand.

1. Tape a legal or tabloid sized paper on the wall, horizontally, at eye level to the subject being tested. Make sure the center of the paper is at eye level. Note that a letter sized paper (8"x11") will definitely not do.
2. Place a black dot of approximately 1/8 inch at the center of the paper.
3. The subject must stand in front of the paper with his eyes at a distance of approximately 11 inches (28 cm.). You may use a ruler or a letter size paper to measure this distance. Check it periodically since people tend to sway away from the paper. Precision is important!
4. The subject will fix his eyes on the black spot and will then cover one eye while leaving the eye being tested focused on the dot. This will avoid binocular vision.
5. At the corner of another sheet of paper, place a small red dot. This dot should be small and you should have had this prepared beforehand. Place the red dot over the black dot on the wall and slowly move the paper away horizontally while asking the subject to let you know when the red dot "disappears". Note: If, for example you are testing the right eye, stand on the right side of the subject and move the paper towards the right away from the subject. When testing the left eye, then move over to the left side and avoid crossing your arms in front of the subject.
6. Place a small dot on the taped tabloid size paper at the spot where the subject says that the red dot disappeared.
7. Continue moving the red dot away from the subject while asking him, "let me know when the red dot **reappears**".
8. As soon as your client says that it re-appears, you place a second dot to mark the spot or reappearance.
9. Note: you must keep ordering your subject to keep his eyes focused on the black spot, as sometimes they tend to move their eyes to follow the red dot.
10. From the center of the first and second dot, move upwards and ask the subject to let you know when the red dot **re-appears**. Mark the spot.
11. Return to the center and move the red dot downward and ask the subject to let you know when the red dot re-appears, and mark the spot.
12. You now have a diamond formed by the four dots. Join these dots with a line. Do the same on the other side. If you're doing the left side, have the client cover the right eye and repeat the whole procedure.
13. Make sure you label the paper with the subjects name, date, right eye and left eye for future reference and comparison.



Practice this exercise numerous times until you can do this with ease. In our N.L.P.A.K. course we teach a more specific exercise. For now this will be a simple way of recording blind spots. Do this exercise on the same person at different times and see if it changes.

There are numerous tests that should be performed to determine hemisphericity. Many of these have to do with the vestibular system and its relationship to eye movements. This in particular is appealing to Neuro Linguistic Programmers who study eye movements and the activation of memory. There is a lot to be said about the neurology of the eyes and its relationship to brain function in general.

For the purpose of this article I will mention briefly the following simple tests:

1. **Cortical perception through blind spot mapping** as previously discussed.
2. **Muscle balance and fatigueability.** Compare analogous muscles of one side of the body to the other and see if there is a difference in strength. Check at least four muscles. I recommend the Deltoid muscle, the anterior pectorals, the Iliopsoas muscle, the lower extremity abductor (tensor fasciae lata). Specificity is very important. Muscles should be isolated and watch out for recruitment. If you are unfamiliar with Applied Kinesiology muscle testing then you should take a muscle testing course to develop the art of doing it. Remember that muscle testing is not a competition to see if you can outperform your client. You should explain this very carefully to you client. When you muscle test you want to find the relative threshold where the muscle shows signs of weakening. If on testing these muscles you don't see much difference, then you do the fatigueability test. Test each muscle repetitively (about five to six times) and then compare. If there is hemisphericity one side of the body will fatigue and the other side will not. If there is a big hemispheric problem you may encounter soft paresis which is a very weak side, barely strong enough for the person to move about.
3. **The "non dominant" eye test.** Using a small tube (even your hand will work well by looping your fingers) look through it with both eyes open and focus on an object on the wall. At this time you are using binocular vision. Keep the tube fixed and close one eye and see if you can see the object you were looking at through the tube. If you can, then this is your dominant eye. If you lose it, then this will be your non-dominant eye. Do this test with both eyes until you determine which eye is dominant and which one is not. The non dominant eye will represent the weak hemisphere on the contralateral side. So if your non dominant eye is the left eye, then your weaker hemisphere is the right one.
4. **Eye accommodation and convergence.** This is an excellent test that you should be familiar with. Place a pencil or another small object (one of your fingers will work very well) in front of the subject eyes about eight inches away. Ask the patient to fix his eyes on the pencil while you move the pencil towards the client's nasal bridge. Observe how his eyes converge. Do this several times until you start seeing that one of the eyes does not converge or will initially start to converge, fatigues and then lateralizes (outward) while the other eye continues to

converge medially as expected. The eye that fatigues is the weak eye, non dominant, and will represent the contralateral weak hemisphere.

A BALANCING ACT

You can greatly improve brain function by creating greater balance between the hemispheres. It is true that there will always be one hemisphere more dominant than the other, however decreasing this difference will greatly improve on learning, memory, emotional states and will also improve biomechanical stability. Creating greater balance will also improve the effectiveness all N.L.P. therapy techniques.

The use of Applied Kinesiology Methodologies (AK) and Brain Gym Exercises has been very effective tools to stimulate and balance the hemispheres. It must be noted, however, that when the imbalance is to such a degree that it causes impairment in body mechanics and further joint and muscle lesions or decreased cognitive function, then the application of more hemispheric-specific therapies are required. AK has done a good job at locating and working on more specific problems and because of this has been very successful. Brain gym exercises have been more symmetrical in the applications but can be tailored to address the more significant hemispheric imbalances.

An analogy that may illustrate the need for hemispheric-specific activation is that of two glasses of water where one has two ounces of water and the other four ounces. The difference between them is two ounces. If we were to add two ounces of water to each glass we would still have a difference of two ounces. What we really needed to do in order to even them out was to add two ounces to the lesser of the two. Similarly, if we activate both hemispheres equally, the difference would still remain. Hemispheric-specific activation would require increasing afferentation to the weaker of the hemispheres in order bring it up to the stronger hemisphere.

Following are several suggestions that may help activate the weak hemisphere. Once the weaker hemisphere has been determined:

- Start using the opposite side more often, for examples if you have a right weak hemisphere, use your left side of the body (washing your car, brushing your hair etc.)
- Masticate on the opposite side.
- Use your phone on the opposite side. Beware of using blue tooth on one side all the time. You should alternate the used of this devise.
- Be aware of environmental stimuli that may cause one side activation such as windows, lights, sounds (music, construction etc.). Sometimes it is necessary to move the furniture and get the activation on the other side.
- Avoid sports that are unilateral in nature such as golf, baseball and bowling. Participate in sports that are bilaterally active such as swimming, running, aerobics and others.
- Practice Brain Gym Exercises and if necessary tailor these so that they may be more hemispheric specific. The Eye-Q reading exercises are also excellent once balance is achieved. These exercises provide excellent stimulation to many parts of the brain and the cerebellum as well.

THE FEET

Fatigueability and weakening of the muscles to one side of the body will eventually tax the spine, the discs, the shoulder joint, the low back, the hip joints, the knees and also the feet. Each foot has three arches and millions of proprioceptors that feed into the brain for modulation of posture and ambulation. Once these arches drop consequent to weakening of the intrinsic muscles of the feet, these they start sending aberrant messages to the brain altering the how the body behaves while weight bearing (standing, walking and running).

Alteration of proprioception is a major cause of cerebellar dysfunction and eventual vestibuloocular problems, visceral problems, problems with cognition and affect. Recognizing and resolving this problem can be a major leap in the management of clients visiting the Neurolinguistic practitioner or any other health professional.

Anatomically the feet where not designed for walking on flat feet, at least not all the time. Poor activation of the arches has been a major problem. The use of custom made orthotics is paramount in the management of hemispheric imbalance and disruption of the proprioceptive stimuli originating in the feet. An excellent test to see the benefits of orthotics is to lay the patient in a supine posture and test fatigueability of the abductor muscles. If there is a weak side, stimulate the arches with deep kneading massage and mild foot mobilization. Retest the weak muscles to see if there is a change. If the muscle becomes stronger then this is a good indication that orthotics will be beneficial. Then, have the patient walk for about half a minute and re-test. If the muscle weakens again, then the need for orthotics is absolutely necessary.

I hope this article has been helpful to many practitioners and health professionals. Needless to say this is just an introduction to the subject matter. A deeper understanding of the neurology and the testing procedures and also the techniques to balance the hemisphere is important and a valuable adjunct to any practitioner, whether in PNL, psychology, chiropractic, physical therapy, acupuncture, massage therapy and medical doctors of all specialties.