

WHOLE BRAIN THINKING AND LEARNING

By: Dr. Eduardo A. Morató, Jr.

“The human brain is an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern, though never an abiding one, a shifting harmony of sub patterns. It is as if the Milky Way entered upon some cosmic dance.”

- Sir Charles Sherrington

“In each human brain, there are an estimated one million, million (1,000,000,000,000) brain cells. Each brain cell (neuron) contains a vast electrochemical complex and powerful micro data processing and transmitting system that, despite its complexity, would fit on the head of a pin.”

- Tony Buzan

Our brains are like sponges which receive a gazillion bits of information. Some effort is required to transform these data stimuli into patterns of thinking. The more we repeat patterns of thinking, however, the less our brains resist them, and the easier it is for us to remember and favor them. More likely than not, these are the patterns we would prefer to use for the rest of our lives.

Some brains may be more absorptive than others but it does not mean that less absorptive brains cannot learn. It may just take longer. Perhaps, the right neural pathways have not yet been explored by the learner who may have different preferences, or dispositions if you will, on how to learn. Some brains may prefer certain ways of learning over others because it is more fun and easier for them to learn that way.

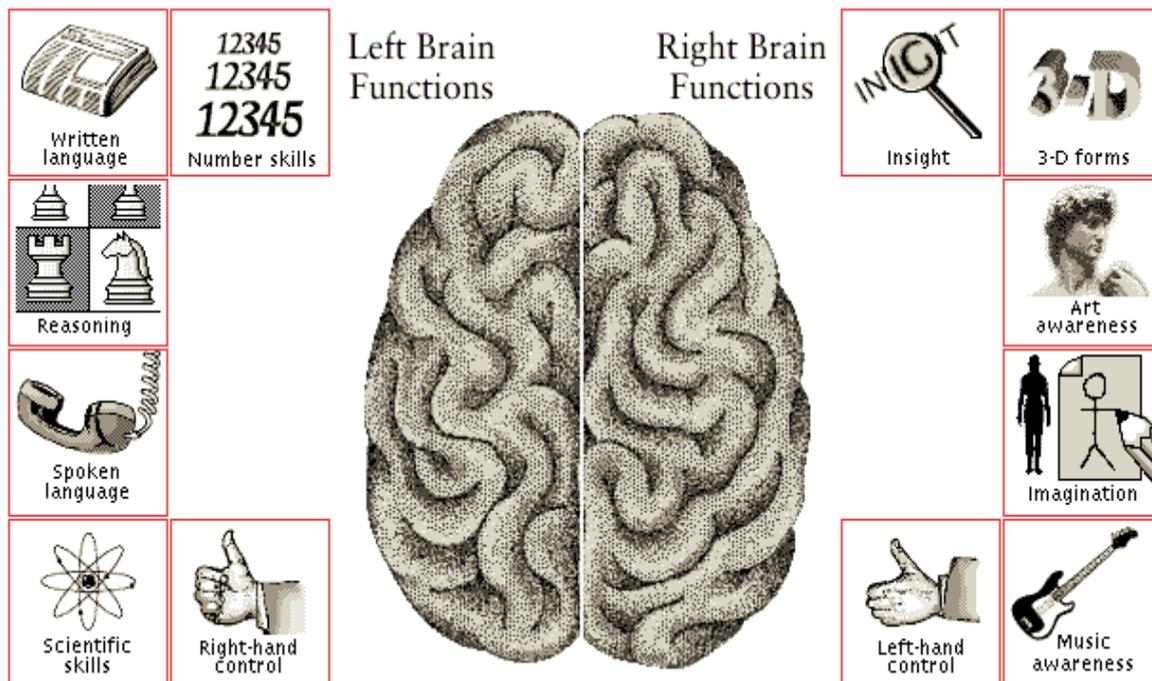
The great learner is one who develops many neural pathways or ways of learning. The superbrain is one which connects and interconnects all of life's learnings. In his book, “The Forming of Natural and Artificial Intelligence,” Professor Peter Kouzmich Anokhin concluded his sixty years of research with these words, “We can show that each of the ten billion neurons in the human brain has a possibility of connections of one with twenty eight thoughts after it. If a single neuron has this quality of potential, we can hardly imagine what the whole brain can do. What it means is that the total number of possible combinations/permutations in the brain, if written out, would be 1 followed by 10.5 kilometers of thoughts! No human yet exists who can use the potential of his brain.”

“I HAVE TWO BRAINS, THE LEFT AND THE RIGHT”

In the late 1960s, Nobel laureate Dr. Roger Sperry, with the help of his students Michael Gazzaniga and Jerre Levy, announced the findings of their research on the most evolved area of the brain, the cerebral cortex. Epileptic patients with life-threatening seizures were subjected to an operation in which the connections between the left and

right brains were cut. As a result, the two hemispheres of the brain were isolated from each other. The left brain controlled the right part of the body while the right brain controlled the left. Since the two hands of the split brain patients were controlled by the opposite sides of their brains, the functionality of the left and the right hemispheres of the brain could be studied. (See Figure 1)

Figure 1



Numerous experiments revealed that the two halves of the brain thought in different ways. The right hemisphere seemed to think in images, visual patterns and shapes and favored spatial thinking, rhythm, imagination, daydreaming, color, dimension and wholeness. The left hemisphere appeared to prefer a different set of mental skills that had to do with words, numbers, logical, sequential ordering, analysis, classifying and arranging.

Research undertaken by other scientists have confirmed the conclusions of Sperry but they observed that, while each hemisphere is dominant in a particular set of mental skills, both sides of the brain are skilled in all areas of thinking. The left and right brain faculties are actually contained throughout the cortex. An impaired left or right brain can activate the mental faculties that have been rendered less dominant in one side of the brain.

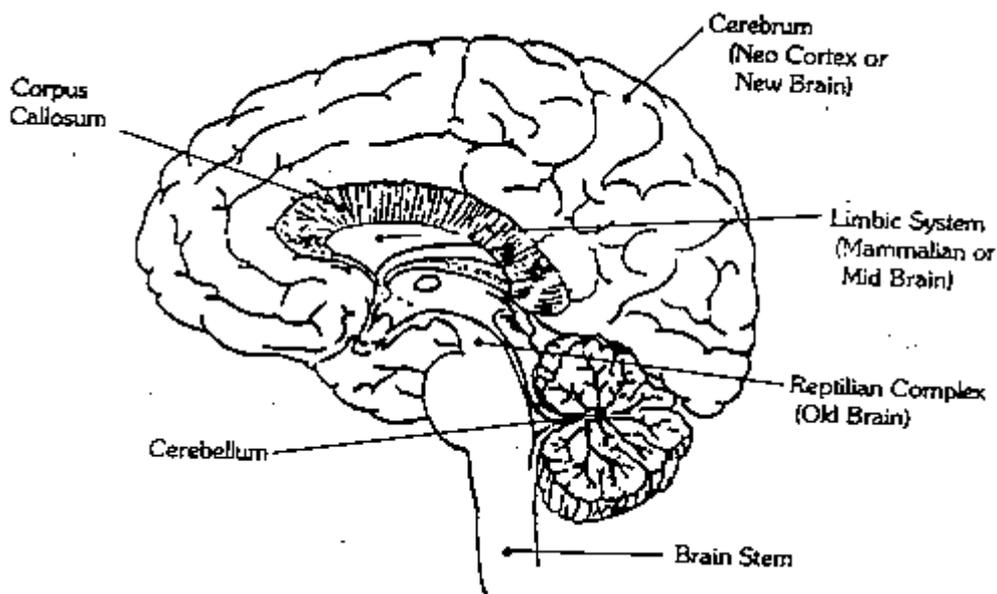
What the subsequent researches suggest is that learners can try to practice the different mental faculties of the left and right hemispheres because there is no such thing as just a right brained or left brained person.

The educator should, therefore, endeavor to activate all the mental skills that the right and left brain hemispheres manifest. The more neural pathways in the brain are built, the greater the learning for the student. The more the right and the left hemispheres are connected to one another, the more the learner learns. Educators should remember that students merely retain a small fraction of the learning that they only read, merely a fraction of what they only hear, just a fraction of what they see. However, if a learner reads, hears, sees and experiences a lesson, the greater are the chances of learning and retaining that learning for a long period of time.

“I HAVE THREE BRAINS: REPTILIAN, LIMBIC AND NEOCORTEX”

Dr. Paul MacLean, former director of the Laboratory of the Brain and Behavior (US Institute of Mental Health), looked at the evolutionary development of the brain and posited his “triune brain theory.” As animals evolved, layers of the brain also evolved. In humans, Dr. MacLean claimed, the three layers of the brain developed: the reptilian brain (R-complex), the limbic brain and the neocortex. For MacLean, while all three layers of the brain interact constantly, they have separate functions. (See Figure 2)

Figure 2



The reptilian brain is composed of the brain stem and the cerebellum. Its primary job is to maintain bodily functions and trigger the instinct to fight or to flee. The cerebellum is in charge of movement, while the brain stem controls digestion, reproduction, circulation, breathing and the need to stay alive. Since the reptilian brain is designed for physical survival, this is what links humans to all animals. It perpetuates the

species, establishes social dominance in groups and sets territorial boundaries. The reptilian brain governs the hard-wired patterns of human behavior.

The second brain to evolve is the limbic system, primarily concerned with emotions. The limbic brain includes the amygdala (which attaches events to emotions) and the hippocampus (which converts information to long term memory and memory recall). The amygdala arouses emotions such as anger, compassion, fear and pity and tempers the repetitive, ritualistic and instinctive habits of reptiles. The hippocampus aids the brain in selecting what memories to store, most probably by affixing emotional content to them.

In the animal kingdom, the limbic system is highly developed among mammals, which need to take care of their young over a long period of time. Elephants, chimpanzees and humans are known to care of even their very weak offsprings. Social bonding is also very strong among mammals. They are present in other species as well, but not to a high emotional state. It is necessary for mammals, which bear only one or several offsprings, to act in this manner. Fish and insects can lay millions of eggs, obviating the need for emotional bonding.

The neocortex, or the cerebral cortex, accounts for over 80% of the brain. It is responsible for verbal, mathematical and logical thinking, as well as the cognitive and problem solving functions. It allows humans to do long range planning and forecasting, to discern relationships and patterns of meaning, to create personal metaphors or models of understanding, and to process emotions in a “sensible” manner. The neocortex is highly developed in human beings, hence our dominance in this planet. The neocortex allows us to think and reflect about ourselves, hypothesize on new possibilities, concoct new paradigms, and continuously improve upon ourselves in a geometric pattern.

MacLean’s triune brain theory suggests that educators (and managers in the work setting) can tap into the instinctive, emotional and intellectual faculties of learners.

The basic need to survive makes human beings naturally competitive for food, for mates, for territory, for shelter and for a higher ranking in the pecking order of dominance. Games, contests and performance scoring systems evoke the “fight or flee” or “reptilian” instincts from learners.

However, the environment should not be so competitive as to scare most of the learners to flee. In order to reduce the number of “fleeing learners,” the educator should rely on the limbic system for emotional and social bonding among learners. Teams can be formed to approximate equal chances for the competitors. Team identification strengthens the “fighting spirit” and allows members of the team to teach, tutor, and mentor one another. This has value in itself. However, but higher order thinking is required to push the teams to achieve their best.

The neocortex plays an excellent role in goal setting, strategizing, implementing and achieving results.

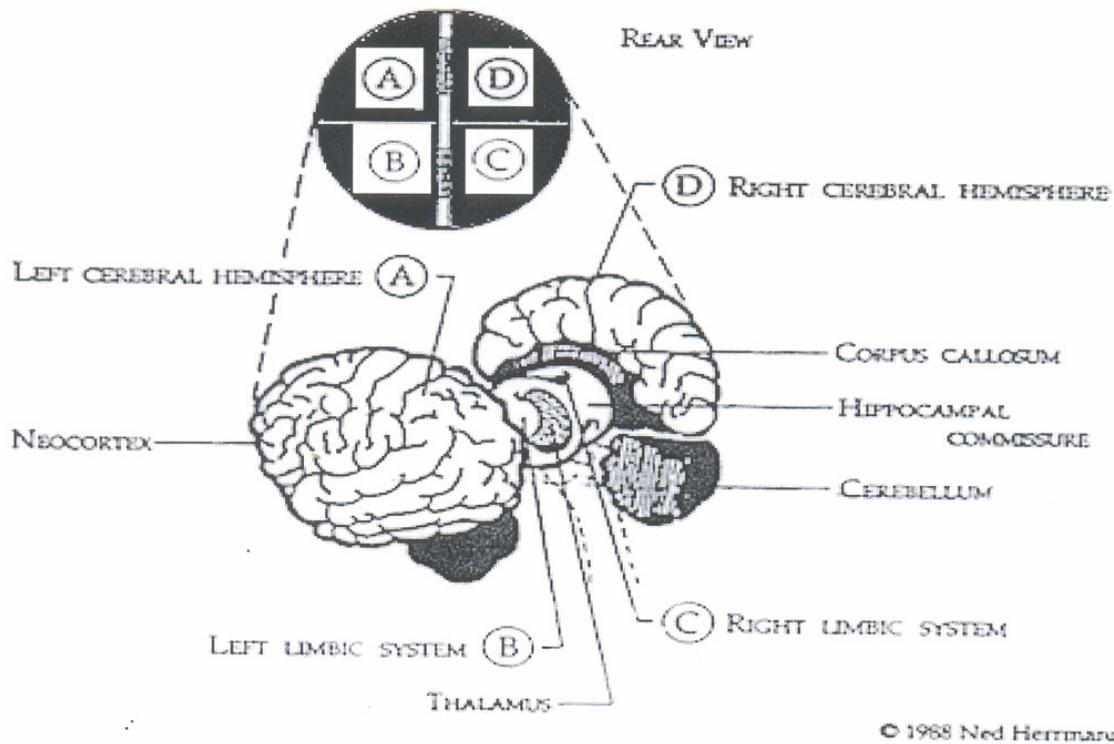
In the world of business or public governance, MacLean's theory applies perfectly. The reptilian brain is superactivated because corporations fight to thrive and to survive. Fleeing is, oftentimes, not an option. Institutional morale, organizational cohesion, and culture building are essential to raise levels of energy, dedication and commitment. The corporation or institution then becomes a community. It becomes the second family. Hence, the limbic brain also becomes superactivated. Finally, the neocortex is driven full speed ahead as corporations, countries and development agencies strive to be the best, the most competitive, the cheapest, the sturdiest, the cleanest, the biggest, and all the other superlatives they want to become.

**“I HAVE FOUR BRAINS: LEFT CEREBRAL, LEFT LIMBIC,
RIGHT LIMBIC, RIGHT CEREBRAL**

Dr. Ned Hermann adds his theory on brain dominance to the growing discourse on the functioning of this thinking organ. He combined the theories of Dr. Roger Sperry and Dr. Paul McLean to postulate that the brain specialized functionally into four distinct quadrants. People manifest their brain preferences in the subjects that they enjoy most in school and in the careers that they pursue. Oftentimes, they overdevelop a preferred brain function over their lifetime.

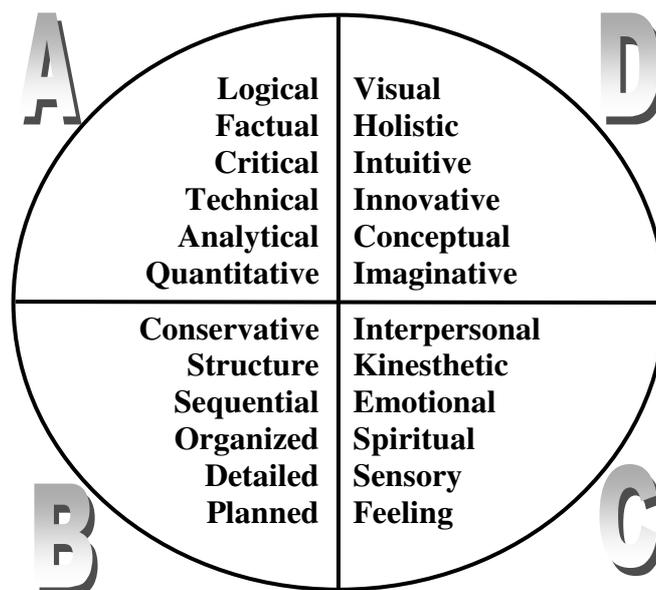
Hermann maintains that the two halves of the brain are not used in the same way and with the same frequency by people. Each of the cerebral hemispheres has one-half of the limbic system lodged into it. Since the limbic system is the control center that regulates basic bodily functions, chemical balances, heart rate, blood pressure, hormones and emotions, it plays a crucial part in learning. From this discovery, Hermann divided the brain into four, with each quadrant exhibiting a distinct learning preference. He designed his own Hermann Brain Dominance Instrument (HBDI). He drew a metaphorical model of the four-quadrant brain of thinking preferences. This model is depicted in the illustration below. (See Figure 3) The left side of the model is occupied by the left brain. On the top left quadrant is the Left Cerebral brain preference. On the lower left quadrant is the Left Limbic brain preference. On the lower right quadrant is the Right Limbic brain preference, while the upper right quadrant is the Right Cerebral brain preference. In the order presented (from upper left going counterclockwise to upper right) the quadrants are labeled simply as A, B, C, D.

Figure 3



The HBDI developed by Hermann yielded a brain dominance profile. (This is shown in Figure 4) The four quadrants of the brain are arranged like a bullseye target. The circle closest the center is marked by the score of 3. The next circle is marked by 2, followed by 1 and, finally 1+. The more a person prefers to use a quadrant of the brain, the more that he or she moves out to the outer circles, indicating stronger and stronger brain dominance.

Figure 4



1. Quadrant A

The Left Cerebral or Quadrant A prefers to think in a factual, analytical, quantitative, technical, logical, rational and critical manner. People who prefer Quadrant A want to dissect data, assess risks, solve problems, and work on financial, quantitative or technical issues. They want to engage in debates that capitalize on superior reasoning.

The Quadrant A person is an achiever and is performance driven. He tends to be a thinker and academic in approach. He prefers school subjects like algebra, science, mathematics, finance and banking. Hence, Quadrant A people end up as lawyers, finance managers, engineers, scientists, doctors and systems analysts.

2. Quadrant B

Quadrant B people prefer to think in highly organized, sequential, planned, programmed, structured, detailed, disciplined, orderly, consistent and predictable manner. They are good in administering things, implementing clearly articulated plans and programs, promulgating policies, systems and procedures and ensuring that people comply. They excel in safeguarding properties and monitoring assets, maintaining detailed records and making progress reports. They tend to be conservative and bureaucratic. They are status quo keepers but they are reliable, dependable and persistent in their work. Quadrant B people prefer school subjects like accounting, computer programming, history, administration and planning. Hence, they are comfortable with repetitive, routine and sequential work. They are great bureaucrats, accountants, administrators, budget officers, planners, computer programmers and personnel managers. They are good at keeping schedules, enforcing rules and regulations, and ensuring compliance from others.

3. Quadrant C

Quadrant C thinkers are concerned with interpersonal relations and hook their thinking to their emotional context. Hence, they are highly sensory and appreciate symbolic messages. They are also aware of body sensations and tend to be kinesthetic. They are aware of the feelings of others, and put a premium on values. They are effective communicators. They appreciate music since it feeds the soul. Quadrant C people prefer school subjects such as social sciences, psychology, music, dance, physical education, and communications. They join extra curricular activities such as the glee club, social outreach groups, the acting guild and varsity leagues. Quadrant C dominants make good social workers, teachers, nurses, entertainers, communicators, counselors, missionaries, salesmen and public relations agents. Quadrant C people are concerned about the team, the family, the club and the society. They are genuinely concerned about people, causes and, also, having fun. They are constantly reaching out to others.

4. Quadrant D

Quadrant D thinking is creative and intuitive, imaginative and innovative, conceptual and spatial, holistic and intuitive, flexible and open. Quadrant D people see possibilities. They dream, envision futures, and strategize. They are entrepreneurial and encourage, even advocate, change. They can see the whole, and synthesize the many parts to form a cohesive, synergistic picture. They think in total systems and integrate multiple expressions in life to form new insights into things and how they work. They are quite independent-minded and create their own worlds. Quadrant D people prefer school subjects such as entrepreneurship, the arts (painting, sculpture), design, literature (poetry and drama), architecture, geometry and philosophy. Hence, Quadrant D types are constantly trying to recreate the world around them. They plunge into new endeavors, revel in change and celebrate the diversity of life.

For their careers, Quadrant D people become visual artists, scientists (who explore new theories rather than apply old ones), entrepreneurs, designers, creative writers, corporate strategists, societal visionaries and inventors. Quadrant D dominants dislike the shackles of rigidity and disciplined procedures. They are iconoclasts and relish the idea of destroying old paradigms to make way for new ones.

“I HAVE EIGHT BRAINS” OR THE EIGHT MULTIPLE INTELLIGENCES”

Dr. Howard Gardner, Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education, postulated the Theory of Multiple Intelligences in 1983. He defined intelligence as “the ability to solve problems or to create products that are valued within one or more cultural settings.” He claims that “intelligences are not things that can be seen or counted. Instead they are potentials – presumably, neural ones – that will or will not be activated depending upon the values of a particular culture, the opportunities available in that culture, and the personal decisions made by individuals and/or their families, school teachers, and others.” Gardner used eight criteria in determining the multiple intelligences. These were:

1. The potential of isolation by brain damage
2. An evolutionary history and evolutionary plausibility
3. An identifiable core operation or set of operations
4. Susceptibility to encoding in a symbolic system
5. A distinct developmental history, along with a definable set of expert “end-state” performances
6. The existence of idiot savants, prodigies, and other exceptional people
7. Support from experimental psychological tests
8. Support from psychometric findings

Gardner does not claim that these are the definitive criteria of intelligence. Moreover, he acknowledges the presence of “intelligences” not fitting the eight criteria.

Some cannot be notated in symbols or measured, given our current understanding of them, such as spiritual intelligence.

In Gardner's own words, these are his definitions of the eight intelligences. (He originally postulated seven in his first work, *Frames of Mind: The Theory of Multiple Intelligences*. However, he added an eighth intelligence in his 1999 work, *Intelligence Reframed*.)

1. *Linguistic Intelligence involves sensitivity to spoken and written language, the ability to learn language, and the capacity to use language to accomplish certain jobs. Lawyers, speakers, writers, poets are among the people with high linguistic intelligence.*
2. *Logical-mathematical Intelligence involves the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. Mathematicians, logicians, and scientists exploit logical-mathematical intelligence.*
3. *Musical Intelligence entails skills in the performance, composition and appreciation of musical patterns.*
4. *Bodily-Kinesthetic Intelligence entails the potential of using one's whole body or parts of the body (like the hand or the mouth) to solve problems or fashion products. Obviously, dancers, actors, and athletes exhibit bodily kinesthetic intelligence. Hence, this form of intelligence is also important for craftspersons, surgeons, bench-top scientists, mechanics, and very other technically oriented professionals.*
5. *Spatial Intelligence features the potential to recognize and manipulate the patterns of wide spaces (those used, for instance, by navigators and pilots) as well as the patterns of more confined areas (such as those of importance to sculptors, surgeons, chess players, graphic artists, or architects). The wide ranging ways in which spatial intelligence is developed in different culture clearly show how a biophysical pattern can be harnessed by domains that have evolved for a variety of purposes.*
6. *Interpersonal Intelligence denotes a person's capacity to understand the interests, instincts and desire of other people and, consequently, to work effectively with others. Salespeople, teachers, counselors, religious leaders, political leaders, and actors all need acute interpersonal intelligence*
7. *Intrapersonal Intelligence involves the capacity to understand oneself, to have an effective working model of oneself, including one's own desires, fears, and capacities – and to use such information effectively in regulating one's own life.*

8. *The Naturalist Intelligence refers to the ability to recognize and classify plants, minerals and animals, including rocks and grass and all variety of flora and fauna. The ability to recognize cultural artifacts, like cars or sneakers, may also depend on the naturalist intelligence. In cultures without formal science, the naturalist is the person most skilled in applying the accepted “folk taxonomies”; in cultures with a scientific orientation, the naturalist is a biologist or an environmentalist, with an extensive knowledge of the living and inanimate world.*

Gardner advises that “it’s very important that a teacher takes individual differences among kids very seriously....The bottom line is a deep interest in children and how their minds are different from one another. The teacher’s job is to help students use their minds well.”

Rather than measure intelligences, like psychometricians prefer, Gardner introduced the “Spectrum Classroom” which provided children with all sorts of learning materials that would encourage them to learn in their preferred ways. Gardner’s approach adhered to the principle that, rather than assessing children, the children must be provided an environment to assess themselves. Gardner “created an environment with inviting resources and let the children demonstrate their spectra of intelligences in as natural a fashion as possible.” Gardner claims this approach can be adapted to all ages of learners.

For Gardner, the risk in making psychometric assessments is to label children (or older learners) as “challenged” in a particular intelligence. Also, the psychometric instruments themselves may not capture the “intelligence” by the way they are designed and written.

There have been many misapplications of the Theory of Multiple Intelligences as Gardner himself pointed out. The mere execution of a human faculty (moving, speaking, writing) if not used to solve problems or create products, is not “intelligence.” Some educators merely assign projects to students and allow them to use freely whatever intelligences they prefer. This loosely conceptualized method of developing the intelligence may be beneficial but it lacks depth in really developing the students’ full potentials in the different intelligences. Moreover, the Theory of Multiple Intelligences does not prescribe what subjects should be targeted. (e.g. Mathematics, Literature, Physical Education, Arts, etc.). Neither does it prescribe how to teach any subject. Rather, the role of the educator is to define a learning goal and then “recommend specific practices, spell out a rationale, and hypothesize why these practices might indeed lead to the desired goal. And, going one step further, the educator should then begin to lay out criteria that would determine whether a practice, inspired by multiple intelligences, has led to a desired effect.” In other words, human beings have their intelligences to tap into in order to solve problems and create products. Which intelligence, or intelligences, they want to access should be left to the individual learner. The job of the educator, or the manager in the work setting, is to help deepen and broaden these multiple intelligences so that they can be exploited to the fullest.

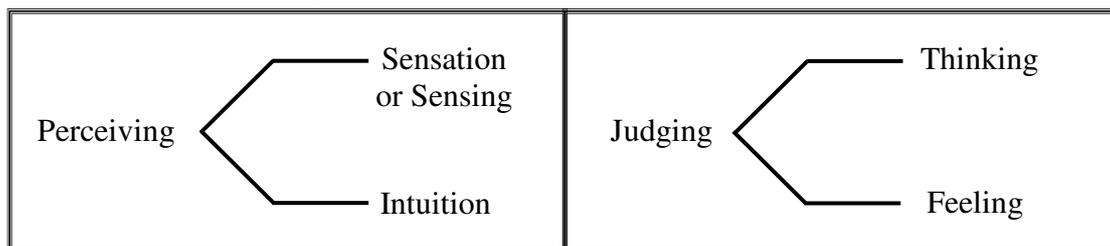
“I HAVE SIXTEEN PERSONALITY TYPES”

The famous psychologist Carl G. Jung postulated a theory on personality based on his observation about the differences among normal people. Jung asserted that people have inborn tendencies to use their minds differently. These tendencies lead to patterns of behavior when they are dealing with external and internal stimuli. When people’s minds are stimulated, they are either **perceiving** (or taking in as much information as possible) or they are **judging** (or organizing the information in order to arrive at conclusions).

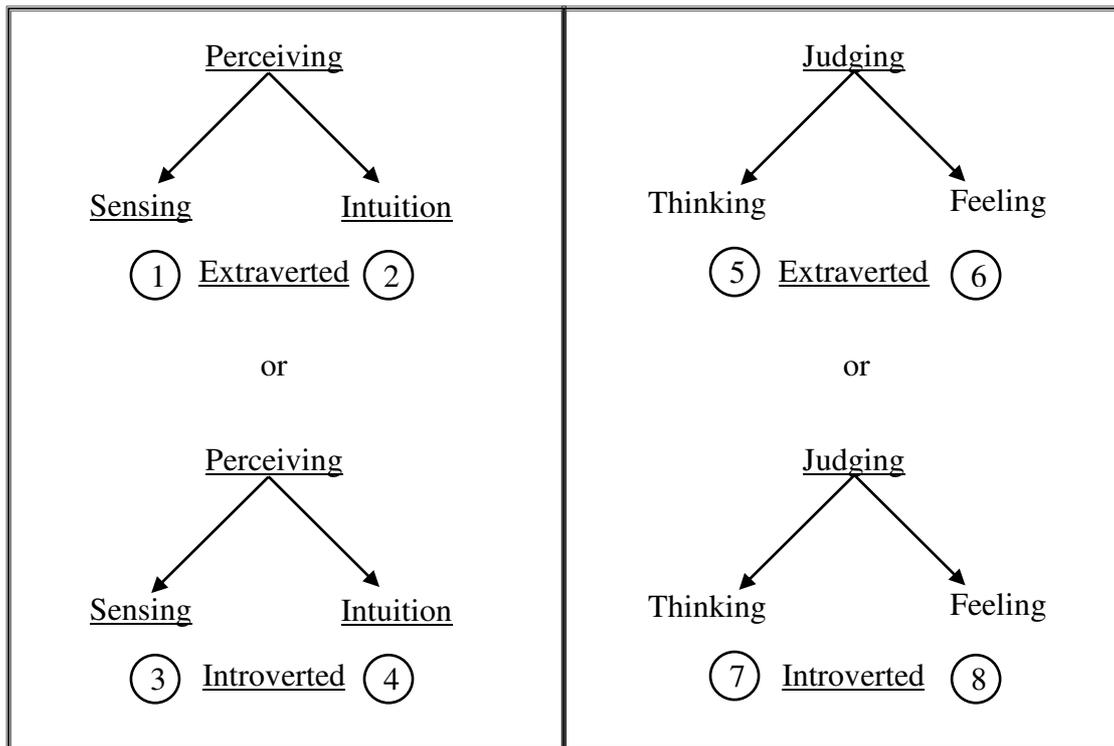
When people are perceiving or taking in the information, they either rely on **sensation** or **intuition**. Sensation (or sensing) means the sensory assimilation of facts and figures and the details of the situation. Intuition means going beyond the details to see the big picture of the situation, the overall scheme or design.

When people are judging or organizing information and making conclusions, they either use their **thinking** side or their **feeling** side. Thinking is the rational, logical and sequential process of organizing information and arriving at conclusions. Feeling is the relational and personal process of organizing information and arriving at conclusions.

The basic mental process can be summarized as follows:



Carl Jung further theorized that people rely on two sources of energy: (1) the external world of people, experiences and activities; and (2) the internal world of ideas, memories and emotions. Jung called these two sources as **extraversion** or acting in the external world or **introversion** or reflecting in the inner world. Thus, Jung formulated eight mental functions as follows.



Everybody actually uses the eight mental functions according to Jung but they prefer some over others, resulting in behavioral and personality patterns. These differences in preferences lead to psychological types. These personality types are not fixed and constant but flexible and dynamic patterns. Jung suggests that preferences for a dominant function (most used mental process), an auxiliary function (second most used), a tertiary function (third most used), and an inferior function (fourth most used and least preferred). Dr. Katharine Briggs and her daughter Dr. Isabel Briggs Myers further developed Carl Jung's theory and lined up the eight dominant functions against eight auxiliary functions to produce sixteen personality types, which comprise the Myers-Briggs Type Indicator (MBTI). This is shown below:

Dominant Function	*	Auxiliary Function	MBTI
Introverted Sensing	3	With Extraverted Thinking	ISTJ
Introverted Sensing	3	With Extraverted Feeling	ISFJ
Extraverted Sensing	1	With Introverted Thinking	ESTP
Extraverted Sensing	1	With Introverted Feeling	ESFP
Introverted Intuition	4	With Extraverted Thinking	INTJ
Introverted Intuition	4	With Extraverted Feeling	INFJ
Extraverted Intuition	2	With Introverted Thinking	ENTP
Extraverted Intuition	2	With Introverted Feeling	ENFP
Introverted Thinking	7	With Extraverted Sensing	ISTP
Introverted Thinking	7	With Extraverted Intuition	INTP
Extraverted Thinking	5	With Introverted Sensing	ESTJ
Extraverted Thinking	5	With Introverted Intuition	ENTJ
Introverted Feeling	8	With Extraverted Sensing	ISFP
Introverted Feeling	8	With Extraverted Intuition	INFP
Extraverted Feeling	6	With Introverted Sensing	ESFJ
Extraverted Feeling	6	With Introverted Intuition	ENFJ

*The numbers correspond to the eight mental functions of Carl Jung in the previous chart.

People's preference dichotomies are shown and juxtaposed below. The dichotomies represent the polarities in the way that people naturally prefer to do things.

Extraversion	Introversion
More oriented towards the world outside of the self, meaning other people, the external environment and the situational setting. Extraverted people prefer to develop ideas by engaging in discussions. They are usually overtly expressive and take the initiative in building relationships.	Introverted people are more oriented towards the inner world of the self. They are usually reflective and introspective. They prefer depth to breadth. They want to communicate in small groups or in writing. They take the initiative when it comes to concerns that are personally important to them.

Thinking	Feeling
<p>People who prefer Thinking in their decision-making can distance themselves from the issue at hand and use their analytical, logical and rational processes to arrive at a balanced, fair and objective solution. They believe in using definite criteria and principles in making decisions. They believe in treating everyone equally.</p>	<p>People who prefer Feeling in their decision-making put themselves and all the other people involved in the forefront to ensure that their values are upheld and their personal points of view are considered. They are highly empathetic and compassionate and are motivated by their personal principles and the impact of their decisions on people. They believe in treating everyone as an individual.</p>

Judging	Perceiving
<p>In dealing with the world around them, people who are the Judging type prefer a well-ordered, structured, planned, programmed and controlled way of managing things in arriving at conclusions. They want closure in their dealings. They are highly systematic and methodical people who do not want frequent changes and vacillations. They plan and execute well.</p>	<p>In dealing with the world around them, people who are the Perceiving type prefer open-ended, flexible and spontaneous, experiential and changeable conditions where they can use their resourcefulness, adaptability and expansiveness. They are quite comfortable with constant change and are energized by what is new, what is possible and what is appropriate for the moment.</p>

In her *Introduction to Types, A Guide to Understanding Your Results on the Myers-Briggs Type Indicator*, Isabel Briggs Myers provided a summary of Characteristics Frequently Associated with Each Type in the Sixteen Personality Types.

Characteristics Frequently Associated with Each Type

Sensing Types

Intuitive Types

Introverts

ISTJ

Quiet, serious, earn success by thoroughness and dependability. Practical, matter-of-fact, realistic and responsible. Decide logically what should be done and work toward it steadily, regardless of distractions. Take pleasure in making everything orderly and organized – their work, their home, their life. Value traditions and loyalty.

ISFJ

Quiet, friendly, responsible and conscientious. Committed and steady in meeting their obligations. Thorough, painstaking, and accurate. Loyal, considerate, notice and remember specifics about people who are important to them, concerned with how others feel. Strive to create an orderly and harmonious environment at work and at home.

INFJ

Seek meaning and connection in ideas, relationships and material possessions. Want to understand what motivates people and are insightful about others. Conscientious and committed to their firm values. Develop a clear vision about how best to serve the common good. Organized and decisive in implementing their vision.

INTJ

Have original minds and great drive for implementing their ideas and achieving their goals. Quickly see patterns in external events and develop long-range explanatory perspectives. When committed, organize a job and carry it through. Skeptical and independent, have high standards of competence and performance – for themselves and others.

ISTP

Tolerant and flexible, quiet observers until a problem appears, then act quickly to find workable solutions. Analyze what makes things work and readily get through large amounts of data to isolate the core of practical problems. Interested in cause and effect, organize facts using logical principles, value efficiency.

ISFP

Quiet, friendly, sensitive, and kind. Enjoy the present moment, what's going around them. Like to have their own space and to work within their own time frame. Loyal and committed to their values and to people who are important to them. Dislike disagreements and conflicts, do not force their opinions or values on others.

INFP

Idealistic, loyal to their values and to people who are important to them. Want an external life that is congruent with their values. Curious, quick to see possibilities, can be catalysts for implementing ideas. Seek to understand people and to help them fulfill their potential. Adaptable, flexible, and accepting unless a value is threatened.

INTP

Seek to develop logical explanations for everything that interests them. Theoretical and abstract, interested more in ideas than in social interaction. Quiet, contained, flexible, and adaptable. Have unusual ability to focus in depth to solve problems in their area of interest. Skeptical, sometimes critical, always analytical.

ESTP

Flexible and tolerant, they take a pragmatic approach focused on immediate results. Theories and conceptual explanations bore them – they want to act energetically to solve the problem. Focus on the here-and-now, spontaneous, enjoy each moment that they can be active with others. Enjoy material comforts and style. Learn best through doing.

ESFP

Outgoing, friendly, and accepting. Exuberant lovers of life, people, and material comforts. Enjoy working with others to make things happen. Bring common sense and a realistic approach to their work and make work fun. Flexible and spontaneous, adapt readily to new people and environments. Learn best by trying a new skill with other people.

ENFP

Warmly enthusiastic and imaginative. See life as full of possibilities. Make connections between events and information very quickly, and confidently proceed based on the patterns that they see. Want a lot of affirmation from others, and readily give appreciation and support. Spontaneous and flexible, often rely on their ability to improvise and their verbal fluency.

ENTP

Quick, ingenious, stimulating, alert, and outspoken. Resourceful in solving new and challenging problems. Adept at generating conceptual possibilities and then analyzing them strategically. Good at reading other people. Bored by routine, will seldom do the same thing the same way, apt to turn to one new interest after another.

Extraverts

ESTJ

Practical, realistic, matter-of-fact. Decisive, quickly move to implement decisions. Organize projects and people to get things done, focus on getting results in the most efficient way possible. Take care of routine details. Have a clear set of logical standards, systematically follow them and want others to also. Forceful in implementing their plans.

ESFJ

Warmhearted, conscientious, and cooperative. Want harmony in their environment, work with determination to establish it. Like to work with others to complete tasks accurately and on time. Loyal, follow through even in small matters. Notice what others need in their day-by-day lives and try to provide it. Want to be appreciated for who they are and for what they contribute.

ENFJ

Warm, empathetic, responsive, and responsible. Highly attuned to the emotions, needs, and motivations of others. Find potential in everyone, want to help others fulfill their potential. May act as catalysts, for individual and group growth. Loyal, responsive to praise and criticism. Sociable, facilitate others in a group, and provide inspiring leaders.

ENTJ

Frank, decisive, assume leadership readily. Quickly see illogical and inefficient procedures and policies, develop and implement comprehensive systems to solve organizational problems. Enjoy long-term planning and goal setting. Usually well informed, well read, enjoy expanding their knowledge and passing it on others. Forceful in presenting their ideas.

Source: Introduction to Types, A Guide to Understanding Your Results on the Myers-Briggs Type Indicator, 1998

References:

Adbrecht, Karl, Brain Power, 1987, Prentice Hall Press

Blakeslee, Thomas R., Right Brain: A New Understanding of the Unconscious Mind and Its Creative Powers, 1980, Anchor Press/Publishing

Buzan, Tony, The Mindmap Book, 1995, BBC Books

Gardner, Howard, Intelligence Reformed: Multiple Intelligences for the 21st Century, 1999, Basic Books

Gardner, Howard, Multiple Intelligences: The Theory in Practice, 1993, Basic Books

Hermann, Ned, The Creative Brain (2nd ed). 1995, Kingsport: Quebecor Printing Group.

Myers, Isabela Briggs, Introduction to Types, A Guide to Understanding Your Results on the Myers-Briggs Type Indicator, 1998, Australia Psychologists Press and Consulting Psychologists Press Inc.

The brain has two hemispheres , which have each parts of the brain . Something like "the face has two eyes ,each for one half" (not all are like that) . I suggest getting hooked up on the Internet for that. However they are physically similar (until one extent) , their mental process vary (probably a lot). A simple yet quite accurate description of the difference between the right and left brain is provided in a great Khan academy video Hemispheric differences and hemispheric dominance. A very good and cogent discussion of the functional differences between the two hemispheres of the brain (termed lateralization) is contained in the book Neuroanatomy through Clinical Cases, second edition by Hal Blumenfeld.