

Teaching the Way Kids Learn— What Brain-Function Research Tells Us About Learning

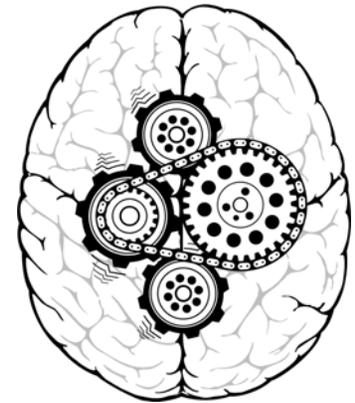


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References: Selected Brain Facts

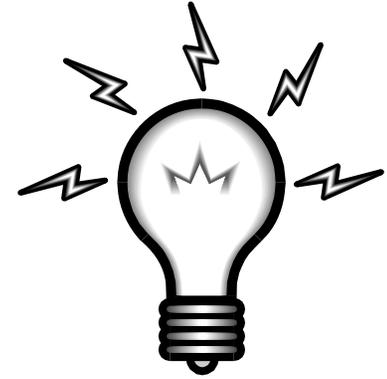
www.arlenetaylor.org

URL: http://www.arlenetaylor.org/selected_brain_facts/index.htm



Learning can be Defined as:

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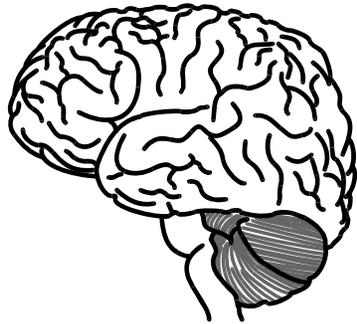


Skills or knowledge acquired through instruction, study, or experience

- ❖ **The likelihood that skills or knowledge will be acquired – the brain will transfer information from short-term to long-term memory -- is increased:**
 - **When the brain “gives a rip” (cares about the information or is interested in the topic)**
 - **When the information can be linked to something the brain already knows (e.g., metaphor, story, fact, label, process)**

Your Brain is as Unique

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❖ **As your thumbprint -- no two brains are ever identical in structure, function, or perception!**



- **Give up any expectation of another brain perceiving anything exactly as yours perceives it—and vice versa**
- **The way your brain functions largely determines the way in which you learn**
- **This presentation is one brain's perception of the research**

The Human Brain

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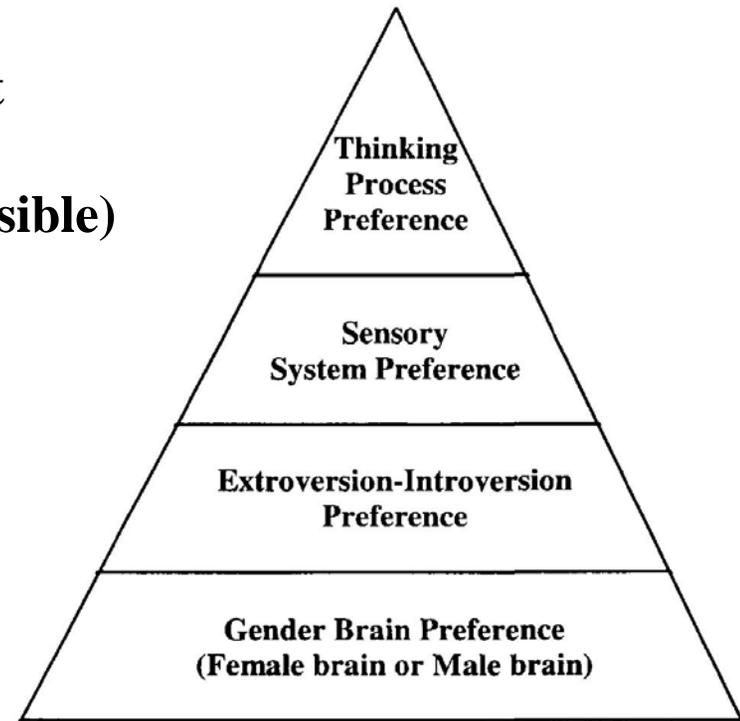
- ✓ **Begins developing by about the 4th day after conception**
- ✓ **Weighs about 3 lbs in adulthood and contains 100 billion neurons and 900 billion neuroglia – give or take a few billion**
- ✓ **Houses the corpus callosum, a bridge of approximately 250 million nerve fibers that connects the two cerebral hemispheres**
- ✓ **Connects with all portions of the nervous system through a million miles of nerve fibers**



Learning by Design Requires

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- A realization that every brain is different
- A commitment to identify (insofar as possible) and honor each person's uniqueness
- An awareness of key components of brain function
- A willingness to brainstorm ways to address key brain-function components so learning is as easy as possible

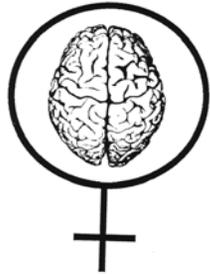


“Who Am I?” Pyramid

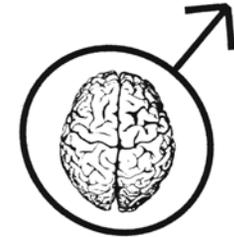
- ✓ Fail to address one component and learning effectiveness can diminish
- ✓ Miss two or more and learning can drop off dramatically . . .

Male-Female Continuum

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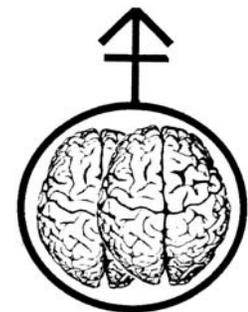


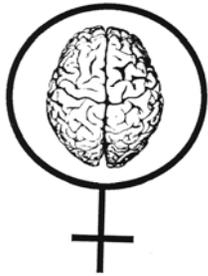
- Takes in 95% of the population
- Checklists of psychological maleness or femaleness give two scores



Empathizing Brain (equated more with female brain)	Balanced Brain Systemizing = Empathizing	Systemizing Brain (equated more with male brain)
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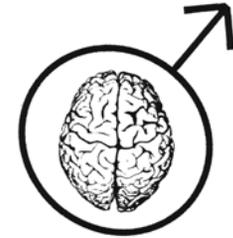
- ✓ Some brains definitely lean toward systemizing, others lean toward empathizing, and some are 50-50
- ✓ Some brains match their external housing while other's don't, and about 5% of brains don't even fall on the continuum
- ✓ No wonder people are confused!





Girl and Boy Brains

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- Brain is lighter and smaller
- 3 of 12 areas are larger (e.g., basal ganglia, language computation)
- The left hemisphere matures earlier
- Larger corpus callosum: the brain typically tends to be more generalized and collegial
- A gray matter peak occurs about age 11
- Brain is 10-15% heavier
- 9 of 12 areas larger (not certain how this impacts real-life functioning)
- Right hemisphere matures earlier
- Smaller corpus callosum: brain tends to be more lateralized and instrumental (dyslexia, hyperactivity)
- A gray matter peak occurs about age 12

Cross-Lag Development

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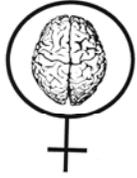
- ❖ Median development of a boy age 5 = development of a girl age 4 (approximate difference of 20%)
- ❖ Scandinavian girls start first grade at age six, boys at age seven due to cross-lag in development

✓ Girls are at a definite advantage in kindergarten and grade school due to more developed left hemisphere

✓ May develop math and science anxiety in high school

✓ Boys are at a disadvantage in kindergarten and grade school due to more developed right hemisphere (and left hemisphere curriculum)

✓ Are at higher risk for dropping out before or during high school



Girl/Boy Brains - Learning



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Girls:

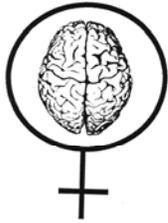
- ✓ Better at long-term planning (may think ahead more about homework, exam deadlines, prom or special event)
- ✓ Better at handwriting and articulation
- ✓ 100% of sounds are words
- ✓ Tend to be more auditory and are often better readers (e.g., learn to read earlier and more easily)

Boys:

- ✓ Better at short-term planning (may think more about recess and what is happening after school today)
- ✓ Better at setting/achieving goals
- ✓ 60% of sounds are words, 40% are non-language noises
- ✓ Tend to be more visual - auditory skills may need to be honed to help reading. Bottom 10% in reading classes are boys

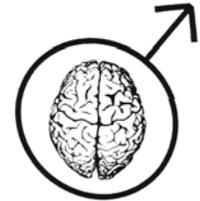
Brains and Learning, Cont'd

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Girl Brain

- Uses more energy second for second
- Tends to function better in an environment that has low levels of distraction (e.g., IQ test scores were higher when room was quiet, may have difficulty concentrating with music playing in the background)

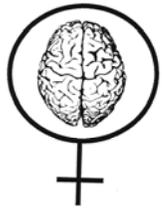


Boy Brain

- Uses less energy second for second
- Tends to focus better in an environment where there is some distraction (e.g., IQ test scores were higher when there was some noise/distraction in the room, may concentrate easier / do homework better while listening to music)

Brain Differences Impact Learning

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Girl Brain

- Generally better able to sit quietly without fidgeting. Tend to be more auditory overall and better able to listen and pay attention to ideas.
- Less likely to be diagnosed as hyperactive (e.g., only 5%-10% are girls)
- Less likely to be medicated for being too active physically



Boy Brain

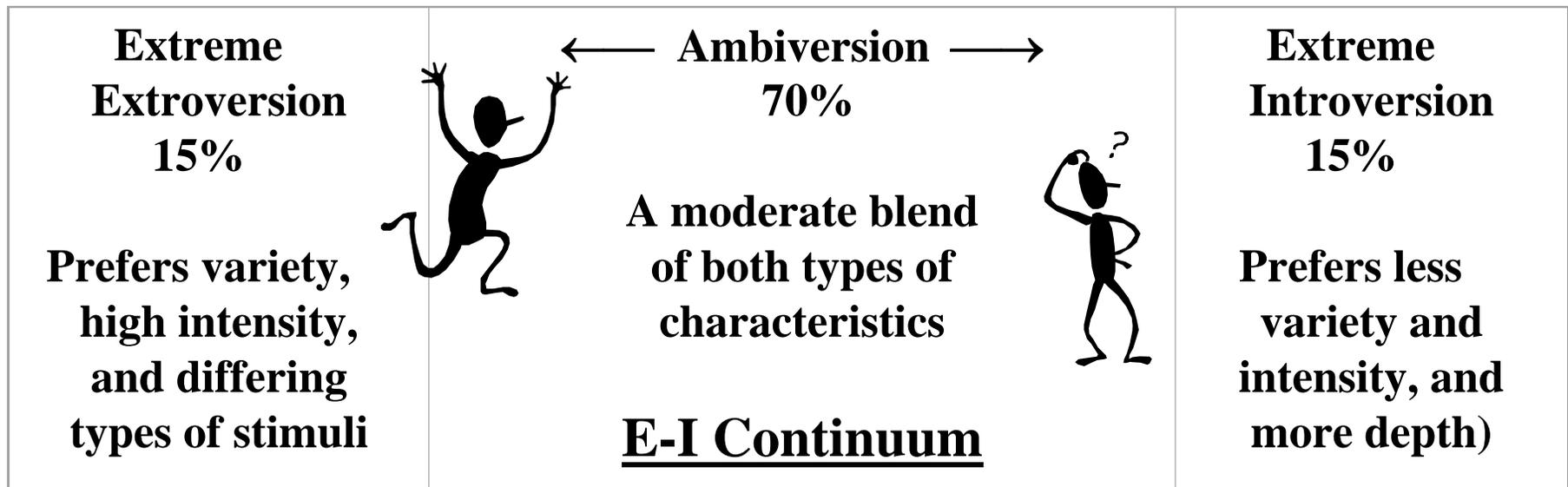
- Can find it difficult to sit quietly, listen, not fidget, and pay attention to ideas especially during auditory presentations (tend to be more visual).
- More likely to be diagnosed hyperactive (e.g., 90%-95% are boys)
- At higher risk for being medicated when activity levels don't match those of a comparable girl

Extroversion Ambiversion Introversion

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Labels refer to the brain's focus – internal or external

❖ And little if anything to do with how much you like people

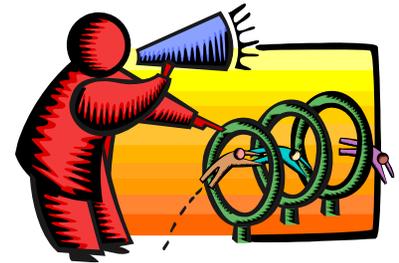


❖ Short-term you can flex along the E-I Continuum in specific situations and environments to some degree and still function – long-term it will cost you in energy and can decrease your effectiveness

Characteristics of Extreme E and I

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- ✓ **Style of energy recharging: (EE – by externals, EI – by internals)**
- ✓ **Approach to experiences: (EE – collecting; EI – pondering)**
- ✓ **Modification of incoming sensory data: (EE – miniaturized, EI – magnified)**
- ✓ **Size of metaphorical aperture: (EE – small, EI – large)**
- ✓ **Norepinephrine levels: (EE – low, EI – high)**
- ✓ **Blood flow pathways and fuel types are different:**



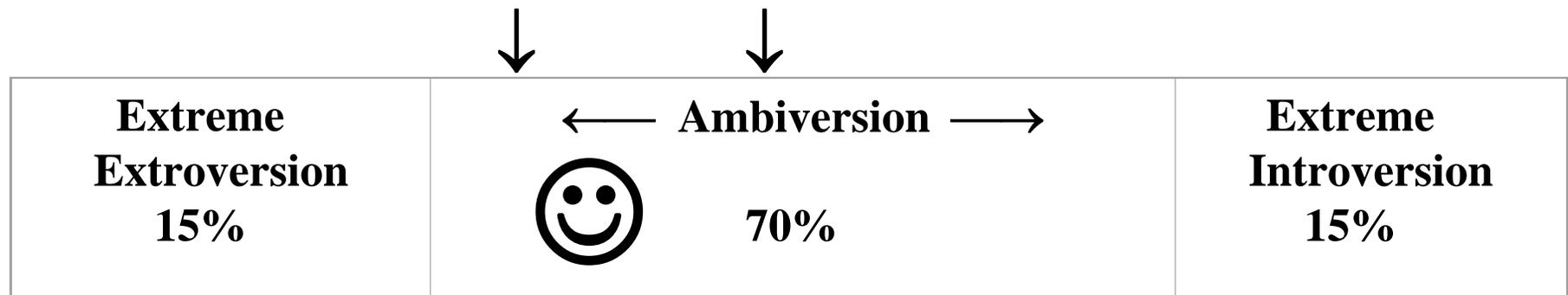
EE – Short, fast-acting, thru novelty/variety/senses. Fueled by dopamine.

EI – Longer, complex, thru pondering/planning. Fueled by acetylcholine.

Education Typically Rewards

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A portion of the ambiversion range



- ❖ **Individuals who do not match societal expectations often try very hard to function in the rewarded zone even when this requires prolonged adaption**
 - **EE - Energy is drained in an under-stimulating environment (bored, restless, delinquent, fall asleep)**
 - **EI - Energy is drained in an over-stimulating environment (tired, withdraw, get sick, become depressed)**

Typically Exhibited Characteristics

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Often form the basis for assumptions and labeling

Extreme Extroverts:

- ✓ Participative
- ✓ Outer directed
- ✓ Party person
- ✓ Debate/argue/compete
- ✓ Roughhouse/fight
- ✓ Often easily bored
- ✓ Perceived or labeled as:



Noisy, restless, manic
Undisciplined
Non-cooperative
ADD, ADHD

Extreme Introverts:

- ✓ Prefer to observe
- ✓ Inner directed
- ✓ Small groups
- ✓ Sit or stand alone
- ✓ Take a walk or nap
- ✓ May feel a “misfit”
- ✓ Perceived or labeled as:



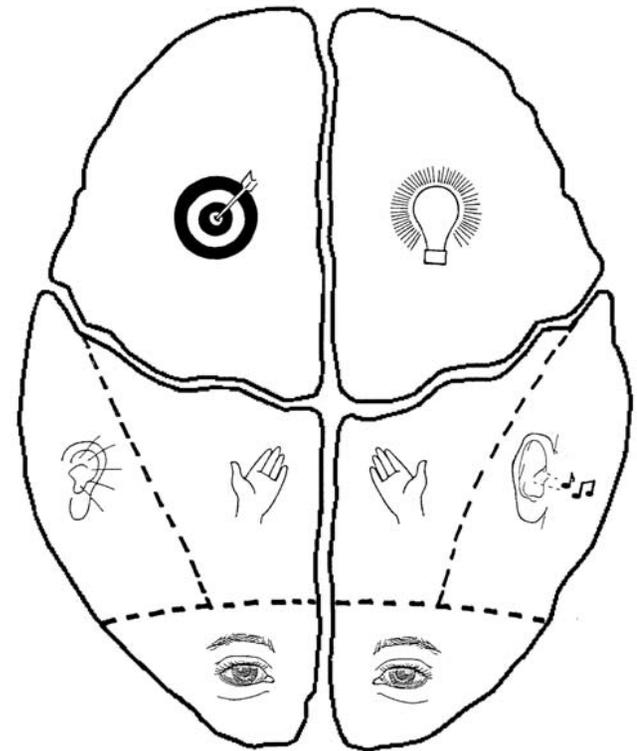
Quiet, loner
Shy, timid, stuck-up
Wallflower, reader
Scaredy-cat

Sensory Preference

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Sensory Preference: the type of sensory stimuli that registers most quickly in one's brain

- ❖ **Early in life human beings tend to use the senses almost equally during this period of extremely rapid learning**
- ❖ **By age 5 or 6 the brain begins to organize toward a sensory preference**
- ❖ **Sensory preference impacts how you prefer to absorb sensory data, the type of data you miss, the way you tend to communicate with other, and how you learn easily**



Estimates of Incidence

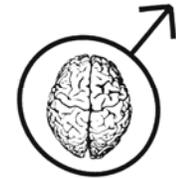
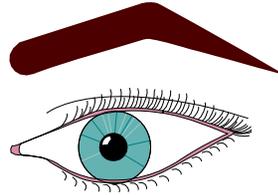
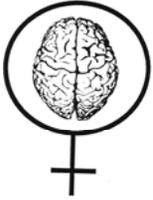
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<p>20% Auditory Preference</p>  <p>✓ More females than males</p>	<p>60% Visual Preference</p>  <p>✓ More males than females</p>	<p>20% Kinesthetic Preference</p>  <p>✓ Equal males and females</p>
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- ❖ **Problems can arise when the learner's sensory preference is a mismatch with the teacher's sensory preference . . .**

M-F Vision Style Differences

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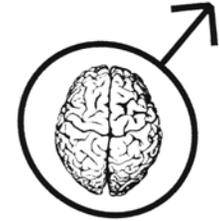
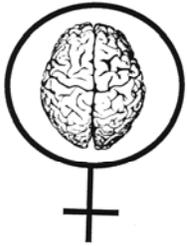


- Females tend to have a short-range, wider, peripheral-vision style
- Females may find it easier to locate specific items in cupboards, drawers, and refrigerators as their vision style takes in more of the immediate environment

- Males tend to have a long-range narrower, tunnel-vision style (e.g., built-in binoculars)
- Males may find it easier to locate items that are a further away (e.g., signs, markers, hunting quarry)

Male-Female Hearing Differences

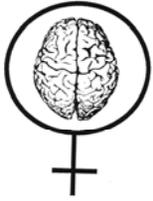
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- ✓ **Females tend to hear better overall**
- ✓ **Eleven-year-old girls are distracted by noise levels that are approximately 10 times softer than the levels that boys find distracting.**

- ✓ **Males tend to have less acute hearing overall**
- ✓ **Hearing differences become more pronounced throughout life**

❖ **Success in reading is impacted by the ability of the brain to process sounds**



Practical Applications

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- ❖ **When communicating with females, minimize extraneous noise and distraction in the environment**
 - ✓ **Speak more softly if you have a loud voice**
- ❖ **When communicating with males, speak up and/or use a microphone**
 - ✓ **Minimize small-group learning situations (males are typically rewarded by their buddies for being disruptive, especially in small groups)**
- ❖ **Based on hearing differences, consider placing boys closer to teacher or moderator**

Thinking Preference

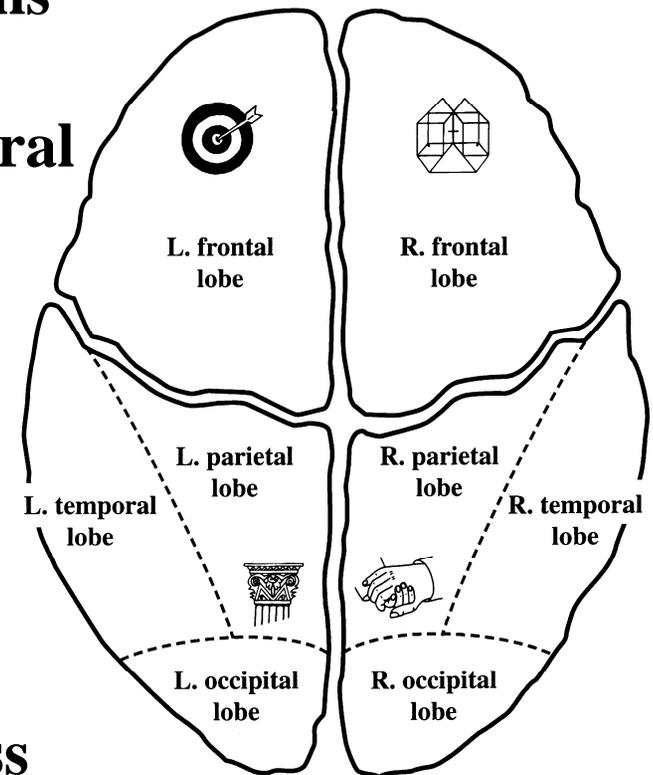
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Known as a *brain lead*, refers to a brain's specific biochemical advantage for processing information

- Based on PET Scan Studies, human brains are thought to possess an innate, stable, energy advantage in one of the four natural cerebral divisions over the other three

- Brain lead is energy efficient and impacts at least:

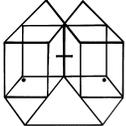
- ✓ Ease of learning
- ✓ Level of competence
- ✓ Ability to sustain high performance
- ✓ Health, longevity, and overall success



Each Cerebral Division has a Purpose

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Functions enable humans to accomplish specific tasks

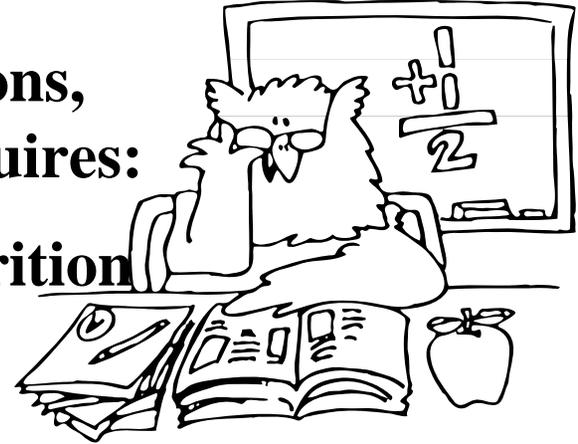
<p>Left Frontal Lobe </p> <ul style="list-style-type: none">■ To set and achieve goals, and make timely and objective decisions	<p>Right Frontal Lobe </p> <ul style="list-style-type: none">● To anticipate and make changes, visualize, and innovate
<p>Left Posterior Lobes </p> <ul style="list-style-type: none">■ To provide and supply or maintain the services that are needed for sustaining life	<p>Right Posterior Lobes</p> <ul style="list-style-type: none">● To build trust, harmony, connection, and peaceful foundations 

PET Scans Have Shown

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❖ **When performing non-preferred functions, the brain expends more energy and requires:**

- **More oxygen, glucose, and micronutrition**
- **A longer rest time to recover**



❖ **The difference in energy expended may be pennies on the dollar (monetary metaphor):**

- **1¢ per second versus \$1 per second -- and that's after the skills have been developed**
- **Based on brain lead, the brain will tend to excel at some tasks energy-efficient expenditure), and procrastinate or struggle with others (energy-intensive expenditures)**

Orchestra Metaphor

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Think of the brain as an orchestra in which you are the soloist

- ✓ You have the ability to play many different instruments
- ✓ The sound at any given moment reflects the solo instrument
- ✓ All instruments are equal in value, but some require less energy for you to play
- ✓ Your success and your fatigue at the end of a selection depends on the amount of time you played and whether or not the instrument was a good match with what your brain does energy efficiently



Nothing in Life is Free

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- ❖ You always give up something to get something – and the bottom-line unit of exchange is energy
- ❖ Knowing the way in which your brain functions most energy-efficiently can enable you to make pro-active choices about the types of tasks you undertake and the amount of time you devote to them
- ❖ Train yourself to become of aware of your relative energy expenditures and to ask:
 - ✓ How much is this *something* going to cost me in energy?
 - ✓ Do I want it badly enough to give up that much energy?



Brain Energy Drain

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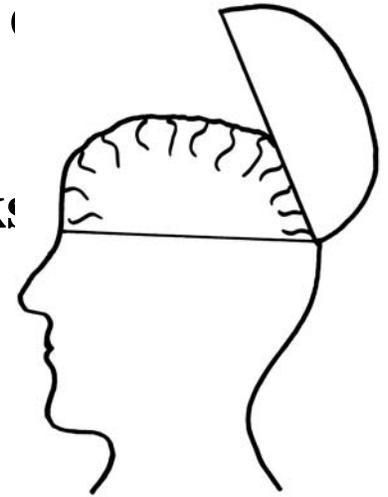


- ❖ **Can negatively impact your health, longevity, and long-term success**
- ❖ **Estimates are that human beings can shorten their lifespan from 14-25 years when they spend large amounts of time on tasks that are a mismatch with what their brain does energy-efficiently**
- ❖ **Human beings are more likely to be happy, healthy, and successful long term when there is a match between what the brain does energy-efficiently and a majority (e.g., at least 51%) of their life's activities.**

Train up a Child in the Way . . .

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- ❖ **One purpose of education is to develop skills in all four divisions of the cerebrum**
 - ✓ **Some subjects will require higher levels of energy expenditure, other less**
 - ✓ **Minimize brain drain by sandwiching tasks that require more energy between those that are energy efficient**
 - ✓ **Reward EFFORT as well as OUTCOME**
- ❖ **For the long term, assist learners in selecting a career that is a match with their brain's innate advantage – where the key tasks involve energy-efficient brain functions**

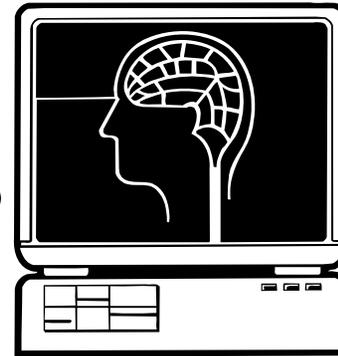


Learning by Design Requires

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❖ **An understanding of brain-function components that impact learning, including:**

- ✓ **Gender Brain differences**
- ✓ **Extroversion-Introversion ratio**
- ✓ **Sensory Preference**
- ✓ **Thinking Process Style**

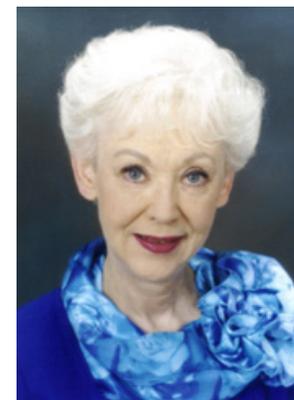


❖ **Along with a willingness to brainstorm ways to address each component in practical application, and a commitment to identify (insofar as possible) and honor each unique brain**

- ✓ **Example is the most memorable of teachers!**

Speaker Information

If you ask Arlene Taylor what she does in life that absolutely energizes her, she will likely reply, “I’m a brain-function specialist and I help people thrive!” She incorporates cutting-edge brain-function research into her empowering seminars, highlighting strategies that, when practically applied, can help people be more successful—by design.



A recipient of the American Medal of Honor for Brain-Function Education (American Biographical Institute Inc, 2002), Taylor holds earned doctorates in Health and Human Services and in Clinical Pastoral Counseling. In 1989 the Loma Linda University Nursing Alumni Association selected Taylor as Alumna of the year. She has life membership in the *National Registry of Who's Who*, 2000 edition. A member of the *National Speakers Association*, Taylor is listed with the *Professional Speakers Bureau International*.

Access her web site (www.arlenetaylor.org) for descriptions of seminars, *Taylor-on-the-Brain Bulletins*, *SynapSez®* newsletter, Selected Brain Facts, Frequently Asked Questions, lecture schedules, and more.

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