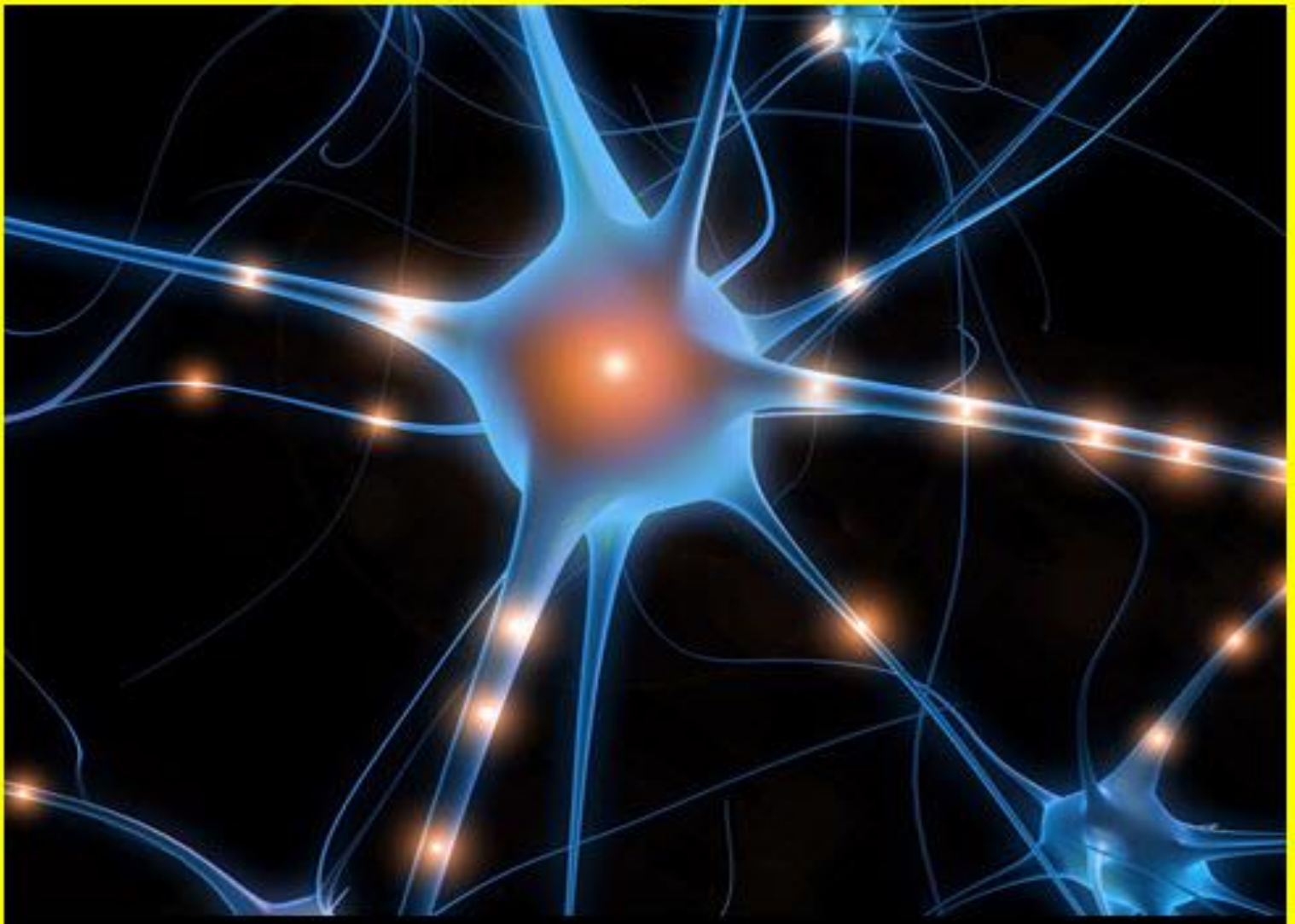


CHAPTER 1

Brain Research & Learning

CHAPTER 1: Brain Research and Learning

Our primary goal as teachers is to help children learn. This seems like such a simple concept, but it really can cause a great deal of controversy. There are so many methods to choose from and everyone seems to have an opinion about which design is best. One way to merge the different methods is to find their common foundation, and that foundation is the science of learning. To state it simply, the goal of each and every curriculum model is to help children put information into memory and to be able to retrieve it at a later time in a useable form. This is the one piece that is consistent in every curriculum model. In light of this, we will begin our construction of a universal teaching framework from a neurological understanding of how this memory is formed.

Making a Memory

So, exactly how does the brain form memory? Well, there are some basic concepts that can be simply understood. Let's start at the beginning…

The Process of Engram (Memory) Development

Learning is the process of gathering new information, but it does not happen automatically. There is a great deal of information that will pass the child by and never be noticed or learned. The key to forming a memory is repetition and perceived importance. If a stimulus is not perceived as important, the brain will just dump it out.

TRY IT!

Close your eyes and sit very quietly for a minute or two. Allow yourself to feel and hear all the information that your brain is ignoring. Feel the air move around you. Feel the seams of your socks, the clothing on your back and the chair under your legs. Listen for the sounds that were passing you by unnoticed….

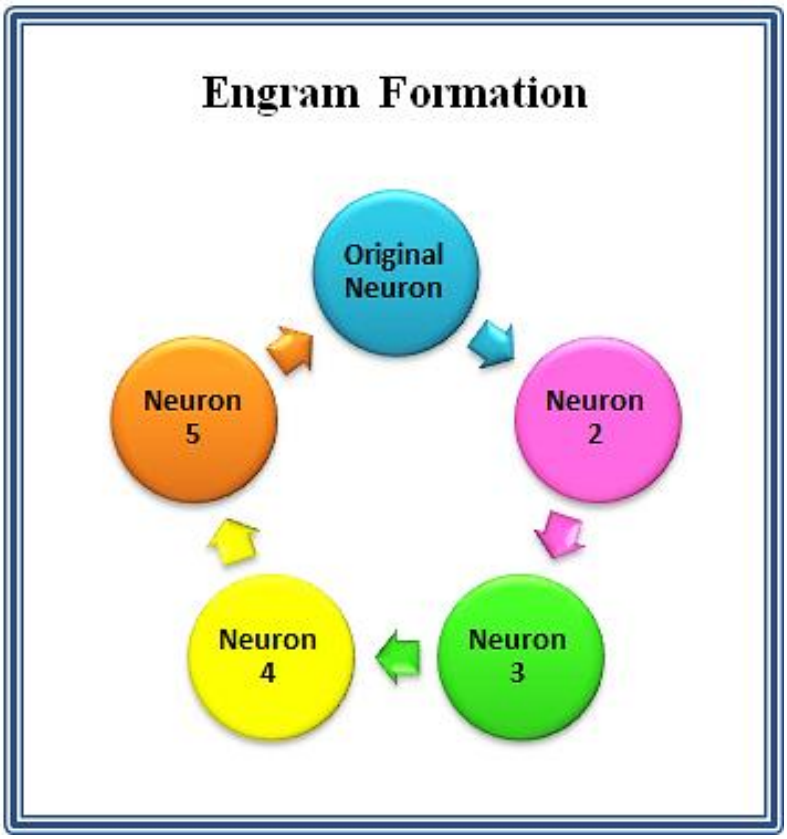
When you open your eyes, think about all the sensory information your brain automatically filters out!

As we experienced, there is a great deal of information our brains just allow to pass by without using. Thank goodness! Imagine paying attention to every little stimulus that surrounds us. The sensory register is responsible for making these decisions. It not only decides what is important but when it is important as well. That is why the sound of movement doesn't gain our notice when we are among friends in the afternoon, but hear that same sound when alone in the dark at 3 a.m. and the brain will definitely pay attention. Our brain knows intuitively that the situation has changed and there is now a need for our attention.

Another way for information to get through the sensory register is when it is repeated. When a stimulus happens again and again, the child's brain marks it as important and will begin to pay attention to it in a different way. The same thing will happen if the new information is somehow linked to something the child has learned before. If that connection is made, the brain will also mark it as important and will begin to manage it in a way that may lead to a memory.

So, we now know that information has to move past the sensory register for our brain to pay attention to it. If the stimulus happens repeatedly or is linked to prior learning, the brain can then

mark it as being of interest, thus giving the brain a chance to form a memory. But, how does that memory actually form? To put it simply, when a neuron is stimulated, it will begin to fire which activates other neurons around it. This repeated stimulation of the neighboring neurons causes them to fire in tandem with the first neuron. As this continues, the neurons become more and more sensitive to the stimulation and more nearby neurons are affected until a full circle of neurons is firing together. This circle of neurons links to form a memory and is known as an engram.



Once an engram or memory begins to form, it will have different levels of strength and duration. Some memories are rather weak and will last only moments if not reinforced. These short term "immediate" memories fade after only 30 seconds. Other memories are stronger and may linger for minutes at a time. These "working" memories, though, will still fade if not reinforced and used. In very young children, these memories can fade in five minutes or less. Or goal is to

reinforce a memory enough that it passes into long term memory storage. This will allow the child to retrieve and use the memory over a long period of time.

The Difference between Implicit and Explicit Memories

Memories, once developed, take two different forms. The first form of memory is called non-declarative or implicit. This form of memory involves all of the unconscious procedures, motor skills and emotions that we recall without really thinking about them. The second form of memory is declarative or explicit. This form of memory is conscious. It involves information we can recall and examine at will such as memories from our own lives and other facts and concepts we have learned. These two forms of memory can sometimes be confused, so here is a simple way to keep the two terms straight.

Declarative vs.// Non-Declarative Memories

Declarative or **Ex**plicit Memory

*If we **Declare** our love to someone it:*

…is said out loud to everyone around us

…it **ex**its out of us

…..Everyone is **conscious** of it

Non-Declarative or **Im**plicit Memory

*If our love is **Non-Declared** to someone it:*

…it is never mentioned to anyone

…it remains **in**side us

…..no one knows about it; they are **unconscious** of it

Knowing the difference between declarative and non-declarative memories really helps us understand how to teach various skills. For example, a dancer must develop non-declarative or implicit, internal memories for many different dance steps. Until these memories are well formed and working perfectly in the subconscious, the dancer cannot free up the brain enough to use declarative or conscious information. They are not able to interpret music, problem-solve an unexpected change in stage position, etc. The same process occurs for any skill that involves both an unconscious motor pattern and a conscious application of the skill. This is why learning to drive was such a task for us. We were so busy trying to remember which peddle worked the gas; our brain could not deal with other little items such as road signs! It was not until the motor patterns of driving became automatic that we could free up our brain enough to manage other tasks like looking at a map or talking to a friend without compromising our driving ability.

This same difficulty can be seen in the children in our classroom. If the child's brain never developed a strong implicit or non-declarative memory for the mechanics of writing, the brain will have difficulty retrieving memory of facts at the same time. That is why some children seem to know so much information verbally but when given a handwritten test, suddenly lose those facts and do poorly. That has great implications for how we need to teach skills that must become automatic or implicit and will be discussed in length in future chapters.

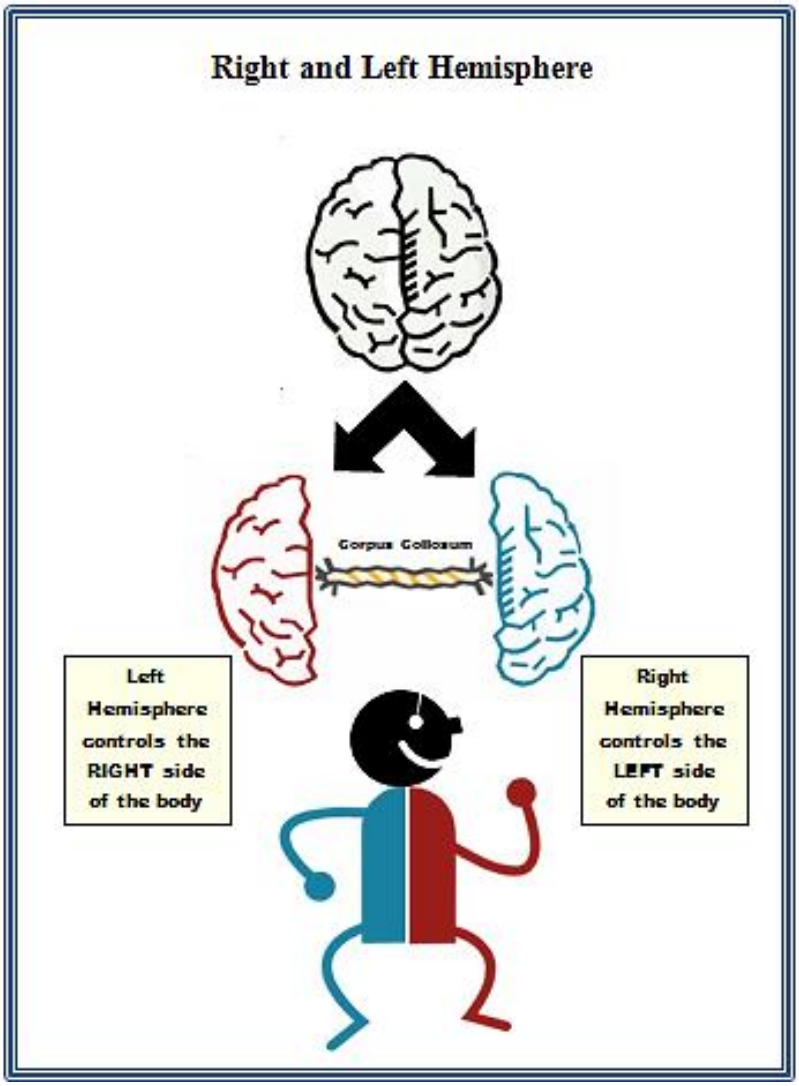
Individual Differences

Now that we have a good sense of how simple memories are formed, it should be fairly easy to apply this information to teaching, correct? But, like all aspects of working with children, it rarely is that simple. We always need to take the individual differences into account when we teach, and the memory process is no different. There are many individual tendencies that can

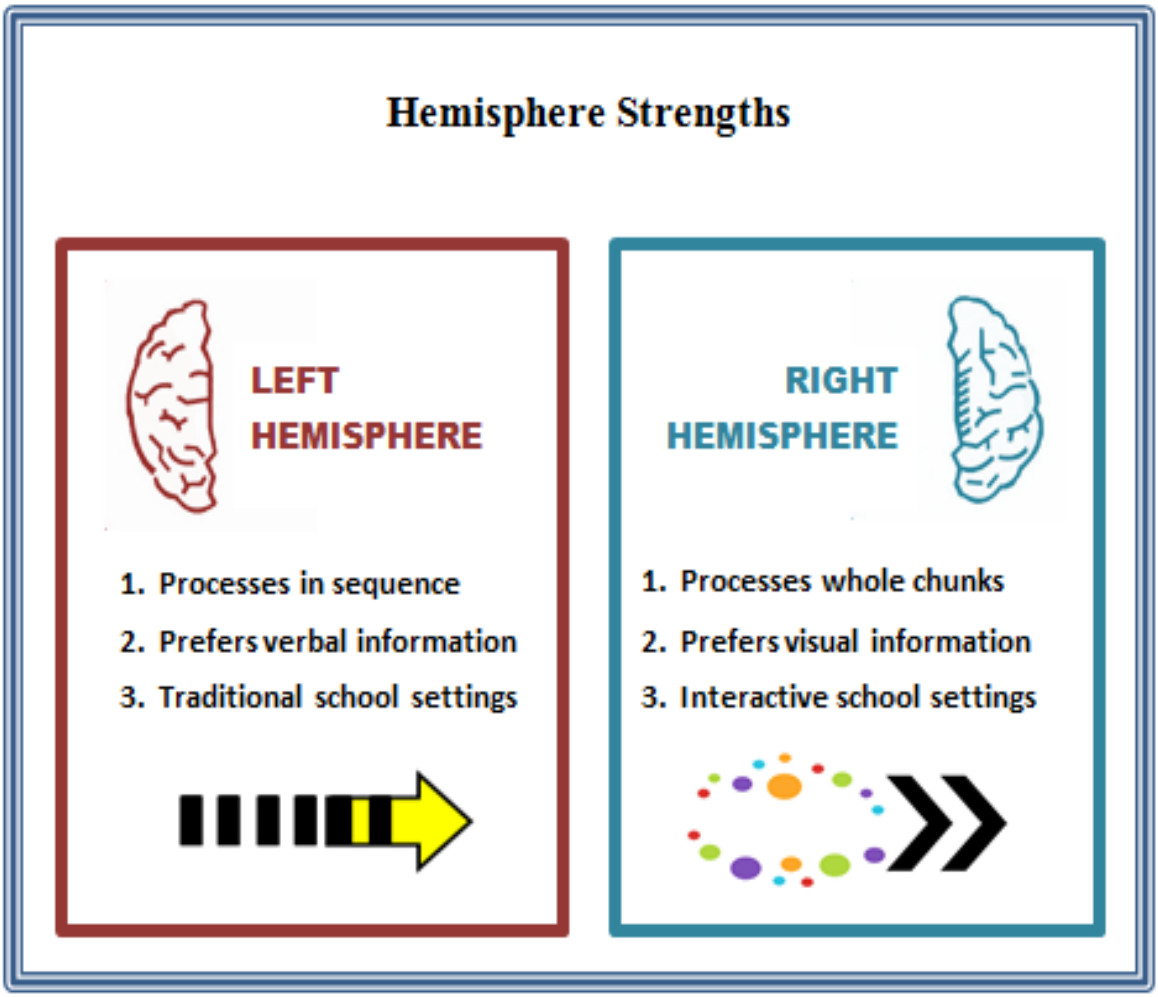
help or hinder the formation of a memory, and it is best to have a good handle on them before we proceed any further. Let's begin with the most basic difference, hemisphere strength.

The Influence of Hemisphere Strength

Most teachers have at least casual awareness of terms such as "left brain" and "right brain", but what do these really mean? Well, a small bit of brain anatomy before we describe the process. The brain is formed in two roughly even halves. The right side of the brain, or the right hemisphere, controls the left side of the body. The left side, or hemisphere, controls the right side. The two sides of the brain "talk" with each other through the corpus collosum, a bundle of nerves that connects the two sides.



The two hemispheres or sides of the brain are not only structured a bit differently from each other, but they also operate in very different ways as well. The left hemisphere tends to process information in a very sequential and systematic way. It processes verbal information best and works well in a traditional, formal learning environment. The right hemisphere is the exact opposite; it processes information in whole chunks and often makes connections before it fully processes the stimulus coming in. It tends to deal with images much better than it does words and functions well in integrated or center-based learning environments. These tendencies are how we ended up with the term "left-brained" and "right-brained" in our teaching vocabulary. They describe the overall learning patterns we see based on hemisphere strength.



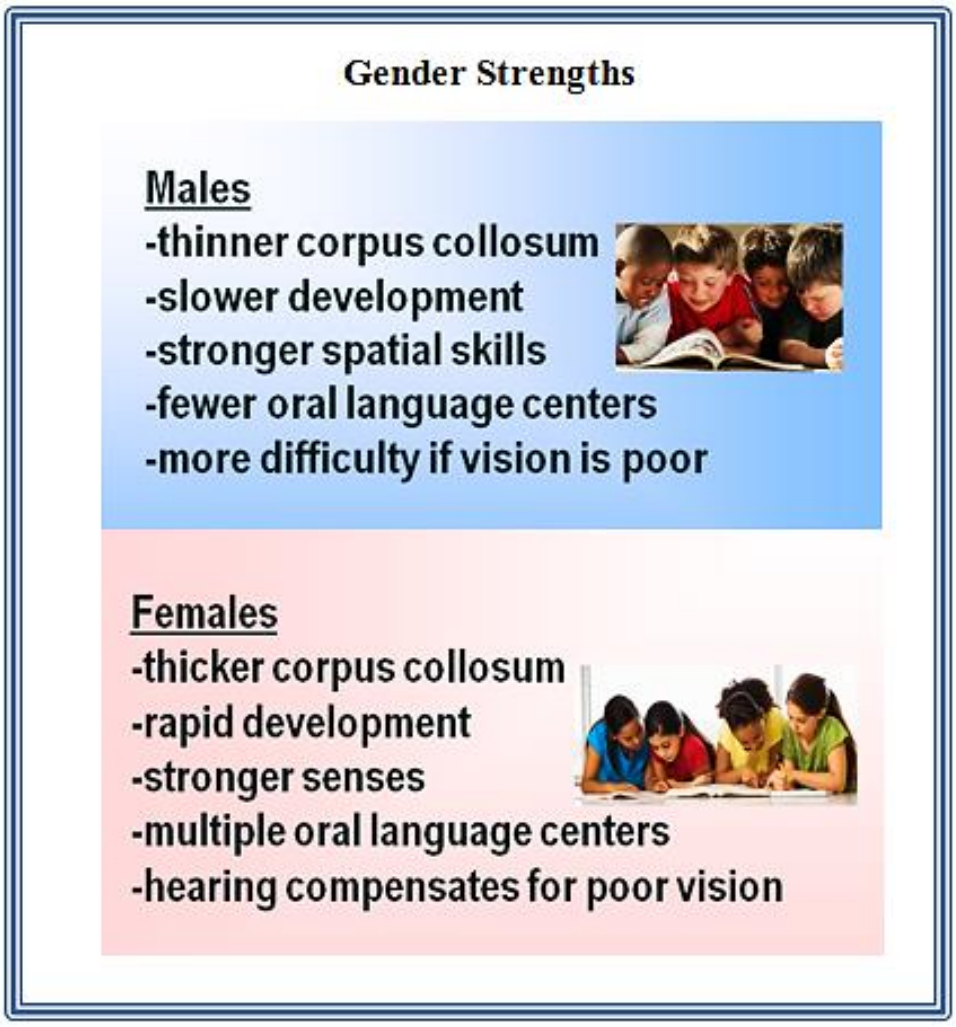
Even though professionals have a fairly good understanding of the different hemispheres and their strengths, it is information that must be used with care. For example, since most people are right-handed and the left hemisphere controls that side of our body, we would expect that most of us would be left-brained, but that is not the case. Hemisphere strength gives us tendencies only. We can use the information in our teaching, but it is also very easy to overuse it as well. So, for our purposes we should note these differences since they can give us insight into a child's learning pattern, but the information should never be counted on as an absolute. We will discuss this topic a bit more when we look at teaching and learning styles in chapter three.

The Influence of Gender

Like hemisphere strength, gender can also suggest information about a child's learning style but can be misused if over-applied. There is just too much diversity in individual learners to hold to any tendency with rigidity. That said, there are some interesting statistical differences between girl and boy learners that are worth knowing.

A great deal of the difference in how the brain functions in females versus males comes from the structure of the brain itself. For example, the corpus collosum, the nerve bundle that connects the two hemispheres, develops more quickly and is much bigger in females than it is males (*). This means that females have hemispheres that "talk" with each other much more than males, something that gives them a slight edge in reading and writing tasks. This is why young girls seem to learn these skills easier than boys.

Other interesting differences in the genders can be seen in the relative strengths and weaknesses of each group. The differences stem from the fact that the male and female brain vary in the size, number and strength of many anatomical features (*). The following figure outlines some of the general differences we tend to see in the male and female brain.



Needless to say, such differences have great impact on what we see in the classroom on a daily basis. Like mentioned earlier, we will see individual boys and girls that will vary from these profiles, but overall, there are general gender differences we must take into account in our curriculum design.

Defining Individual Memory Styles

So, let's recap for a moment before proceeding. After all, we now know that repetition is one of the best ways to get information into long-term memory!

Information comes into the brain, and if it makes it through the sensory register, our brain can begin to form an engram or memory. If the information has importance or is repeated, we the

memory can become so strong that it will last over time. The process of how the brain interacts with this information, though, is somewhat dependent on which hemisphere we prefer using. Those of us who are left-brained will find sequential, verbal information much easier to process. As long as the information is ordered in this way, we can construct memories easily. On the other hand, those of us who are right-brained will form memories much easier if the information is highly visual and interactive. That is our preferred learning mode. To complicate the memory process a bit more, we have gender variations. Females will tend to process and form memories across hemispheres while males are much stronger within a single hemisphere, due to the structure of their corpus collosum.

Once we have all these differences firmly in hand, what we end up with is a learning profile of an individual child. Some children will be Verbal Learners. They will respond well to oral directions, seem to listen and understand information from their peers and often are highly verbal themselves. They tend to do quite well in a typical classroom. Other children will be Visual Learners. The do much better when shown information instead of just hearing about it. They not only process verbal information at a lower level, but they themselves may think in pictures. Take a moment and process that piece of information using the exercise on the following page….

TRY IT!

Close your eyes and think about some of the activities you plan on doing this next weekend. Construct as complete of a list as possible. When finished, open your eyes and continue reading these directions.

* *

Now reflect on how you guided yourself while constructing your mental list. Did you "talk" to yourself silently and verbally list what you needed to do, or did you visualize and see pictures of each activity instead?

One you have a sense of how YOU process, try reversing it to the other style. If you were talking silently to yourself, try just thinking in pictures with no words at all. If you visualized pictures, try talking silently to yourself instead.

How did you do with this reversal?

As we can see, it can be a bit difficult to change our processing style. Matter of fact, for people who think in words, it can be almost impossible to imagine what it must be like to think only in pictures. Yet, this type of thinking is not only present in our classroom; it has been well documented in some very famous people. Just take a look at this quote from one of our most premiere thinkers, Albert Einstein:

> *"The words of the language, as they are written or spoken, do not seem to play any role in my mechanisms of thought. The physical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be voluntarily combined."*

In other words, Einstein thought in pictures rather than words. This need to think visually has very serious implications for the classroom, but before we tackle that topic, we need to note a third form of learner first, the Kinesthetic or Physical Learner. This child processes through physical action. These students will pay some attention to verbal or visual cues, but they may

not form strong memories or have true understanding until they physically interact with the information in some manner.

To summarize, then, our students will form memories or engrams based on their hemisphere and gender strengths. This resulting **Learning Style** will remain fairly consistent throughout the child's life but may vary slightly based on the task at hand. The three Learning Styles are as follows:

1. Verbal Learner- learns through oral information
2. Visual Learner- learns through visual information
3. Physical Learner- learns through physical interaction

So, which type of learner are you? Trying the following activity and find out…

> ***TRY IT!***
>
> Imagine you are learning a completely new task. For example, imagine you are learning to crochet, wiring an electric light or weaving on a loom. What help would you need to learn this skill?
>
> 1. Step-by-step oral instructions (you are a Verbal Learner)
> 2. Pictures…preferably color coded and sequenced (you are a Visual Learner)
> 3. Someone guiding you hand-over-hand (you are a Physical Learner)

As we can see, when faced with a new skill to master, our learning style can clearly be seen. It is important to note that this tendency is strongest when learning something unfamiliar. In the

normal classroom, we will have children with a variety of Learning Styles. Because of this diversity, the safest way to meet all of these individual needs is to make sure that we teach in all three modes at all times. How intensely each style must be stressed, though, will vary from year to year and can actually be determined in those first days of teaching. In Chapter ten, we will take a look at some quick methods that can be used to analyze the individual and group learning styles in our classroom.

How Learning Styles Impact Education

At this point we are beginning to realize that we have a classroom of individual learners who show a variety of pathways as they construct memory. I am sure this is not a surprise to most teachers. What may be a surprise, though, is how this information impacts our overall learning environment. This is the type of topic that will be infused throughout the rest of the curriculum, so we will illustrate just a couple of examples now to get us thinking in this manner. Further examples will then be found throughout the rest of the book. Let's start with a strong Verbal Learner.

The Verbal Learner

1. Learns easily from oral information
2. May not understand visual tasks that are teacher-demonstrated such as science experiments, art activities, gym activities and other hands-on activities if they are not verbally explained well.
3. The child will typically learn to spell words by saying them letter by letter to themselves or out loud.

The Visual Learner

1. Learns easily from visual information
2. May not understand verbal information such as directions for activities and worksheets unless they are demonstrated at the same time. Will often have problems with skills that we tend to teach verbally, especially behavior.
3. The child will typically learn to spell words by visualizing the overall form of the spelling word or creating a related picture or story out of the letter sequence.

The Physical Learner

1. Learns easily from physically interacting with information
2. May not understand understand information that is not physical in nature. This includes social skills, science information that is only demonstrated, history and other concepts that are not able to be immediately handled.
3. The child will typically learn to spell words by writing or constructing them with letter blocks repeatedly.

Obviously these differences can be a challenge to manage in one classroom, but the reality is we must manage them if we are to see progress in ALL children. Once a teacher understands the three Learning Styles, though, a handful of simple tricks will allow us to start hitting all modes of learning within a single lesson. We will learn these tricks later as we beginning using the neurological information we have discussed, but before we move on to those concrete techniques, we need to expand our understanding of these Learning Styles a bit more. Being able to construct the neurological sequences fully will be the foundation of the teaching techniques we will eventually learn.

The Neurological Cue Sequence

The Neurological Cue Sequence supports the three Learning Styles we now know. It helps us to expand and see what techniques to use for each type of learner. It is probably the most important piece of information I can give you in this chapter and well worth the time needed to learn it completely. In order for it to be used well, I suggest memorizing it in full or posting it somewhere in your room. A handy chart is provided in the Appendix A for you to use.

Overview of the Complete Cue Sequence

The Neurological Cue Sequence is broken into four segments. The segments are as follows:

1. **Cognitive Cues**: We do not need to help this child
2. **Verbal Cues:** We help the child verbally
3. **Visual Cues** We help the child by showing visual information
4. **Physical Cues** We help the child by having them interact with visual information

Cognitive Cues do not really align with any of the Learning Types we have discussed previously because children who are using Cognitive Cues simply do not need us. They learn easily on their own. Yes, they use our materials, watch our actions and listen to what we have to say, but they rarely need much guidance or specific help from us to learn. Matter of fact, if we are absent, they probably will end up assisting the substitute teacher manage the day! Most children will develop Cognitive Cues independently, but there are times when we may need to encourage their construction. For example, if a child is forgetting to hang up their coat, we can ask the child to come up with ways to remember and then allow them to construct their own cue. If we go beyond this simple suggestion and provide the cue itself, we have moved out of the Cognitive level and into another part of the Cue Sequence.

Verbal Cues

Verbal Cues are easy to understand because they serve as the primary mode of teaching. We use a Verbal Cue to assist children whenever we speak to them. There is a bit more to Verbal Cues, though, than meets the eye. Here is the full Verbal Cue Sequence with an example of each level. The situation for the example is a child needing to clean up their play area before they leave it:

VERBAL CUES:

1. **Question Level**- Teacher asks a question and provides no information.

   Example
   "You're done playing. What are you going to do now?"

2. **Prompt Level**- Teacher makes a casual statement that suggests the child needs to remember something on their own.

   Example
   "You're done playing, and when we finish playing we always….."

3. **Remind Level**- Teacher reminds the child in a conversational manner.

   Example
   "You're done playing. When we are done playing we always clean up, don't we!"

4. **Tell Level**- The child is given a formal direction that directly tells them what they need to do.

   Example
   "You're done playing. You need to clean up now."

As we can see, the differences between the Question, Prompt, Remind and Tell level of the Verbal Cue sequence is very subtle and may mean little to most children. Regardless of which Verbal Cue we use, they will respond appropriately. With some children, however, the change in language is very important and can really make a difference in behavior. This is especially seen in children who need the Tell Level of Verbal Cues. If we give these children something other than a direct command, they simply will not listen. Many beginning teachers struggle with the difference between the various Verbal Cue Levels. They ask questions when they really do not mean to give children choices, a common mistake that we are now aware of and can easily correct.

Visual Cues

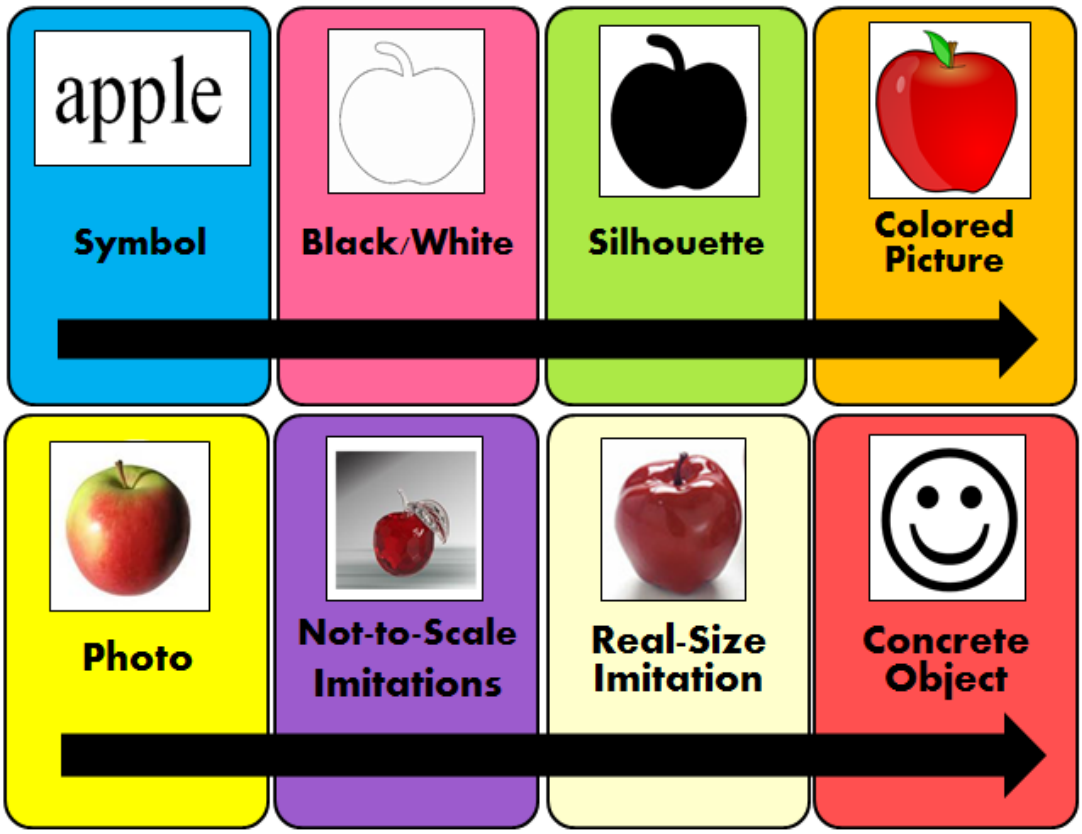
The Neurological Cue Sequence continues to move downward developmentally from Cognitive Cues to Verbal Cues and now Visual Cues. Let's add the Visual Cues to the sequence that we have up to this point:

COGNITIVE CUES:

AUDITORY CUES: Question
Prompt
Remind
Tell

VISUAL CUES: Symbol Level
Black & White Line Level
Silhouette Level
Colored Picture Level
Photo Level
Miniature Level
Real-Size Imitation Level
Concrete Object Level

Visual Cues are best understood by seeing them visually. The Visual Cue sequence is below.



It is easy to look at this figure and not fully appreciate how deeply embedded the Visual Cue Sequence is in our daily lives. Just think about something as simple as typing a paper and how we adjust our typing to make items stand out.

If we are typing something normal, we use the regular font---- *We use the Symbol Level*.

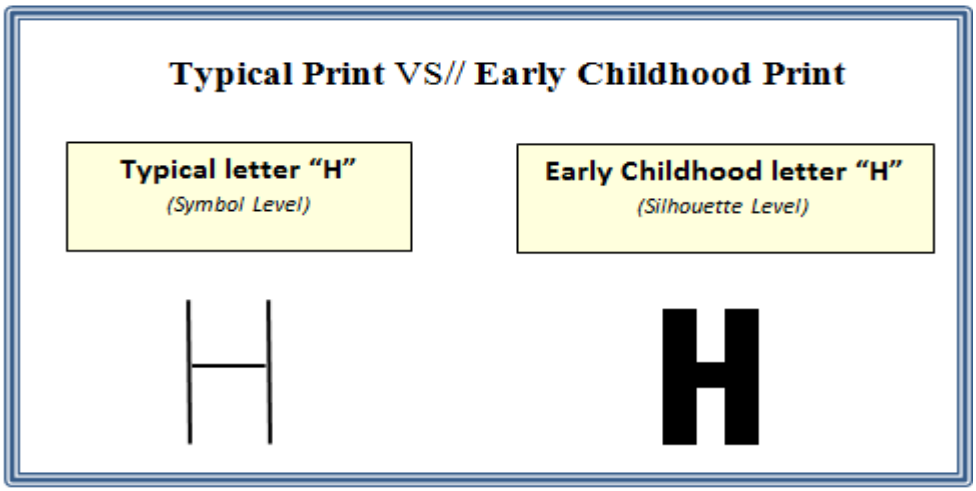
If we wish to emphasize it a bit, we underline it----- *We use the Black & White Line Level*.

If we want it to stand out more, we put it in bold----- *We use the Silhouette Level.*

If we want it to jump out, we put it in color---- *We use the Colored Picture Level.*

So, when we type and want to emphasize something in our text, we simply work our way down the Visual Cue Sequence.

We see the same use of the Visual Cue Sequence in the typical early childhood classroom. For example, if we think about print for young children, we will notice that the letters that we use are enlarged, three-dimensional and filled in. We are using the Silhouette Level of the letter instead of the Symbol Level.



We are not sure why the Silhouette Level is processed more quickly and held in memory better, but it truly does work. This is why over the years teachers have come to use it in early childhood materials. It is also why road signs tend to be silhouettes. We just are able to see and process silhouettes at a superior level.

Luckily most children can move easily from one level of the Visual Cue Sequence to another. In other words, we do not need to start teaching a concept like money and work through every single Visual Cue level one by one for the typical learner. If a child is having difficulty with a concept or has special needs related to learning, though, the difference between visual cue levels can be immense. Just look at this example of a puzzle back cued at the Symbol (indented spaces for each piece), Black & White Line and Silhouette Levels.

Puzzle Back Cued at the Symbol, Black & White Line and Silhouette Levels

An amazingly powerful visual difference, isn't it? We will explore the power of the Visual Cue Sequence much more in the chapters to come. It is not only the key to learning; it is the key to intervention and behavior assistance. Definitely a technique to learn well!

The last piece to the Visual Cue Sequence is the placement of music and moving visual media (i.e. television, computer, etc.). These two pieces do not seem to fit in well anywhere on the Neurological Cue Sequence. Music is auditory, so many put it with the Verbal Cues, but since music has a greater memory power than mere words, others place it with the Visual Cues. We run into the same difficulty with visual media. Because it is picture-based we would expect it to be placed with the Visual Cues, but it seems to have more impact that a regular picture or object, something closer to Physical Cues. So, for our purposes, we will just place these two items off to the side rather than place them in the regular cue sequence. They are such powerful memory aides that they deserve to be highlighted and will be used a great deal as we move forward in constructing our framework.

Physical Cues

We have now reached the point of having the full Neurological Cue Sequence before us. Let's add in the last piece, the Physical Cues, and see the whole the sequence in its entirety:

COGNITIVE CUES:

AUDITORY CUES: Question
Prompt
Remind
Tell

VISUAL CUES: Symbol Level
Black & White Line Level
Silhouette Level
Colored Picture Level *Music

Photo Level *Media
Miniature Level
Real-Size Imitation Level
Concrete Object Level

PHYSICAL CUES: Physical Prompt
Successive Approximations
Chaining (Backwards & Forwards)
Hand-Over-Hand

Children who require Physical Cues need to be "walked through" tasks to some degree until they are learned. When we use Physical Cues with a child, we are physically guiding the child in some manner. The Physical Cue Sequence is as follows:

PHYSICAL CUES:

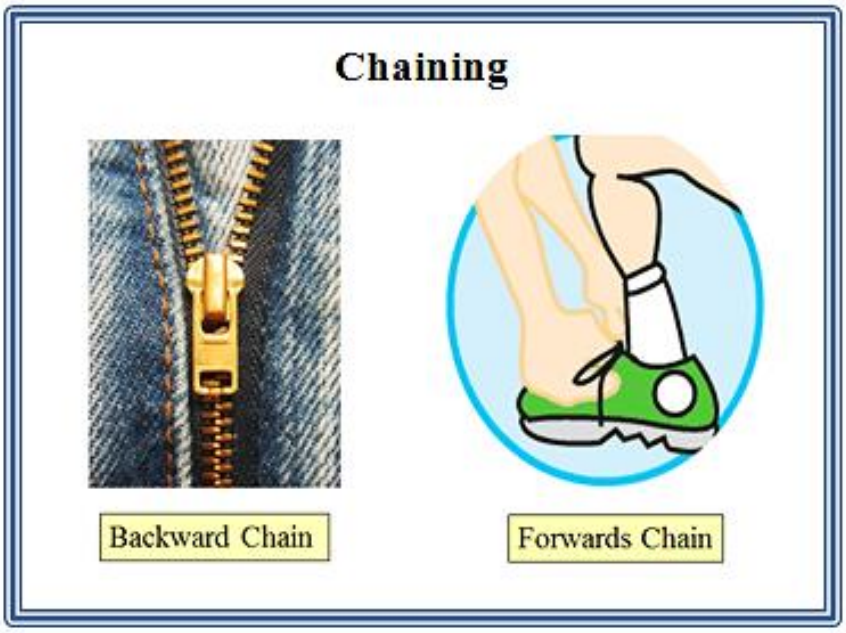
1. **Physical Prompt Level**- The Teacher provides minimal physical nudges to get the child started in a skill

2. **Successive Approximations Level** – The Teacher assist with small levels of physical guidance as needed to increase levels of accuracy.

3. **Chaining Level**- The Teacher directly teaches steps of the skill and fades assistance as the child learns each step. This can be done in two directions, as a forward chain or a backward chain.

4. **Hand-Over-Hand Level**- The teacher provides physical assistance through the total task.

It is clear that the Physical Cue Sequence is fairly straightforward and easy to understand. The two pieces that might be unfamiliar are the chaining techniques, so let's take a moment and review those.



Chaining is a technique where a skill is broken into its sequence of motor steps. Many refer to this breakdown as "task analysis" of a skill. When a skill is task analyzed or broken down, the teacher can then have the child begin with the part of the sequence that is easiest. If the first step of the sequence is the simplest piece, we allow the child to complete that piece and then finish the rest of the steps for the child. Over time, then, we have the child complete more and more of the task on their own. First the child completes only the first step, then the second, and so on working *forward* through the steps until they can do the task independently. We commonly see Forward Chaining in a skill like tying shoes since the first step of tying the laces is the easiest and the last step, the hardest.

With Backward Chaining, the exact opposite occurs. In a skill where the easiest step is the last, we will begin the task for the child and have them finish the last step in the sequence for us. We then work *backwards* over time, allowing the child to do more and more of the <u>end</u> of the task until we finally work our way back to the most difficult part of the sequence, the first step. We see Backwards Chaining in a task like zipping a coat. The most difficult part of zipping a coat is getting the two halves of the zipper meshed together in the first step. The

easiest part is the last step, zipping the final couple of inches. This is why Backwards Chaining is used for this skill. We have the child do more and more of the zipping until they finally work themselves back to tackling the most difficult part of the task, the first step.

We now have the full Neurological Cue Sequence at our disposal. As mentioned earlier, it will prove to be a powerful tool to use in our classrooms. As we worked our way through that sequence, we began to understand the different ways we provide instruction. At first, we can use Verbal Cues and instruct with our words. A bit easier is teaching visually with pictures and objects. At the very bottom and easiest for many children is teaching physically by directly interacting and guiding children. Understanding the Neurological Cue Sequence gives us the STYLE of learning a child needs and leads us to the last topic in this chapter, the manner in which an individual child must be taught---or the HOW to teach. These neurological techniques will bring us full circle back to assisting children learn by constructing a powerful, permanent memory.

The Neurological Teaching Direction

As we have seen so far, the process of helping children construct memory is a very individual one. Each child has a preferred manner of putting down memory based on their hemisphere strengths and gender. This leads to an individual Learning-Cue Style or mode that must be matched to get the best memory put-down. It stands to reason, then, that the order in which we teach skills or HOW they are presented will also differ individually as well. We saw some hints of this in the Physical Cues when we analyzed Forward and Backward Chaining. We will now essentially do the same for teaching in general.

Part-to-Whole versus Whole-to-Part Learning

As adults we have our own learning style. We got a sense of our individual style in the last set of activities. Now we are going to explore the direction of our learning. Take a look at the following activity and see which column matches your preferred Learning Direction.

Learning Direction Quiz

1. If I am giving a party, I tend to do the following:

(A)	(B)
Make a list of what I need. Keep count of who is coming. Organize and plan.	Go shopping and pick up what I need. Hope everyone shows up. Plan little, knowing all will work out fine.

2. If I am learning a new skill, I tend to do the following:

(A)	(B)
Learn it step by step. Need to practice it in little pieces. Read the directions.	Watch and then try to duplicate it. Practice it in chunks or whole sections. Directions? There are directions?

3. If I studying for a class, I tend to do the following:

(A)	(B)
Make notecards. Outline papers and make lists. Color-code and organize info.	Just read the book and notes over. Just start writing. Work from notes I have—no changes.

Do you have more yellow-A's or green-B's?

If you had more yellow, A's marked; your preferred Learning Direction appears to be Part-to-Whole. You like to break information down, organize it into a nice sequence and then learn it step-by-step. If you had more green, B's, you tend to deal with information in large chunks and work backwards to pick up individual skills. You appear to be more Whole-to-Part. In some ways Learning Direction just seems to be a new definition for hemisphere strength, but it really goes much further than that previous topic. Even someone who has a right hemisphere strength may prefer to learn something like drawing step-by-step. The same goes for someone with a left hemisphere strength who is very verbal and sequential. That person may still tend to learn items in whole chunks. So, while hemisphere strength can help us understand a child's general style, it is not the whole picture. Learning Direction really gives us HOW the child learns, and therefore is of great importance.

Another interesting aspect of Learning Direction is how it has been used and misused over the decades. Let's take a quick look at how many former and current teaching techniques can be sorted into the Part-to-Whole and Whole-to-Part categories (see picture to the right):

It is very easy to organize techniques into their categories. If we reflect on the controversy techniques like phonics versus whole language have caused in the past and now filter it through the neurological lens, we can see that the whole argument is somewhat foolish. Each of these approaches represents a different neurological Learning Direction and both MUST be used in every classroom if we are to meet the need of both sets of learners. When we isolate ourselves to a certain Learning Direction, for example only using phonics, a very Part-to-Whole approach, the children who fall into that category will thrive and the ones who do better with an integrated, Whole-to-Part approach will do poorly.

What has happened in the past is we use very isolated approaches that really concentrate on one end of the Learning Direction continuum. Then, when we see the failure of one group of children, we adjust and end up swinging all the way over to the other side of the spectrum, in this case, the Whole-to-Part, Whole Language approach. But, in the process eventually lose the Part-to-Whole children who <u>were</u> doing well. After a while, we notice many children (the Part-to-Whole learners) are not picking up the small pieces of the skill and we reintroduce phonics…and so the cycle begins again. We have gone back and forth across this neurological Learning Direction sequence for centuries. It is my great hope that we come to understand the futility of isolating ourselves at <u>either</u> end of the continuum and learn to teach in a unified manner. That is a topic we will examine intensely as we proceed with our curriculum design.

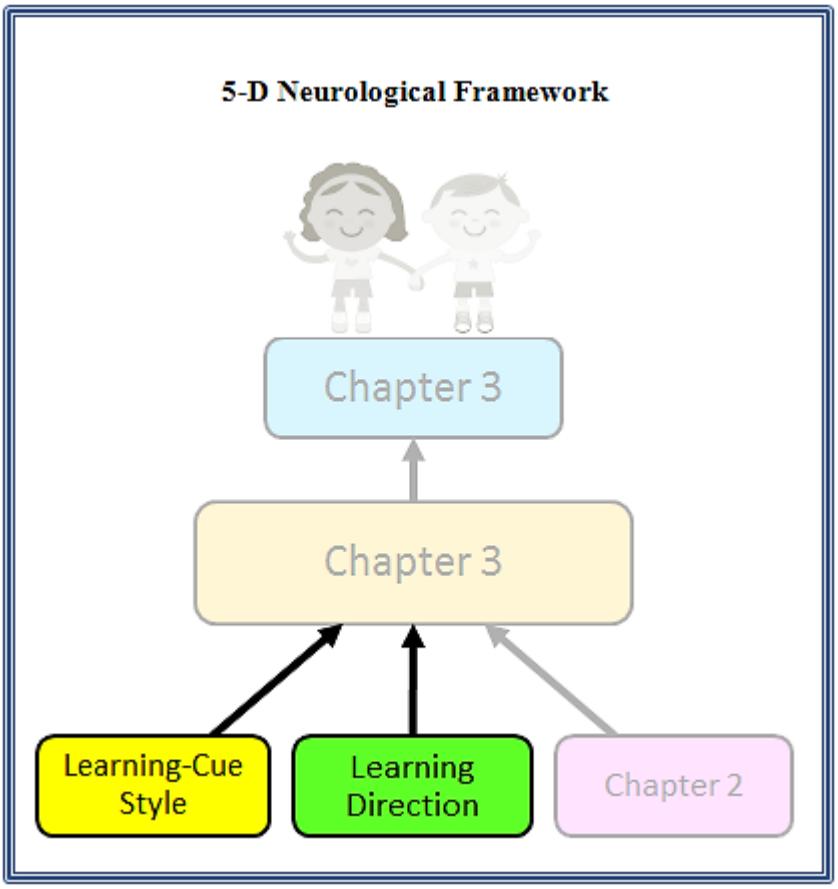
Closing Thoughts

As we have proceeded through this unit, we have had a chance to examine learning and teaching from a neurological perspective. In the process, we have not only come to a better understanding of how to work with children, we have also gained insight into our own Learning

Style and Learning Direction. Knowing this information is very important because we tend to teach how we ourselves learn. This means that we must often make a conscious effort to include the Learning Styles and Directions that we do not tend to use. It seems like a simple task to make this switch, but it is something that really takes some thought, and even planning, at the beginning. Regardless of whether this inclusion comes naturally or must be formally put into lesson plans at first, it is an essential piece to meeting the needs of all learners.

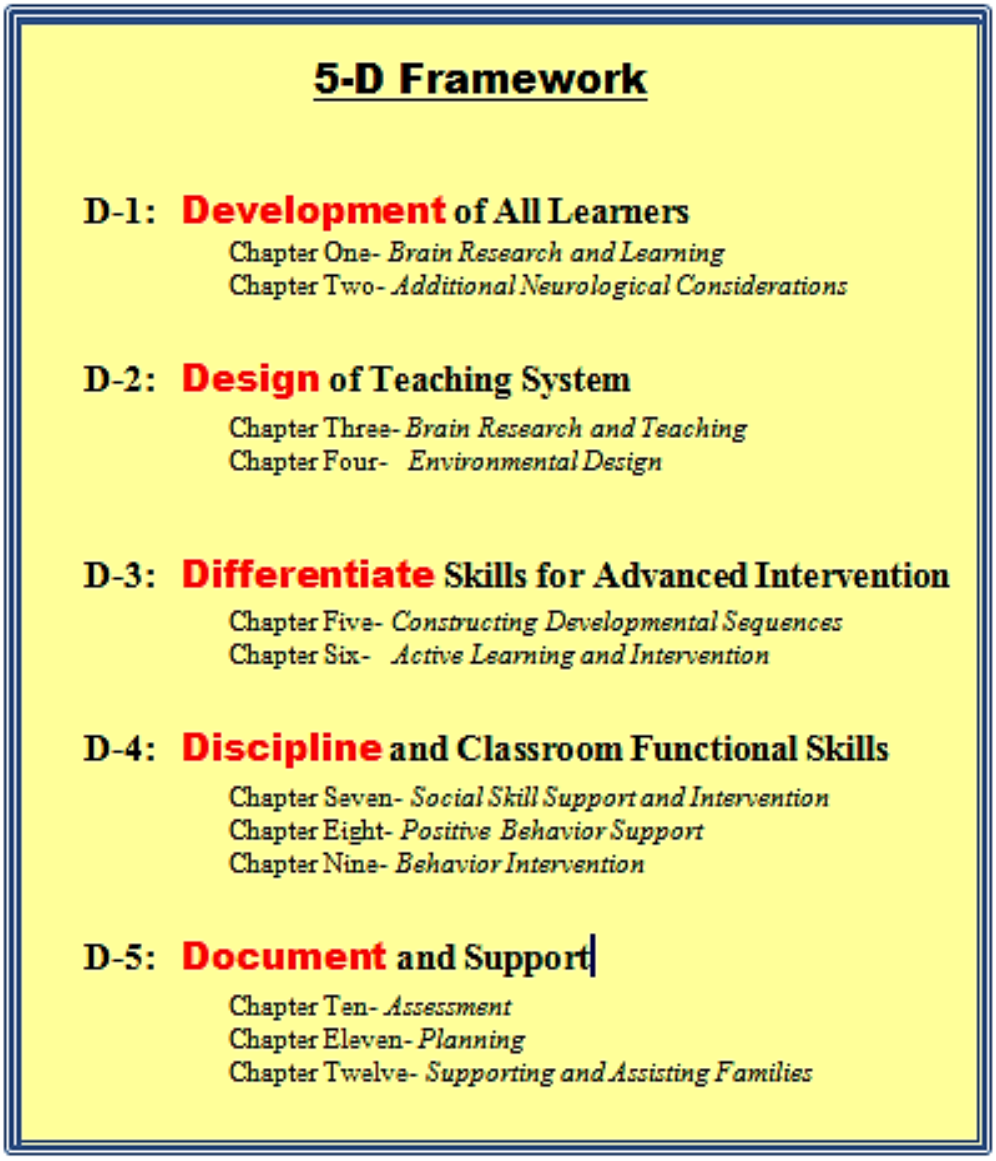
Next Steps

We have now come to the end of our neurological journey for typical learners. It is by no means a total summary of neurological information associated with learning, but for our purposes, it will provide a solid foundation for the framework we are trying to construct. We now can begin to envision how we will create the Neurological Framework that will allow us to move our practice forward. Here is what we have accomplished so far:



So, we have a complete picture of the typical learner and how they learn, the first layer of our framework. Once this Neurological Framework is fully constructed, it can be used with any other curriculum or teaching approach. It also can be used with a learner of any age or developmental profile.

So, now that we have a good understanding of the typical learner and our own Learning/Cue Style and Direction, we need to complete our review of the first D, Development by looking at atypical development. It always helps to visually see where we are going, so here is an overview of this next chapter and the remainder of the book.



We can now take the next step and expand the neurological information we learned in chapter one. We will focus on how neurological processing can become compromised and cause problems for many of the children in our classrooms.