CHAPTER THREE
ELEMENTS OF A DRAWING/WRITING PROGRAM.

From birth to six, you'll be doing the following exercises with your little child. You do what you can, and your child will do what he or she can. Besides doing Marks and Mind with your little children, let's make sure we provide these two things:

1) Cuddling and other loving physical contact throughout the day.
2) Eye contact when you talk with your child or listen to your child.
3) A modulated voice, not too loud, not too soft, enunciating your words clearly and using as many "grown-up" words as you like.
4) READ ALOUD DAILY

Read aloud daily to your child. You need to read and your child needs to hear and see you reading. Hold your baby in your arms while you read. Prop the book on a pillow. When your child is old enough, hold your baby on your lap while you read aloud. Let her turn the pages. Let her talk about the pictures. Let her tell you the story. Be patient. Be interested.

I still remember the day each of my children started to read, sitting on my lap.
I burst into tears. *It could so easily have been otherwise.* Any one of the three could have failed to learn to read. Look at some Arabic script or some writing in Russian. Can you read it? Imagine being able to read it. What a mental event! Your little child is going to be able to do that!

5) Practice Socratic questions and adductive reasoning. The philosopher Socrates got at the truth by asking questions. "What is courage? Blah. And what is blah? Blah blah. And what is blah blah? I see that courage must mean blah, and blah blah, and ....." The method is adductive. "Ad" means "to" and "duco, ducere" means "to lead." Socratic questioning leads toward an answer. The answer is constructed by the questionees. This approach is called student-response education-ally. At home, let's call it child-response centered.

Let's use a Socratic, adductive approach with children. This does not mean that you will not explain things or offer bits of information. Just don't do that first. Ask the question, first.
"I wonder how this door knob works?"

Scribbling exercises.

Materials: A piece of paper and some markers or colored pencils or crayons or whatever you want to use to scribble.
Make sure the paper is as long and as wide as your reach.
The Reasons Why: Marks are going to carry meaning for your child. Your child's first marks will be scribbles. You need to take scribbles seriously.
Remember the four hypotheses:

- **Hypothesis One**: **Very young children's scribbling trains the brain to pay attention and to sustain attention, setting up a self-organizing, dyadic feedback loop between the eye/**

hand and the interhemispheric brain.

- **Hypothesis Two: Very young children's scribbling stimulates individual cells and clusters of cells in the visual cortex for line and shape.**

- **Hypothesis Three: Very young children's scribbles help them practice and organize the shapes or patterns of thought.**

- **Hypothesis Four: Very young children's scribbling encourages an affinity for marks, preparing the mind for its determining behavior: literacy.**

In addition, teaching your child to talk about scribbles sensitizes your child to formal elements in a drawing, and formal elements in text. A drawing has direction; text has direction as intent or purpose. A drawing has a shape: text has shape as poetry or prose, essay or editorial. A drawing has emotion, text has emotion: a diatribe, a eulogy, a gothic tale. A drawing can tell a story, and so can text.

The Scribble Hypothesis predicts that young children who are encouraged to talk about their scribbles and their drawings will read more easily, form stronger relationships with writing, show an affinity for geometry, and, will, in general, think more connectedly and unpredictably, or creatively.

Activity: Scribble, talk, label, write.
Scribble. As you scribble, **talk** to yourself, "Now I am going up, now I am going down, I am swerving to the right, zooming to the left, softly falling to the bottom of the page. Now I am making a series of loops, over and over. My loops are getting bigger, and thicker, now thinner and smaller."

Lines in scribbles have formal properties including direction, shape, texture and weight. A line can go up or down, ascend or descend, cut diagonally, sit perpendicularly, create obtuse or oblique angles. Lines can create soft shapes, hard shapes. Lines can be angular and abrupt, lines can be curving and continuous, flowing or interrupted, staccatto or smooth. Lines can be heavy or light, thin or thick, subtle or bold. You can talk about your scribbles in these ways, and you can **label** the lines in your scribbles in these ways.
EXAMPLE

Lines in scribbles also carry meaning including emotional meaning, narrative meaning, informative meaning, predictive meaning, calculative meaning.

- Lines can be weak or strong, harsh or kind, sad or happy, calm or angry, hopeful, nervous, erratic, dependable, tentative, forthright, aggressive or passive, elated or depressed.
- Lines can tell about landscapes and animals.
- Lines can organize information, provide information, refine information.
- Lines can predict events, ask questions, speculate answers, compute amounts, relate items.

Write about your scribble. What is your scribble telling you? Try a story. Try a prediction. You can talk and write about scribbles.
EXAMPLE
Peer Share with your child. Let your child go first. Show your scribble, read your writing aloud.

The five-step Drawing/Writing program

I'll teach you drawing steps, which will turn you into a realist as well as an abstractionist.
I'll show you how to write sentences about your drawings that will sharpen your skills with description and analysis and inference, including simile, metaphor, analogy, speculation, prediction and hypothesis.

Drawings have tales to tell. Before the written word carries meaning for the child, drawings are capable of carrying information. Do not worry if your child is not talking yet, not drawing yet, not writing yet. Do the steps with your baby nearby. If your baby goes to sleep, take a nap, too.

Materials: legal-size paper, pencils, markers, legal-size file folders, objects with interest, dignity and power. The kitchen and the tool box and the garage are good places to look.
Procedure:
1) Choose an object. You will work with this object for all five steps, **practicing commitment.**

2) Set up the learning environment. Clear off a surface for drawing and writing. Turn off the TV and the computer. Try turning off all sounds, even music. Make sure the space is comfy —not too warm and not too cool.

3) Look at your watch. Choose a pencil or a marker to draw with. Time yourself. Draw for five minutes. Now, write for five minutes. Draw any way you want to. Write any way you want to.
Peer Share with your child. Let your child go first

This drawing is called Preliminary Drawing and Writing.

4) Stand up. Hold your object in your hands. Close your eyes. With one hand, feel your way around the object. Keeping that felt path in mind, "draw" your object in the air. Make a big drawing using your whole arm. **This drawing is called Drawing on the Air.** Its precedent is the way children are taught to write Chinese characters by drawing them first in the air with large gestures.

5) Now, put your object down on a piece of the legal-size paper. Put the date and your name on the piece of paper. Artists and writers sign and date their work. Put the word Tracing/Writing on the top. You are giving your work a title as well as a way to identify it. Change to magic markers. You will be using magic markers for the next three steps, **practicing risk-taking, courage and commitment.**
If you used a pencil on our preliminary drawing, ask yourself why. How is a pencil different from a marker?
Trace around your object. Now write in this manner;
"My tracing of my object **tells me** that my object is...because..."
Fill in the blanks. The line tells you your object is curving, sharp, angular, bumpy, etc.
The "because" clause makes you explain what you are saying to yourself. This self-explanation refines your naturally sloppy logic system.

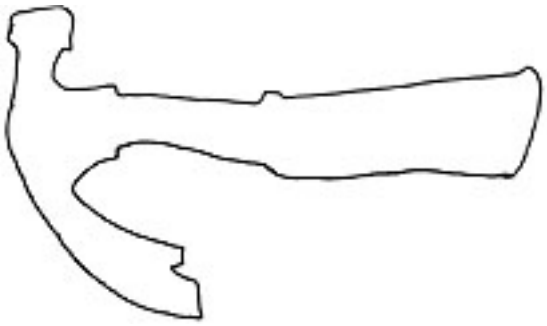
Tracing is not cheating. It is intelligent behavior. Why not feel your way exactly around something with a mark-making tool to get an accurate copy? Makes sense to me.
Write: "My tracing tells me that my object is...because..."
Peer Share with your child. Let your child go first

This drawing is called Tracing.

6) Take another sheet of paper. Add your name and the date. Write the title Blind Contour at the top. Look at your object. Do not look at the paper. You are "blind" to the paper. **Stay with magic marker, practicing courage, commitment and risk-taking.** Without looking at the paper, draw a line that goes around the object, starting at one point and not stopping til you get back to that point with your eyes. You are trying to draw a profile, an outline of your object.
Your drawing will look pitiful. It will not come out where you thought it would. Do not be discouraged. You are learning to see. You are learning to really look at the object as practice for really looking at whatever it is in this world you decide to pay attention to for some important reason. Instead of going through life with half-baked, approximate ideas of what is going on, you are going to train yourself to see what is actually going on to the best of your ability.
And you are going to train yourself to tell yourself in words what is going on. No namby pamby half-truths for us MAM parents and children.

Now, write, "My blind contour drawing tells me that my object is...because..."
Add a simile and a metaphor. You may have to turn your drawing around and around to see something in it. Try practicing with clouds next time you are outside.
Simile: My blind contour drawing looks like a ...because..."
Metaphor: My blind contour drawing is a ...because..."

Why do a contour drawing? This drawing creates **figure/ground distinction**. That is, your outline encloses a shape. This shape is the figure. Everything around it is ground. This simple drawing is practice in choosing **one thing to focus on**.



Why write a simile and a metaphor?
Simile and metaphor are based on similarities or connections —or patterns which map onto each other in some way. The brain looks for patterns, connections, similarities, differences. Douglas Hofstadter wrote in *Gödel, Escher, Bach* that the basic question of intelligence is how things are alike and how they are different. I believe him.
Which was harder to write, a simile or a metaphor? Why?
What is a simile, anyway?
What is a metaphor?

Peer Share with your child. Let your child go first

This drawing is called Blind Contour.

7) Take another sheet of paper. Put your name and the date on it.
Write the title “Regular Contour.”
Now, do an outline drawing of your object looking at the object AND at the paper. This lets you judge spatial relationships: how far it is from this to that on your object. This drawing will not be as pitiful. In fact, you should already be making some gains with accuracy. Don’t stop paying acute attention to your object. Don’t start to draw automatically. You still have a huge amount to learn about your object and you are only on the outside. Draw your outline slowly. Register every little in and out, every bump.
Now, write, “My regular contour drawing tells me that my object is...because...”
Write a simile: My blind contour drawing looks like a ...because...”
Write a metaphor: My blind contour drawing is a ...because...”

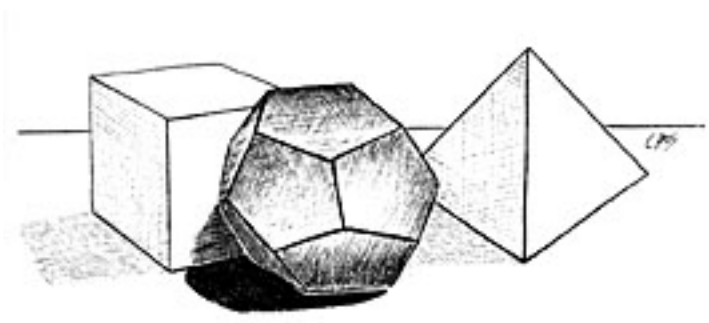
Peer Share with your child. Let your child go first

This drawing is called Regular Contour.

8) Take another sheet of paper. Stay with markers. Put your name on the paper and the date.
Write the title “Euclidean Basic Shapes.”
Why are we doing basic shapes drawings? Some thinkers like Plato and artists like Cezanne believe geometric shapes were the ultimate reality.

What we see as real is a chimera, a poor simulacrum. I think triangles and circles are the shapes of thought. On a neural, intercranial level, the mercurial shapes of thought are Euclidean and non-Euclidean. If this is true, then geometry is our first formal language and should logically comes first as a method for exploration with little children, well before writing words.

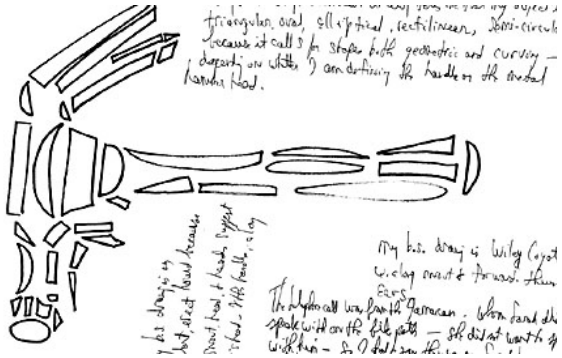
In this drawing, you move from the outside to the inside of your object, via imagination.



That is, you probably can not take your object apart. But you are going to think about your object as if it were built of the shapes you played with as a little child: circles, ovals, ellipses, triangles, squares, rectangles, rhombuses, trapezoids, parallelograms, pentagons, hexagons, octagons.

Practice these shapes at the top of the page, and label them, adding the adjec-

tives that go with them: circular, oval, elliptical, triangular....a student recently taught me that the adjective for rhomus is rhombic, not rhomboid. But I already forget why, the same way I forget the difference between an oval and an ellipse. But every time I find out the differences, I am glad to know them, again. Don't be too hard on yourself. No one can remember everything.
Write: " My Euclidean Basic Shapes drawing is circular, triangular... (and so forth, writing down all of the adjectives that go with the shapes you've used).



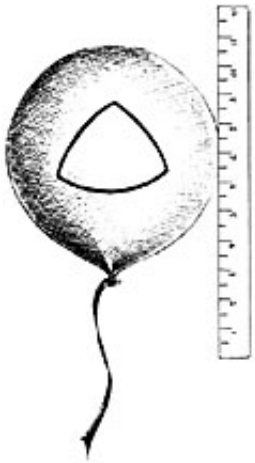
Write: "I note that my Euclidean Basic Shapes drawing has
x number of circles
y number of triangles
(and so forth)
The numbers tell me that my object lends itself most to triangles because...(give the reason why triangles are appropriate shapes for describing your object.)

Write a simile: "My Euclidean B.S. drawing looks like a ...because..."
Write a metaphor: "My Euclidean B.S. drawing is a ...because..."

Did you notice that many Euclidean shapes have sharp angles and straight lines? This geometry works on flat surfaces. The world feels flat locally, works flat locally. We can build a house using straight lines and right angles.

Peer Share with your child. Let your child go first

This is called Euclidean Basic Shape drawing.



9. We are going to do another basic shape drawing. Take another piece of paper. Put your name and the date on it. Title it "Organic Basic Shape." Put a ruler on a balloon. Can you measure distance on the balloon? You would need a different tool, a curving one, and a different geometry.

Why do an organic shapes drawing? For contrast and variety and because such shapes exist. While the Euclidean drawing was controlled by certain kinds of shapes, this drawing is freeform. If has soft edges and curves. It is biomorphic, like an amoeba. "Organic" means life-like in shape. Most living things do not have straight lines and sharp angles.

Draw your object using all of the closed curvy shapes you want to.
Write: "My organic b.s. drawing tells me that my object is...because..."

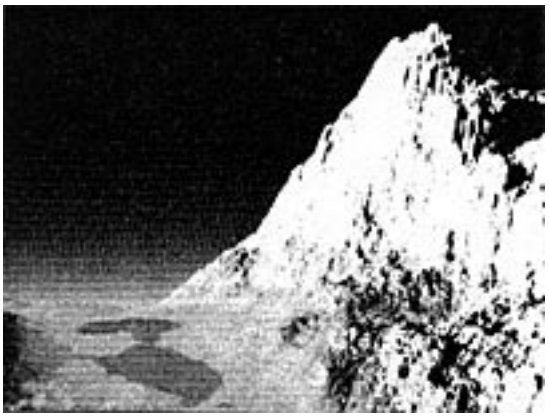
Simile: “My organic b.s. drawing is like a ...because...”
Metaphor: “My organic b.s. drawing is a...because...”

Peer Share with your child. Let your child go first.

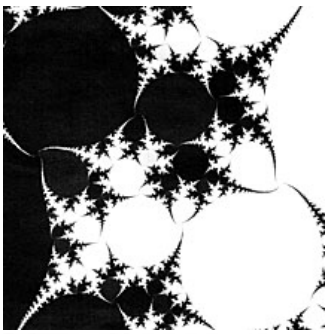
This is the Organic Basic Shapes drawing.

10. We are going to do a third basic shapes drawing. This one is titled “Fractal Basic Shapes.”
Take a new piece of paper. Stay with markers. Put your name and the date and this title on the paper. A tree could be drawn by putting copies of itself together.

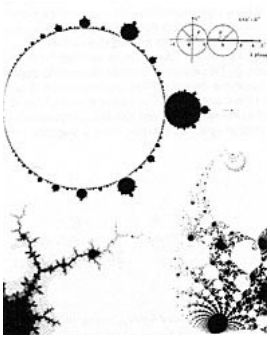
There is a kind of geometry called fractal geometry which describes natural things like clouds or mountains. Fractals and chaos theory go together. Chaos theory says things we used to think were indescribably messy actually have a pattern, but the repeating items are so far apart it’s hard to see the pattern. Fractal geometry creates these kinds of complex patterns, using a seed, repeating it over and over, across scales, little to big and back again. Chaos theory and fractal processes both are very sensitive to tiny changes. A tiny input has huge implications for the whole system. It’s sort of like relationships. The point is, fractal geometry is relevant for our lives. That’s why, even though it’s hard with a marker and a piece of paper and an object, you and your child will practice it.



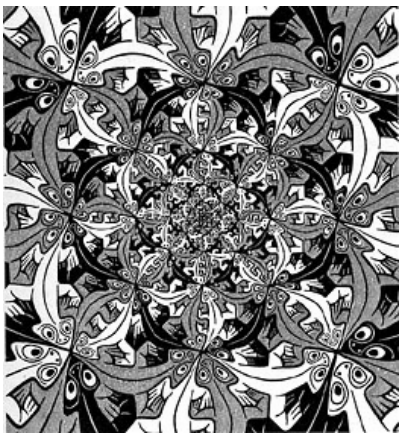
A man named Mandelbrot discovered the relevance of a kind of strange geometry that had been around but had been called pathological, like a disease. With computers, it became easy to plug in a mathematical statement, repeat it a zillion times, and watch what happened. What happened was gorgeous.

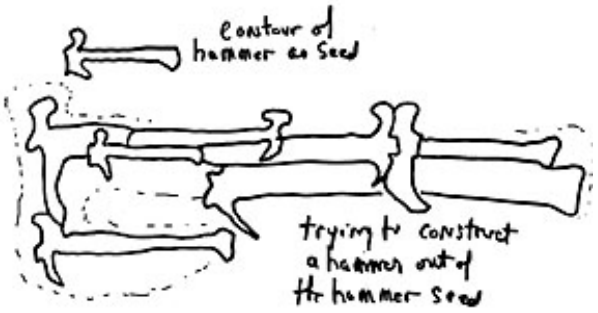


This snow-flaky image is the Mandelbrot set. See the repeating black “ladybug?” It looks the same across scales. It looks like the same ladybug whether it’s big or small. Also, do you notice that it is decorated with itself. It makes itself using copies of itself.
That’s the way DNA works, too, and powerful computer programs and other powerful systems which repeats a little seed of information over and over to create something much bigger and more complicated.



We are going to try a fractal drawing. You can try using your contour drawing as the seed.



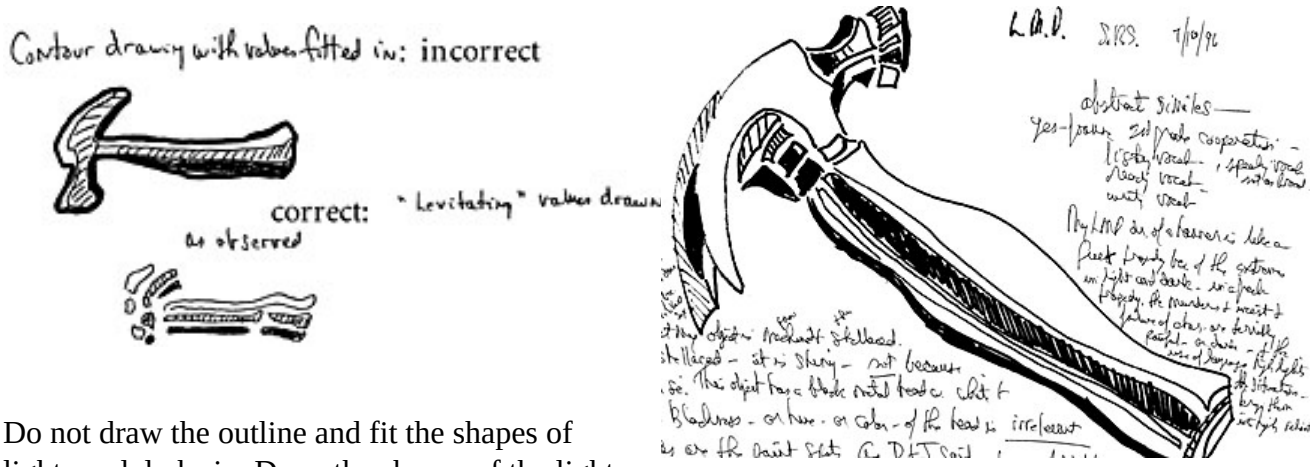


Or a basic geometric shape, like a triangle. You have to construct the object, using one “seed” that looks the same, large or small, and fits together with no space left over. A few shapes “tile the plane,” or fit together without any space left over. Good luck.

Write: “My fractal b.s. drawing tells me that my object is...because...”
Simile: My fractal b.s. drawing looks like a ...because...”
Metaphor: My fractal b.s. is a ...because...”
Peer Share with your child. Let your child go first.

This is the Fractal Basic Shapes drawing.

11.Now, we are going to do a value drawing. We are going to see how light hits your object, making it light in some areas, dark in others. If you can draw the lights and darks, your object is going to start looking real.
Take a piece of paper, stick with markers, put your name and date on the paper and add the title “ Light-Medium-Dark.”
Turn off the artificial lights in the room. Put your object by the window, where it gets light from one source. Squint. Try to see where your object is light, middle value, and dark.
Draw the shapes of the light, the shapes of the middle value, the shapes of the dark.
Why do the LMD drawing? For one thing, rendered drawings look real.We love to produce real-looking drawings. For another, it is good training to learn to distinguish the obvious from the less obvious; the dramatic themes from the subtle nuances in a painting, a story, a piece of music, an everyday problem.



Do not draw the outline and fit the shapes of lights and darks in. Draw the shapes of the lights and darks and middle values as you actually see them. Think about why light behaves as it does on your object. Does the texture of the object influence light? The age of the object? The materials it is made of?

Write: “My LMD drawing tells me that my object is....because...”

Write a simile: “My LMD drawing is like a ...because...”
Write a metaphor “My LMD drawing is a ...because...”
Peer Share with your child. Let your child go first.

This is the LMD drawing.

12. Take another piece of paper. Change to pencils. How are pencils different from markers?
Do you think differently about pencils, now? Put your name and the date on the paper. Title it “The ‘Perfect’ Whole.”
You are going to draw for as long as you can - at least 20 minutes. Think about the contour of your object, its basic shapes, its lights and darks, and all of its little imperfections and details.
Why is this drawing call the “perfect” whole? The quotation marks around the word perfect tell us something ironic is going on. So, we know this drawing is not going to be perfect because no drawing can be without any mistake, any distortion. We are humans, after all. But the drawing can be perfect in the sense of being complete: perfect from your point of view in that sense.
It will be “whole” as “complete.”

The five sensory icons

My hammer feels like freedom because...

My hammer smells like imprisonment because...

My hammer sounds like the end of the world because...

My hammer looks like conquest because...

My hammer tastes like old age because...

Peer Share with your child. Let your child go first.

This is the “Perfect” Whole drawing.

Patterns of Practice.
Take a new sheet of paper. You are going to do the writing exercises called Patterns of Practice.
You are going to write five concrete sensory similes and five abstract sensory similes:
My object looks like....because...
My object smells like...because
My object feels like...because
My object tastes like...because
My object sounds like....because
A concrete simile compares the object to something you can touch.
An abstract simile compares the object to something you can not touch, an intangible item like courage, fear, happiness, terrorism, patriotism.

Now, do the same with metaphor: 5 sensory concrete metaphors and 5 sensory abstract metaphors.
Now, negate your best simile and your best metaphor.
"My object does not smell like....because..." Watch how shooting your own best simile down forces you to be even more precise in your simile.
Now, write an analogy.
The blah is to my object as the blahblah is to blahblahblah.
Now write a speculation:
My object might, could....because
Write a prediction;
My object will...because.
Write an hypothesis:
If my object.....then....because...

Negate any of these constructions and see what happens.
Change any of these constructions from concrete to abstract.

13. Now you are ready for the fifth step, the cognitive kicker. Take one bit from all of your other drawings and put these bits together in a new drawing which does not look like your object but which stands for object. This drawing is called the "Composite Abstraction." You can use anything you want to draw with. You've earned it.

"Co" means "together," and "pono" means "to put." "Ab" means "away from," and "traho" means "to drag." The CA is a drawing that drags certain elements away from a series of drawings and puts them together again in a new drawing. The drawing is "abstract." It does not look like the hammer. Still, it stands for the hammer. Like a word, an equation, a musical score, the CA stands for object. The child who can not read words yet, can read his CA. The child is inventing its own abstract symbol system. The child has created a sign to represent meaning. This is hugely powerful. The child is writing and reading.

Why do the CA? We do the CA with children so they can practice writing and reading their own symbols, first, before they move on to anyone else's. By connecting drawing with writing, and by starting with children's self-constructed abstract symbols, we may prevent or remediate some learning disabilities before they even start.

We do the CA with children so they can practice inventive or recombinant thinking, seeing what happens when they take something apart and put it back together in a new way.

We also work with the CA to open discussions on ethical behavior and tolerance.
By asking children to analyze their abstract drawings for too much, and too little, children start to think about right relationships in drawings. We can also introduce the idea of acceptable differences in CA drawings. One child's CA of a shell will be very different from another child's CA of a shell. Once children know about right relationships and acceptable differences in drawings, we can talk about right relationships and acceptable differences in connection with human beings.
Write: "My CA tells me...because..." You do not have to write about the object anymore.
Just write about this abstract drawing. See where it takes you.
Write: "This writing about the CA refers back to my object...because..."
Simile" My CA is like a...because..."
Metaphor: "My CA is a ...because..."

Doing CA #2.
Now, hold up your child's CA#. Rotate it til your child nods. Your child is asked to nod where he has decided where there is too much and where there is too little in the drawing.
When the child nods, he takes another sheet of paper and markers and does another drawing.
He can add one new item, but otherwise is rearranging the bits from the first drawing, eliminating some, changing sizes, changing relationships.
Write: "My CA#2 tells me...because..."
Simile
Metaphor.
Why do the CA#2? Because, in judging too much and too little, the child discovers right relationships and acceptable differences and can begin to talk about them in other ways, for instance, in terms of family relationships.

Peer Share with your child. Let your child go first.
These drawings are Composite Abstractions.
14. Closing Drawing and Writing.
Take a piece of paper. Write your name and the date on it. Take a new object.
Draw it for five minutes and write about it for five minutes.
Compare your Preliminary Drawing and Writing and your Closing Drawing and Writing.
Did you write more or less words?
Did you write more or less similes, metaphors, analogies, speculations, predictions, and hypotheses?

Look at your drawing. Has your drawing become more complex, more realistic, larger, stronger in lights and darks, or value?
Peer share with your child. Let your child go first.
Translating across two more sign systems.
For the mathematical translations and the musical translations, let's do some review.

Mathematics:
I am going to assume you know your numbers. 1 2 3 4 5 6 7 8 9 10 and so forth.

There are positive numbers and negative numbers and imaginary numbers. I am unclear on imaginary numbers. Negative numbers have a minus sign in front of them. They are located below the middle line on four -part graphs.
draw an example of a four-part graph with positive and negative numbers.

I am going to refresh you on algebra and on the few logical operations I know and apply them to algebra instead of to numbers. So instead of writing 1 +2=3, I am going to write
A + B = C addition
A - B= C subtraction.
this means that B=C-A and it also means that -B = C-A. Figure that out.
A x B = C multiplication which means B=C÷A
A÷B= C division which means B=C x A. Figure that out.

I think little children think algebraically and will invent marks that stand for these kinds of logical operations. Ask children questions about relationships and see what kind of marks they make.

How about A $\sqrt{}$ B= C or A = C x B•B or B squared or B. Figure that out.
If all of the above equations are true, then one of the items probably equals zero. I need to keep writing this book and so not have time to work on this right now.
I am not a sophisticated mathematician. If you select equations under the edit menu on your computer you can do things like this $a \neq b \otimes \sum \forall \varnothing \xrightarrow{\wp \alpha \theta \Phi \oiint \mathfrak{m}} c \, \mathbb{M} \cong \|w\|$ but I do not have the faintest idea what this means.
I do know that trying to represent a problem, say a relationship, algebraically can be interesting. Greater than $\leq$ and less than $\geq$. I have a hard time remembering these so I do not use them. The logic of which way the open v goes is never clear.

Let's try a life problem and express it algebraically.
For instance, let M stand for mother
Let F stand for father
Let D stand for divorce
Now, would you write MxF=D or M divided by F = D? Neither makes much sense. We need more variables.
Let P= problems
Now, MxFxP=D but that is not enough either. We need to know what kinds of problems.
Let DP =difficult problems
Let AW = another woman
Let AM=another man
D=DP(AM+AW)(M+F). But this is not complex or precise enough. I may have to learn what all those squiggles mean under the equation menu .
But I will try again with just what I know; let LP=little problems like putting down the toilet seat=2; let BP = big problems like not enough money for groceries=10. Then D=100(LP) + 10(BP) or D=200 + 1000 or D has a value of 1200.
That can't be right. How could a divorce be worth only 1200 points? Can you see the kinds of questions equations raise even if you can not use them in very sophisticated ways?

Musical notation.
Here is a musical staff with whole notes, half notes, quarter notes, eighth notes, and something called

a rest.
Sharps look like this and make a note a little higher, and flats look like this and make notes a little lower.
This is all I know but I can do quite a lot with this and a piano. The white keys are whole jumps between sounds and the black keys are half jumps between sounds. On the staff a whole jump looks like this and a half jump looks like this.
I do not know about keys of C or other items. But I can write a tune and I can write a crab canon, and I can write a fugue.

Exercises in translating across two more sets of sign systems.
15. Take your CA#2 and express it numerically, graphically, algebraically, and in a sculpture.
16. Take your CA#2 and express it musically, as a crab canon.
17. Take your crab canon and write lyrics for it.
18. Listen to your crab canon played as a string quartet and do a little dance to it, and do a big painting to it.

Conclusion

If you work with this program until your child is ready for school, a little bit here, a little bit there, you will have done all of the six steps in the program many times. You will be good at translating between drawing and writing and mathematics and music. You'll feel smart and pretty capable. So will your child. By the time your child is ready for school, she'll be able to communicate using multiple literacies, and she'll be using her brain bihemispherically.

So will you. You'll be a multiliterate, bihemispheric parent. A MLBHP.

Training children to draw

The sciences use drawing and writing together. Think about your lab notes. Mathematics has been using drawing and writing along with arithmetic and graphs for the past twenty years or so (check when the Harvard Consortium published their Rule of Four). Language arts education is beginning to accept drawing as a useful method for student-response to literature. Still, the literature on reading research suggests that the reflective discussions and the analytical writing are the true goal of the drawing response— as if drawings and critical analysis were two different sides of a coin.

It all depends on training. Children naturally use drawing as a way to show themselves and others what they know. Children can learn the grammar and syntax of drawing — the tricks of the trade — just the way they learn the grammar and syntax of writing, and more easily. In fact, we can use training in drawing to help children learn to write and read more skillfully and with more pleasure, starting with scribbles.

Translating across systems of representation (Sheridan, 1990, 1997), or transmediation and intertexturalization (Short, 2000), will become standard strategies and expectations in language

programs where the aim is preparing students for media literacy, or information literacy. Expressing information across sign systems is already part of mathematics education. The Harvard Consortium's Rule of Four requires students to express mathematical problems using words, numbers, graphs, equations and pictures. My colleague, mathematics professor Julian Fleron, Westfield State College, added a fifth item to the set of systems: 3-dimensional modeling.

"The Deck"

"The Loaf"

"The sliding cube on a wire"

Translating information from one set of sensory inputs to another is what the brain is able to do. When a brain is conscious of this process, it is described as synaesthesia. For instance, Wassily Kandinsky, the abstract expressionist artists saw color and heard music. As a child, he played the violin. He was a musician and an artist. His brain was trained in both disciplines. All brains can do

this. Most brains do not do this kind of translation because they are not sufficiently trained, or tuned, to the wavelengths, say, of color, and to the wavelengths of sound to map color onto sound and vice versa.

As my 31 year old daughter, Jessica, said (2/28.2002), “Mom, this kind of drawing has no right or wrong, no good or bad. It’s no standardized test that can be failed or graded. It’s a natural way for children to learn to pay attention, and to feel good about thinking. Adults who grew up on Ritalin are on crack and cocaine, now. It’s in the news. We need to teach our children about natural highs, not put them on drugs. We can help them tune up their own brains for writing and reading and learning.”

If we want to devise brain compatible literacy education at home or at school, we will need to accept the fact that our brains are designed for:

• multiliteracies

• to translate information across systems of representation using a range of sign systems including drawing, writing, mathematics and musical notation.