From a Different Angle

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I'll never forget that scene.

Voice over: When you've used mathematical principles as a key to enjoyable physical activities, your feeling for mathematics is likely to be warmer, more personal, more engaged.

--- Seymour Papert in Talking Turtle, a NOVA program produced by WGBH Public Television

Two young girls in black leotards performed a dance to a pulsating rock-and-roll song, mirroring each other's graceful movements.

Voices over: We wrote the dance like we wrote the procedures for the computer.

--- Mandy and Michelle in Talking Turtle

As Mandy and Michelle cartwheeled across the floor on my television screen, I felt another set of Logo project ideas begin to percolate in my subconscious.

I dream of helping more children experience mathematics as I do, with all the intimacy of dancing.

--- Seymour Papert in Talking Turtle

Winter break is over. Many of you are now settling in to four months of uninterrupted school days. The weather is cold enough in many states to move gym classes inside, and physical education teachers can now spend some weeks on gymnastics, dancing, or yoga units. Why not integrate some Logo explorations into these naturally appealing physical activities?

Angular Notions

At one elementary school, it all began with a bulletin board. During one of my "I-need-to-relax" trips to a local bookstore, I happened upon a paperback authored by Olympic gymnast Kurt Thomas. (Kurt Thomas on Gymnastics, Simon and Schuster, 1980.) It contained many beautiful black-and-white photographs of his work on the rings, horse, and floor mats. The precision of his moves and his perfect muscular control were masterfully revealed through these still portraits. The angles formed by his limbs and torso were fascinating.

Books about ballet, yoga, and running seemed to jump out from the shelves. Why not help the children to see the beauty of disciplined bodily movement through geometric angles? I tucked the Thomas book into the crook of my arm, and headed for the cashier.

Viewing Angle

The bulletin board drew many thoughtful observers. I had selected 15 of the full-page pictures of Mr. Thomas that most vividly displayed different body angles, then added semicircles of white self-adhesive label material to identify the angles whose size I wanted the onlookers to estimate. I laminated the pictures, knowing that my students would be wise enough to use their hands to help them to judge angle size. I also hung up a protractor, with directions for its use in measuring angle size. The "answers" were provided under a flap of paper next to each picture.

It was exciting to see students and teachers stop in front of the display and become immersed in the presentation, often for long periods of time, and with no knowledge that they were being observed. The gym teacher asked for similar pictures to hang in the gymnasium, and I was happy to provide her with photographs of children in ballet positions. Students voluntarily began collecting and submitting action shots of football stars, wrestling matches, jazz dancers and acrobats. Some even brought in cameras to photograph each other on the balance beam and uneven parallel bars.

New Angles

Truly, they had discovered a new way to look at their world. Angle estimation conversations around the displays would often become somewhat heated, and, to the teachers' delight, would be settled with the use of a protractor. It was interesting to watch how this difficult skill was passed on voluntarily from student to student. Many reacted with surprise when they realized that it was not as hard as it had seemed when they had had to do it in their mathematics books.

It was no surprise, then, when the children's Logo work began to reflect this new area of interest. Some had just
discovered the animation tools on the Terrapin Logo utilities disk ("SHAPE.EDIT"). Others had found out how to use PEN-COLOR 0 (PENERASE) to erase simple shapes just drawn, to achieve another type of animation. Still others began exploring text screen animation (see Glen Bull's "Microworlds", NLX, February 1983). One group created pictures of stick figures in all of the basic ballet positions. Another decided to draw ice skating moves. A third group, fascinated with sign language, began a graphic collection of simple signs, such as "I love you."

**Personal Angles**

I must confess to having been bitten by the same bug. Two projects occupied too much of my out-of-school time during those winter months. One was a "generic gymnast," whose body parts were subprocedures with variable inputs that represented the different joint angles needed to position him in any dance, yoga, gymnastic, or ice skating pose. The other was a traditional four-couple square dance in Sprite Logo from a bird's eye view.

The most energizing aspect of these varied investigations was their common denominator, a quite powerful idea. Seeing the angles of body position and feeling the geometry of movement added depth to the way all of us, students and teachers alike, perceived the world around us. There is a wonder and a balance to the physical experience of abstract notions; a bridge to deeper understanding, no matter what age the thinker.

Little by little, we are learning how the computer can make bridges between the mathematical and the sensual; the abstract and the intimate.

---Seymour Papert in *Talking Turtle*

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_Council for Logo in Mathematics Education Established_

Ihor Charischak has announced the formation of the Council for Logo in Mathematics Education (CLIME), an organization committed to high quality mathematics education through creative uses of Logo. At the East Coast Logo Conference, April 2-4, 1987, in Arlington, Virginia, CLIME will host a special interest group meeting and present a panel discussion entitled, "The Role of Logo in Mathematics Education." For more information about CLIME, send a stamped self-addressed envelope to Ihor Charischak, 445 Broadway, Hastings on Hudson, NY 10706. If you are interested in joining CLIME, send annual dues of $5 to the above address.

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**Special Talk**

_by Paula Cochran and Glen Bull_

**Untrapping Intelligence**

Many of us who have watched an impaired child use Logo have been startled. Usually, we are startled because before our eyes we have seen the child recognize a pattern or solve a problem which we assumed was beyond his ability. In her long-awaited book, *Cultivating Minds: A Logo Casebook* (Harper & Row, 1987) Sylvia Weir provides many such glimpses into the minds of children as they learn.

**A Window on the Mind**

Weir suggests that the interactive quality of Logo provides a window through which an attentive observer can watch the learning process. Like the Logo windows she describes, Weir's book is a series of windows. As individual children and their work are described, Weir provides commentary to help the reader see in it what she does. For example, what can we learn from the way a child drawing with the turtle accommodates her mistakes?

One child described in Weir's book continually announced a new objective whenever the turtle didn't quite go the right way. That is, she was not comfortable acknowledging an error or a miscalculation, so it was easier to pretend to have changed her intentions. Further investigation showed that this was a child who maintained unrealistic expectations of herself in other situations as well. Through her Logo work, she gradually learned to acknowledge and correct mistakes, and to take advantage of debugging.

Weir's perspective is of value not only to special educators, but for all who use Logo as a teaching tool. Many of the children described in the book have special learning needs. For example, there are in-depth examples related to learning disabilities, autism, and physical impairment such as cerebral palsy. However, all teachers will recognize themselves and some of their students in the dialogs and illustrative examples in *Cultivating Minds*. What will be new is Weir's interpretation of otherwise familiar events, and her suggestions of how teachers can maximize the learning associated with them. For example, in an early part of the book Weir discusses the way children choose numbers as inputs for commands such as FORWARD. What do such choices suggest about the child?

**Teaching to Strengths**

*Cultivating Minds* is not a book about Logo. It is not even a book about teaching Logo. It is a book about learning. Weir states that so far, Logo is the best medium through which we can watch learning take place, especially in some impaired children. However, she readily points out the value of other computer-based activities such as word processing.

The value of animated graphics for inspiring story-writing in