

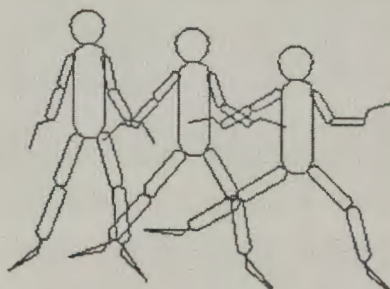
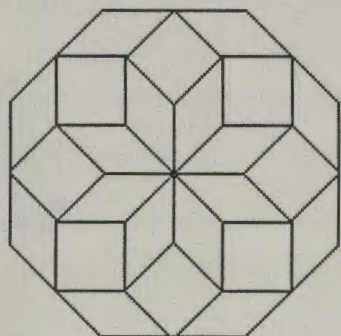
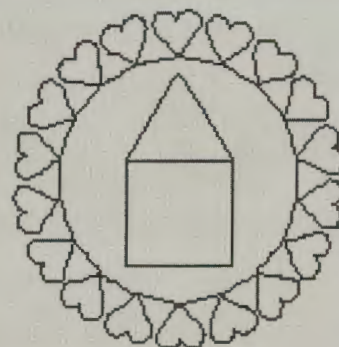
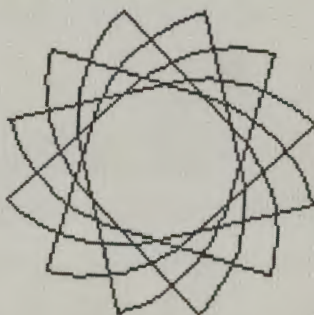
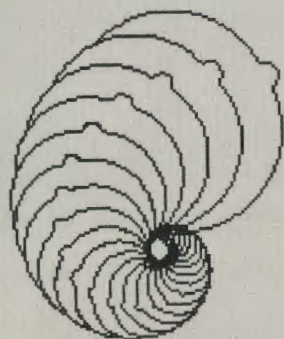
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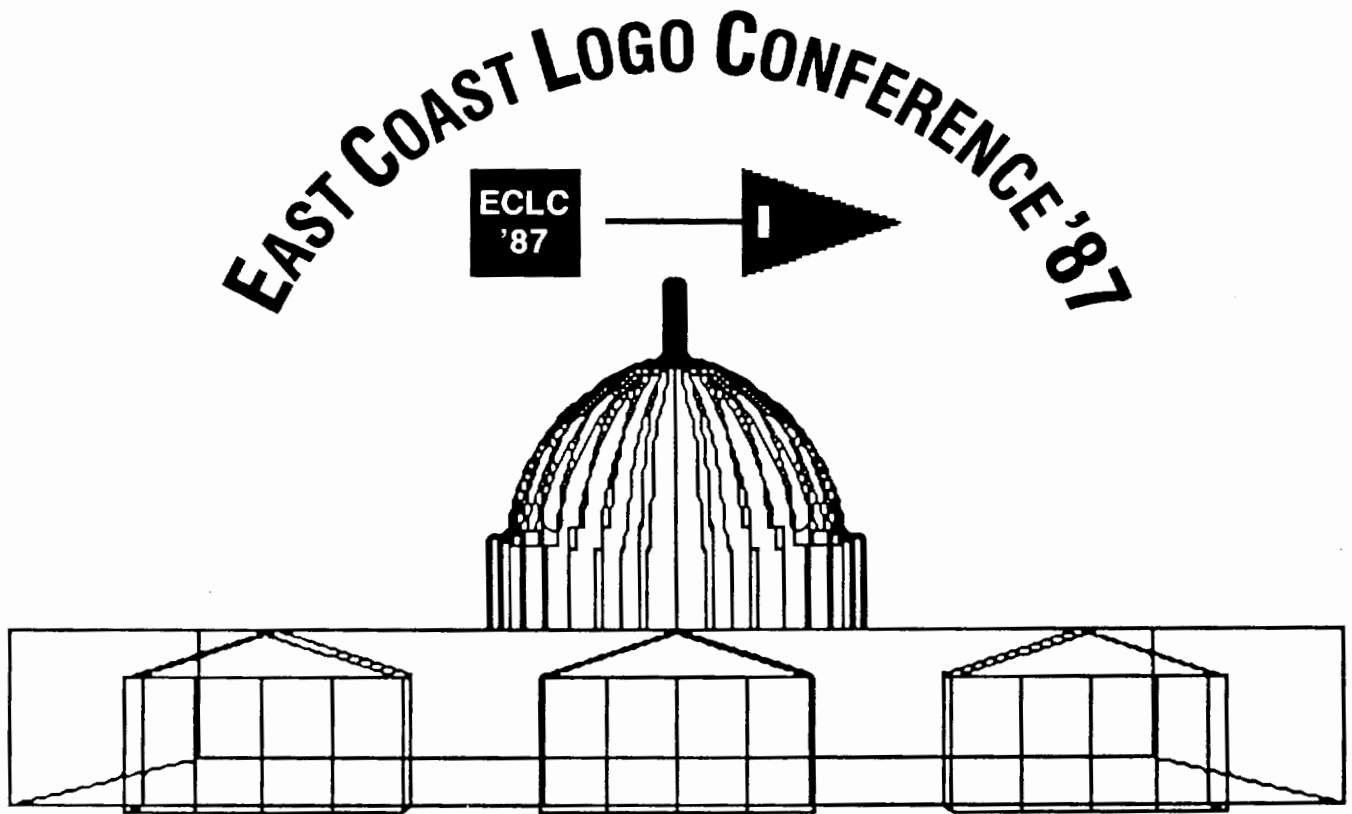
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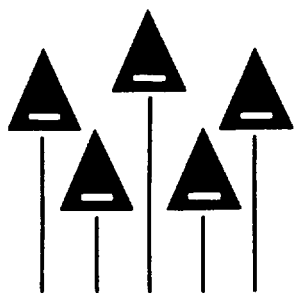
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## From the Editor

by Tom Lough

### But I Already Know How It Ends...

Being born and raised in the beautiful Shenandoah Valley of Virginia did not give me the opportunity to be exposed to much opera as I was growing up. Recently, one of my former students offered Posy and me a pair of tickets to the Metropolitan Opera in New York City. Puccini's "Tosca" would be presented, with the famous tenor Placido Domingo in the starring role. Neither of us had ever been to a "varsity" opera, so I reached quickly for my checkbook.

One of our friends suggested that we obtain a copy of the libretto to read in advance. Another gave us a record album of "Tosca," so we could listen to the music.

As you might imagine, one does not just "up and go" from Charlottesville, Virginia, to New York City. There were travel and lodging arrangements to be made, work to be scheduled around, and a host of other details. But at last everything was ready. We boarded the train for our great adventure.

The train ride was quite enjoyable. As the miles clickety-clacked away, I began thinking about why we were making the trip. An absurd idea entered my mind. "Tosca kills herself at the end of the last act. Why are we going to all this trouble to see an opera when we already know how it ends?" Amused, I let the thought meander around a while, and then dismissed it.

It was later that the thought returned ... later, when we and several hundred others were on our feet, roaring our approval of a magnificent Met performance, pleading for just one more curtail call. Even though I had known the plot from reading the libretto and was familiar with the music from having listened to the records, the experience of *being there* was unexpectedly overwhelming.

I really should not have been surprised. The experience had masked the appearance of two familiar visitors of mine, Process and Product. In thinking these thoughts, I found that I had been forced to focus on the very essence of each of them.


Product emphasized the plot and its outcome, the completed musical score, the finished opera. Process directed my attention to the experience of the production itself, the thrill I felt as the magnificent Domingo sang, the anguish which surged within me as the emotionally tortured Tosca hurled herself off the battlement of the castle to join her lover in death. Neither a hundred listenings of the records nor a thousand readings of the libretto could compare to the experience of attending the opera in person.

On the return train, I thought about how the opera experience might affect my teaching. I resolved to emphasize more the experiences during our laboratory exercises, to acknowledge the importance of what goes on between laboratory partners. Perhaps I should have another look at how I grade my laboratory reports. Do I place too much emphasis on the printouts and the computer program designs, and not enough on the thoughts and interactions behind them? Do I have an attitude of "Check it off," as each laboratory exercise is completed, without any thought to its extensibility and applicability?

This same idea could be applied to the New Year, couldn't it? We all know how it is going to end. On December 31, 1987, we hope to be turning the calendar forward, just as we did recently. But think of all the opportunities we will have between now and then to value the process of our lives during 1987, as well as the final product at year's end.

Maybe this is what New Year's Resolutions are all about, anyhow...

FD 87!



# Louisville Goes Logo

by Ric Manning

At Roosevelt-Perry Elementary School in Louisville, Kentucky, the Logo turtle has become the school's unofficial mascot.

Roosevelt-Perry, an inner-city school in a low-income, mixed-race neighborhood, was thrown headlong into the computer age three years ago. Humana, Inc., the Louisville-based hospital company, donated \$150,000 to make Roosevelt-Perry a model for elementary school computer programs.

"Logo was a key element in Roosevelt-Perry's plans right from the start," said former principal Madeline Holland. The school installed MIT Terrapin Logo on a central hard disk, making it accessible for any of the school's 75 Apple-compatible Syscom terminals.

The school's 450 students get an average of three hours a week of computer time, either in the classroom or in a computer lab.

Roosevelt-Perry teachers say they like Logo because it helps teach students how to accomplish tasks by performing a logical series of steps.

"These are the kinds of things that are very difficult to teach," said Mrs. Holland.

"Logo is probably the most useful program we have," said J. Back, who succeeded Mrs. Holland as principal.

And Logo has been a hit with the students, too.

"I like the turtle," said first grader Tatasha Dickerson. "It's fun."

## Logo Research Study

This year the school began a research program designed to test Logo's impact on general intelligence. Students in three third- and fourth-grade classes are using Logo to help develop the ability to visualize the relationship of lines and spaces.

"We think the REPEAT command is significant because it requires a student to see a pattern," said Back, "and we use the ability to see patterns as a measure of intelligence."

Working with educators from the University of Louisville, Roosevelt-Perry teachers put together a series of 15 lessons that use the REPEAT command to improve perception skills. By using the computer, Back said students can see how patterns are created and perhaps increase their ability to reason through problems.

Chuck Thompson, a University of Louisville instructor who worked on the project, said he believes the project is the first time Logo has been used to try to increase students' cognitive skills. (Ed. note: See Chuck Thompson's related article elsewhere in this issue.)

Back said the students received pre- and posttests on their Logo training, and on portions of the Cognitive Abilities Test, a test the Jefferson County school system uses to qualify students for its advanced program.

Back said they won't have final data on the intelligence question until later in the year, "but we feel that, just given the posttest, students learned a lot about Logo and the REPEAT command."

## Teacher Training

Back said the school videotaped the instruction program and compiled the 15 lessons so the training can be used in other local schools. And he said teachers have been begging for that sort of curriculum assistance.

"(Seymour) Papert fought doing a curriculum," he said. "He wanted Logo to be a discovery process, for students to learn as they experiment. But we in the school business can't function too well without a sequence and a teaching plan."

Back and other school administrators have been big boosters of Logo training and of computer training in general. Since the computers were installed at Roosevelt-Perry, Back says attendance has improved, discipline problems are down, more parents have gotten involved in school activities, and students are learning some things faster.

"The kindergarten students are learning their letters and shape recognition much faster than we ever saw before," he said.

The school board is apparently also impressed. This year the board approved a \$4.4 million program that will put an average of 32 computers in each of the system's 85 elementary schools.

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*Ric Manning covers computers and technology for The Courier-Journal in Louisville, KY.*

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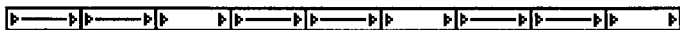
## East Coast Logo Conference '87 Advance Program Available

The Advance Program of the East Coast Logo Conference '87 is now available. Scheduled for April 2 - 4, 1987, in Arlington, VA, the conference features warmup activities, presentations on Logo applications and extensions, panel discussions, special interest group meetings, and social activities. The advance program also includes registration instructions and information on how to obtain the lowest air fares to Washington, DC. For a free copy of the advance program, write to ECLC '87, Meckler Publishing, 11 Ferry Lane West, Westport, CT 06880, or call (203) 226-6967.

*by Chuck Thompson*

### Key Idea: Concrete to Symbolic

Page 1 of 1



Next, children copied the pattern onto a dot line and extended the pattern by identifying the group of elements that was repeated over and over. This group of elements was called the "core" of the pattern. The core of the pattern above is "line line space." Note the small >'s denoting the starting (S) and ending (E) positions and headings of the turtle if it were to draw the pattern.



TO LINE  
PENDOWN  
FORWARD 10  
END

?REPEAT 3 [ LINE LINE SPACE ]

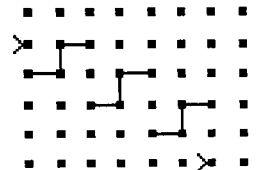
### Key Idea: Simple to Complex Patterns

REPEAT 2 [ YELLOW RED BLUE ]

The third type used the same posterboard lines and spaces to make two dimensional patterns. These patterns are more complex, not only because they involve the use of LEFT and RIGHT turns of 90 degrees, but also because these turns are "transparent." That is, the turtle changes its heading and not its position at the turn point.

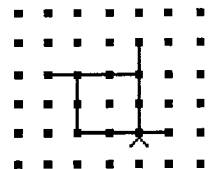
Nevertheless, the children became adept at identifying these turns, especially when they verbalized the patterns to a partner who "drove" a small turtle along a blank dot grid in an effort to recreate the pattern built from the posterboard strips. Instruction with these patterns first used the Logo procedures LINE and SPACE, but soon progressed to use of the standard Logo primitive procedures of FORWARD and BACK. Thus, the pattern below could be written as

?REPEAT 3 [PD FD 10  
LT 90 FD 10 RT 90 FD 10  
PU RT 90 FD 20 LT 90]



The final patterns used were also two dimensional, but, for the first time, the patterns resulted in closed figures. The commands for the pattern in the figure below could be written as

?REPEAT 4 [ FD 30  
BK 10 LT 90 ]



The fourth grade teachers observed that the children became excited about, and capable of, using Logo to create patterns. This was facilitated by loading from the disk a picture of a predrawn rectangular dot grid. The dots on their grid were 10 turtle steps apart. Thus, the children could readily compare what they had drawn on dot grids with the result of the REPEAT command that was displayed on the computer monitor.



## The best way to introduce students to Logo is to

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One reviewer said: As I proceeded, I kept thinking "What a great idea!" or "Why hasn't someone put this in before?"

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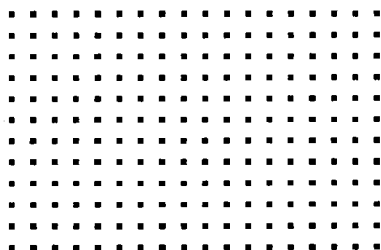


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**SPIN** Allows for rotation.  
**STAMP** Replicates the turtle anywhere on the screen.  
**MIRROR** Creates the mirror image of the graphic.

Logo graphics for the rest of us.



The research study results are being compiled, and we eagerly await the results. Meanwhile, we would be interested in learning what others have done with children in exploring patterns with Logo. Please write to:

Chuck Thompson  
School of Education  
University of Louisville  
Louisville, KY 40292

*Chuck Thompson is a professor in the Early and Middle Childhood Education Department of the School of Education at the University of Louisville, Louisville, KY.*

## Tipps for Teachers

by Steve Tipps

### Lessons from Logo

Five years ago this month, Glen Bull and I embarked on an uncharted venture. Starting with 5 TI 99/4A computers and a class of 40 eager—but uncertain—students (including Tom Lough), we began teaching with Logo. We had been to a Technical Education Research Center (TERC) workshop where Dan Watt introduced us to Logo. Glen spent most of the following week on the telephone to Texas Instruments until he found somebody who had the authority to ship 5 TI's. We unpacked the computers on a Sunday. The class started the next day!

### TI Times

Logo consumed the rest of that semester; it was an exhilarating time. Logo was the first use of the computer which matched my beliefs about learning. I learned or relearned much from practically living in the laboratory while students experimented and struggled with Logo. I learned many lessons with Logo about computers, computing, and Logo. The whizzabongs inside a computer are less important than the computer operating in a dependable, troublefree manner.

Inside, the TI 99/4A is/was a wonderful computer with a 16 bit processor and (in its time) great graphics and sound chips. Outside, it was considerably less wonderful. Old-timers remember that the 16K memory expansion module weighed about 16 pounds and hooked onto the keyboard/CPU module something like cars on a train. If you wanted additional features, you added a new module. The footprint of a 64K system was approximately the size of six counties in West Texas. Of course in Lubbock, where they were built, space was no issue.

The couplings between the modules were temperamental and tentative. The slightest movement or jiggle could send Logo and procedures into the netherworld. At other times, the systems would heave a communal sigh and turn off. We never figured out exactly why; we suspected that the TI's were very sensitive to slight variation in current.

### Hard Lessons about Hardware

The experience with the TI's taught me several important lessons about hardware. I am much less concerned all the technical characteristics of the computers. Put the computer down and see how it performs. Or, better, put it in a laboratory where it is used day after day by 100 different people.

A computer is of little practical value without a disk drive and a printer. You, no doubt, have the luxury of disk drives which work reliably. Five years ago, a spurious debate raged between the merits of saving to tape cheaply versus the "expensive" method of saving to disk.

Saving on the TI was a misadventure. A disk drive was available at a premium, but the people at TI did not send any. Glen bought a satisfactory tape recorder after many unsatisfactory attempts. The tape recorder could not be an ordinary one; it required a special polarization available only on a few brands. A few hardy students were able to save to tape, but I never managed to answer all twenty questions which were necessary to save and retrieve a file. Most students did as I did and started from scratch with each assignment which meant that you had to stay with your project until it was DONE.

Not having a reliable method of saving was compounded by not having any way to print. Students had to write out all of their procedures also. You may be thinking, "How primitive!" However, in the last year, several teachers have reported that their school delivered 2 to 5 computers without any printers.

### Computers and Bicycles

Computing is more like riding a bicycle than like saying the ABC's. People have different styles of learning. Some like to be fully prepared and know everything before they start. People who want to know everything before they start give themselves very little room for mistakes. They seem afraid to fall off the bicycle because falling off shows they have not already mastered the skill. Having a lot of information in your head before working with a computer seems to be the wrong way to approach the task.

Riding a bicycle is a fairly difficult in the beginning. Many activities are going on simultaneously: steering, pedaling, balancing, watching the road, etc. Describing how to ride a bicycle is probably more difficult than riding. Describing how to use the computer seems to be just as difficult. Simultaneous awareness of entities and processes -- program or language, file or procedures, input and output -- is needed.

Unfortunately, a few mistakes seems necessary to bring words into reality. In laboratory, I have a habit of shouting out every 10 or 15 minutes, "Have you saved recently?" When someone has actually lost a chunk of work, they pay attention to warnings. "Now I understand what you mean," is the usual comment.

Computing is a skill which takes time to learn and is never perfected. When I sit down with Logo or software, I still get a little frightened that I have forgotten how to make it work. After a few seconds, the fear subsides but never goes away completely. I have learned to live with the insecurity of falling off and getting back up again.

### Computing is a Social Event

One of my early concerns about computing was the possible dehumanizing aspect, or as it turns out myth. In one semester in the laboratory, I had more interaction with students and students more interaction with each other than in any other class. This phenomenon has happened in almost every computing situation I have observed from kindergarten through college. Student talk to each other, ask questions, use each other as resources, problem solve, argue, and laugh. The bonding may occur as a defensive response; however, I believe that the behavior is almost inevitable when people work on things which matter to them. The computer is a chameleon which changes to the user's need and desires.

Two situations I have observed which do not facilitate the social aspect were situations structured to prevent it. Individual carrels with substantial walls were used to block communication. Tightly controlled question-and-answer programs also inhibit sharing; they are constant inquisitors and most allow only the right answer.

I value the caring and cooperation in computing and try to infuse that spirit in other classes. Pair or group projects are part of almost every class. I want to generalize to "Learning is a social event."

### There Must Be an Easier Way

When I am working with students in Logo or other applications, I state that the most important phrase for them to remember is, "There must be an easier way." Thus forewarned, students are allowed to do things the hard way until they complain.

Students can draw squares with REPEAT 4 [ FD 50 RT 90] forever, but good computer users says to themselves, "This is dumb. Isn't there a better way?" Recently working with teachers on Appleworks, I demonstrated how to type the formula for average @AVG(B5...B13). I continued to type the formula two or three more times until somebody challenged me for an easier way.



One feature of Logo and many "blank page" applications is their adaptability to your level. One evening in a class for intermediate Appleworkers, teachers had been creating new layouts for a data base rather than duplicating existing layouts. The option was on the menu, but they had not challenged the program to do it the easy way. Optimizing computer use comes from constantly asking for an easier way.

### Power Comes from Understanding

A fifth grader had learned to make the screen flash on and off repeatedly. He bartered his technique for gum. The REPEAT 1000 [ BG 1 BG 2 BG 3 ...] soon filled every screen. The student had given his technique, but not necessarily the power of his discovery. The real power in Logo goes beyond making a square or flashing the screen. Logo provides many commands and techniques to make things happen. Under the ability to make things happen lurks powerful knowledge. Many Logo learning situations, I fear, have concentrated on techniques and commands rather than the understanding.

I am not advocating a lecture on "what you should have learned in Logo today." Instead, I want students to become more aware of the knowledge which is just below the surface. They need much exploration time, but they also need help to express the ideas. Making squares, triangles, and circles is fun and exciting. But making the shapes without ever recognizing the rule of 360 means missing the powerful knowledge which is useful in many ways.

### Not Everybody Loves Logo

So many people enjoy the freedom and openness and fun of Logo, I have had a hard time learning the lesson that not everyone has to love Logo. At first, I thought that they simply lacked experience, were frightened of computers, or possibly were dumb as stumps. Not liking Logo was the computing equivalent of disdaining apple pie. However, I now accept that some otherwise perfectly nice and normal people, for whatever the reason, do not love Logo. I don't understand it, but I try not to look at the 1-in-30 who do not to love Logo as if they had snakes in their hair.

### New Lessons Every Day

The lessons from Logo continue to guide my learning and teaching. I am as excited about computing and the power it gives people, but I am less parochial about Logo than I was five years ago. Word processing, Print Shop, and Rocky's Boots are also tools and environments for thinking. Logo continues to be at the heart of my personal computing philosophy, but other programs also offer joy and power. The greatest lesson is that each new day offers new possibilities and new lessons to learn.

*Steve Tipps is the West Professor of Education at Midwestern State University in Wichita Falls, TX, and has been involved with Logo since 1982. He conducts Logo workshops for school systems throughout the United States, and is a popular conference speaker. His CompuServe number is 76606,1623.*

## Key Reference Sources

### LOGO EXCHANGE RESEARCH DIRECTORY

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### NATIONAL LOGO EXCHANGE INDEX (volumes 1-4 (1982-1986))

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## Teacher Feature

by Rebecca Poplin

### Featuring: Michael Charles

#### Infection

Logo is like a rare contagious disease. Most of us catch Logo from a friend or colleague who is excited about its potential. With some, the disease is more virulent than others. Michael Charles, a sixth grade teacher at Pendergast Elementary School in Phoenix, Arizona, caught a good case of Logo from Stephen VanHerpen, the computer lab teacher. Rather than seeking a cure, however, Michael is trying to nurture his infection and spread it to others.

Michael learned Logo while he was working with a group of students during the summer. He talked his school into providing the space and letting him use the computers to work with students just so he could learn Logo by their sides. Michael launched his teaching career in a similar way. He went to a Mississippi housing project to live and work with the residents and left with a change of direction. As an English major, Michael had been planning to teach at the college level but decided that he wanted to affect people's lives more than people's ideas. Teaching younger students seemed to fulfill his purpose better.

A corner was turned in Michael's teaching career when Steve showed him a videotape of Nova's "Talking Turtle" segment. Immediately Michael realized that Logo provided a door to change to the kind of teacher he wanted to be. Prior to Logo, Michael was much more structured and tended to operate on a "Here-is-your-work-Do-it" basis. He had felt that a lot he did was stifling but didn't know a way out. Logo opened the door to a whole new way of teaching.

#### Incubation and Growth

Recently, Michael has been using an approach to teaching writing that he would not have accepted prior to his Logo experience. The one-to-one instruction and small editing conferences with students recommended by Donald Graves are changing the writing activities in his classroom. Michael sees some similarities between the Graves approach to teaching writing and his own approach to Logo. Both involve focusing students on a personal task within a theme, serving as a guide, working individually, and leading students into solving problems. Both approaches often lead toward a product in which the students are highly involved and motivated.

Usually, Michael and Steve assign open-ended projects such as creating an interesting stick figure using Logo. Their project approach averts the "filling up the screen" every Logo teacher has seen. Other projects include making initials, designs with squares and triangles, and the "Twelve Days of Christmas." Each student drew one day of Christmas. Steve wrote the Logo procedures to play the song, and they brought in visitors to see the sound and light show. One project the

students themselves invented was to create a neighborhood. If students didn't like a particular project, they could propose their own plan.

#### Contagion

One of the ways that Michael is spreading his enthusiasm for Logo is through his work with Dr. Gary Bitter at Arizona State University. Michael is doing active research in the lab as he and Steve work together. Last year's project was more of a case study designed to answer particular questions. The situation was an extended day program for 15 Chapter II students, all of whom were low achievers. In order to qualify, students had to be in the bottom third of the class. Most were very active boys whose normal attention spans were short. With Logo, they would work for an hour and a half four days a week after putting in a full day at school. Unlike other extended day programs, students did not drop out.

Michael's study had three parts. First, he took observation notes as the students were involved. The purpose was to categorize teaching activities. Michael developed a schema of 10 different levels at which teachers would interact with students. He discovered a greater depth of teacher involvement and direction than the term "discovery learning" would imply.

The second part of the research involved looking for the kinds of thinking students were doing. Using Bloom's taxonomy, he wanted to find out whether Logo activities were stretching students to the higher levels. Michael was able to document a lot of powerful problem solving.

Michael was curious about Roy Pea's belief that students weren't understanding much if you did discovery teaching. He asked students to step through some procedures to determine if they understood them. Generally, students could reconstruct what the turtle was doing. This was particularly impressive since there had been quite a time lag between the creation of the procedures and this activity.

Michael is still working on his research, and hopes to share it in some meaningful way with other interested educators. If you would like to get in touch with him personally, write to:

Michael T. Charles  
6813 North 29th Avenue  
Phoenix, Arizona 85017

If you know of teachers who should be featured in this column, please write to:

Rebecca Poplin  
2421 Fain Street  
Wichita Falls, TX 76308

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*Rebecca Poplin uses Logo to teach junior high computing and mathematics in Wichita Falls, TX.*

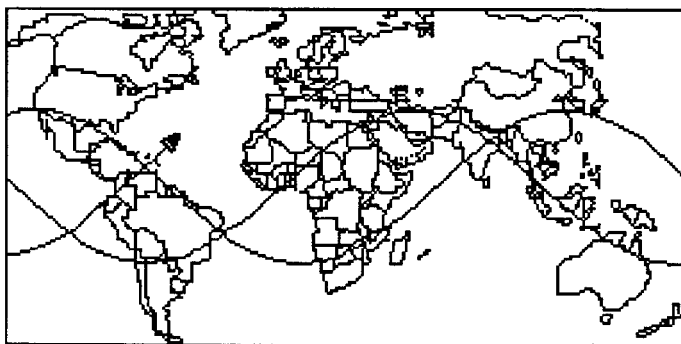
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## Teaching Tools

*Glen Bull and Paula Cochran*

### Science and Sensors

A simulation is one way of using a computer for science. In a past column, we demonstrated how the SIN function in Logo could be used to simulate a sound wave, or the path of a spacecraft across the face of the earth (Bull and Cochran, 1986). Many microworlds in Logo are simulations. For example, dynaturtles are simulations of laws of physics which allow students to experiment with Newtonian laws (diSessa, 1982). Scientists often use computers to create mathematical models of possible experiments.



Simulations have a valuable place in both science and science education. However, there is a definite danger when simulations are used to replace the real thing. Simulations are less expensive and require less setup time than real experiments do. A worrisome concern is that school systems may attempt to save money and effort by substituting simulations for actual experiments.

Another way of employing a computer in science is to use the computer to acquire and analyze data in the conduct of the experiment itself. Scientists have found the computer can serve as a flexible, programmable instrument. The computer has the same attraction for schools. It can be used to collect and analyze data, replacing a collection of single-function scientific instruments which are too expensive for educational use.

Bob Tinker, president of Technical Education Research Center (TERC), has used the term "Microcomputer-Based Laboratory" (MBL) to describe the use of the computer as a scientific instrument in science education. Tom Lam describes an MBL as a "laboratory where a microcomputer gathers and displays data directly from the environment." (Lam, 1984-85, p. 1)

#### Attaching a Sensor to the Computer

In this column we are going to discuss creation of some generalized Logo science tools which can be used to acquire data from many kinds of sensors. Sensors which can be attached to the computer include motion detectors, light cells, and temperature gauges. Many microcomputers have a data collection interface built into the computer itself. This data acquisition port may sometimes go unused because it is called a "GAME PORT". However, the game port of an Apple

or an IBM is actually an "analog-to-digital (A/D) converter". It converts data from the real world into digital information which the computer can understand.

We suspect that this analog-to-digital converter would be used more often in schools if it were called a "data acquisition port" rather than a "game port". In order to use the data acquisition port, it is only necessary to attach a sensor to it, and create some software tools to acquire data from the sensor.

The simplest and most commonly available sensors are game paddles and joysticks. Again, there is a terminology problem here. In some schools these peripheral devices are not available (although they should be) because administrators are reluctant to budget school funds for "game" paddles and "joy" sticks. However, if you do not have access to a game paddle, you should be able to find one for \$10 to \$30 if you shop around. Since a game paddle is actually a "potentiometer," you may want to use that term when you request funds.

#### Software Tools

We are now going to assume that you have a game paddle or joystick plugged into the game port ... er, pardon us. What we meant to say is that we now assume that you have the potentiometer connected to the data acquisition port, and that you are now ready for some software to read the A/D converter. What a difference terminology makes.

Reading the sensor is a fairly simple matter in Logo. Try this procedure.

```
TO READ.SENSOR
  PRINT PADDLE 0
  READ.SENSOR
END
```

First, run the procedure. Then turn the paddle or move the joystick. As you do this, you should see the numbers printed on the screen shift from 0 to 255. As you turn the paddle one way the numbers should increase, and as you turn it the other way the numbers should decrease again. Essentially, the analog-to-digital converter is converting the analog rotation of the paddle into numbers for the computer.

```
?READ.SENSOR
0
15
55
130  <---- Paddle is turned to the right.
180
250
190  <---- Paddle is turned back to the left.
140
105
80
25
0
```

In order to stop the procedure, it will be necessary to use the Logo interrupt key for your version of Logo. (Control-

G in Apple and Terrapin Logo, Open-Apple Escape in Apple Logo II, and Control-Break in IBM Logo.)

### Experiments with Motion

If you have the sensor attached to the computer and are getting satisfactory readings, we are ready to begin some experiments. In a previous column we used the SIN function in Logo to generate a sine wave. In this experiment, we will use the natural motion of a pendulum to create one.

To create a pendulum, it will be necessary to attach a rod of some kind to the game paddle or joystick. As the rod is lifted and allowed to swing back and forth, the motion of a pendulum results. There are several places you might find a rod. We found a metal rod about a foot long lying in the corner of our lab. Most hardware stores carry wooden dowels, or possibly a ruler or yardstick will suffice.

There are also several possible ways of attaching the rod to the game paddle. An elegant way involves removing the knob of the game paddle from its shaft, drilling a hole in one end of the rod, and pushing it onto the shaft of the paddle. Another possibility is to clamp a pair of Vise-Grip pliers onto the knob of the game paddle and use that in place of the rod. We must confess that we attached our rod to both the game paddle and the joystick with liberal amounts of tape.

### Calibrating the Pendulum

Once your pendulum is constructed, lift the rod and allow it to swing back and forth freely. It should swing back and forth two or three times before stopping. Run the READ.SENSOR program as the pendulum swings. The numbers displayed should increase as the pendulum swings one way, and decrease as it swings the other. It may be necessary to attach a weight to the end of the pendulum to make it swing more freely (just like the weight on the end of the pendulum of a grandfather clock).

Turn the game paddle so that the numbers displayed read 128 when the pendulum is hanging straight down. The reason for choosing 128 is that it is halfway between the full range of 0 to 255. Now anchor the game paddle in this position. If you have access to a chemistry lab, you may be able to use one of the stands with a clamp that holds test tubes and bottles. We taped the game paddle to the side of a desk to hold it in place.

### Scale and Offset

The next step is to create a graphic display of the motion of the pendulum. This can be done by translating the numbers produced by the movement of the pendulum into a motion of the turtle. There is one potential problem. As the pendulum swings, it will probably generate numbers between 80 to 180. However, the y-coordinates of the turtle range from -70 at the bottom of the screen to 120 at the top. (Some of the space at the bottom of the screen is used up by the four lines of text in the splitscreen mode.)

### Range of A/D Converter      Range of Graphics Screen of Computer

	255	
Maximum Swing of Pendulum to Right	180	
Pendulum Hanging Straight Down	128	120 Turtle at Top of Screen
Maximum Swing of Pendulum to Left	80	
	0	0 Turtle in Middle of Screen
		-70 Turtle at Bottom of Screen

The turtle can be moved up and down as the pendulum swings back and forth. However, as the pendulum moves to the right, it will generate numbers which move the turtle off the top of the graphics screen. The solution to this problem is to slide the range of numbers generated by the pendulum into the range of numbers which the turtle can display. The easiest way of accomplishing this is to subtract 100 from the number generated by the pendulum. Thus,  $180 - 100$  will become 80.

Pendulum	80-----180
Turtle	-70-----0-----120

The following procedure translates the movement of the pendulum into a corresponding movement of the turtle. Be sure to leave a space between the minus sign and the number 100. Note to Terrapin users: In the examples which follow, substitute "SETXY" for "SETPOS LIST". For example, type SETXY XCOR (PADDLE 0) - 100 in the procedure below.

```
TO MOVE.TURTLE
  SETPOS LIST XCOR (PADDLE 0) - 100
  MOVE.TURTLE
END
```

Run the MOVE.TURTLE procedure. As the pendulum is moved to the left, the turtle should move to the bottom of the screen. As the pendulum is moved to the right, the turtle should move to the top of the screen. When the pendulum is straight down, the turtle should be in the middle of the screen.

The position of the turtle when the pendulum is straight down can be adjusted by changing 100 to another number. Experiment with different numbers to discover the effect on the turtle's position. This number controls the offset of the turtle. Offset is used to translate one range of numbers into another range. Adjust the offset until the turtle is in the middle of the screen.

You may find as you move your pendulum that the turtle goes off the top or bottom of the screen. If this happens, the problem is that the range of numbers generated by the pendulum is too great.

Pendulum	-100-----0-----150
Turtle	-70-----0-----120

The way to compensate for a range of numbers which is too great to fit on the screen is to change the scale. In this case, if we want the scale to be reduced by 60 percent, we will multiply by 0.6.

```
TO MOVE.TURTLE
SETPOS LIST XCOR ((PADDLE 0) - 100) * 0.6
MOVE.TURTLE
END
```

Scale and offset frequently appear in algebra. For example, in the formula,

$$Y = AX + B$$

the variable A is used to adjust the scale, and B is used to control offset. The difference is that, in this case, scaling and offset appear in the natural context of a real-world problem. Hence, the concepts are more likely to appear meaningful and to be understood.

### Logo Challenge

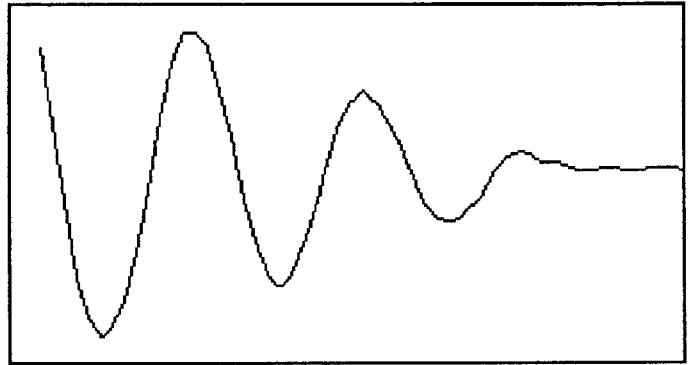
In order to move the turtle down, will it be necessary to increase value of the offset or decrease it?

### Creating a Graphic Display

A graph of the pendulum's movement across the screen can be created by making one slight change to the MOVE.TURTLE procedure. Adding 5 to x-coordinate in between each point will move the turtle across the screen, creating a plot of the pendulum's movement.

```
TO SHOW.GRAPH
SETPOS LIST XCOR + 5 ((PADDLE 0) - 100) * 0.6
PRINT YCOR
SHOW.GRAPH
END
```

As the pendulum swings back and forth, a graph of its movement appears on the screen. This graph looks very much like a graph of a sine wave, except that the movement gradually dies down and stops. This is the result of a phenomenon known as "damping", which is present in the real world but which was not included in our May 1986 simulation.



### Other Challenges and Other Sensors

In this column we have shown how a sensor can be connected to the computer, and used to examine an event in the outside world. A number of experiments and instruments suggest themselves. For example, what happens to the period of each cycle as the pendulum gets longer? With the right kind of calibration, could you use the potentiometer to create an electronic level, or possibly a motion detector?

Once you have tried a motion sensor, you may want to try other kinds of sensors. Broderbund Software (17 Paul Drive, San Rafael, CA 94903-2101, (415) 479-1170) offers a "Science Toolkit" which contains inexpensive light sensors and temperature gauges. These sensors can be used with software included with the "Science Toolkit" or with Logo software tools.

Connecting a sensor to your computer opens up another world. Connecting the real world to the computer allows students to test hypotheses for themselves. Students often find that real phenomena are not as well-behaved as idealized simulations, and that real data are sometimes messy. Next month, look for more Logo science tools for analyzing the data collected with your sensors.

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- diSessa, A. (1982). Unlearning Aristotelian physics: A study of knowledge-based learning. *Cognitive Science*, 6, 37-75.
- Lam, T. (Winter, 1984-85). Probing microcomputer-based laboratories. *Hands On!* 8 (1), 1, 4-5.
- Shumway, S., & Elliot, L. (1985). *Science Toolkit* [computer software and manual]. San Rafael, CA: Broderbund.

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*Glen Bull is a professor in the University of Virginia's Curry School of Education, and teaches Logo courses at both the graduate and undergraduate level. His CompuServe number is 72477,1637. Paula Cochran is an assistant professor in the Communication Disorders Program of the University of Virginia's Curry School of Education. She is interested in Logo applications for language arts and special populations.*

## TO BEGIN :VARIABLES

by Elaine Blitman and Barbara Jamile

*VARIABLE: the idea of using a symbol to name an unknown entity ... one of the most powerful mathematical ideas ever invented.*

---Seymour Papert, *Mindstorms*

Children who use variable procedures find them among the most useful and exciting features of Logo. Variables encourage exploration by enabling the user to see the effect of changing inputs with minimum effort. This month's column gives you some practical, teacher-tested ideas for introducing and using variables.

### What is a Variable?

Variable means subject to change or alteration. Logo variables allow one procedure to do the work of many. A variable STAR procedure might make a star of any size, for instance. In such a procedure, a "placeholder" reserves a spot for specific input to a command, permitting the user to change or alter the input each time a procedure is run. A side-by-side comparison of a fixed procedure with a variable procedure illustrates the differences:

```
TO STAR
REPEAT 5 [FD 50 RT 144]
END
```

```
TO VSTAR :STEPS
REPEAT 5 [FD :STEPS RT 144]
END
```

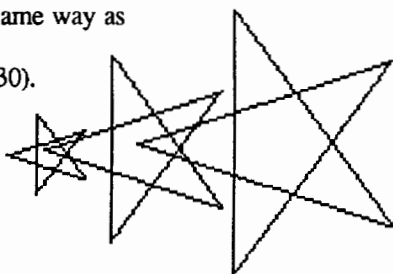
Notice that the placeholder in the VSTAR procedure appears in both the procedure title and following the FD command where the input is needed. Any name can be given to the placeholder, as long as it isn't the name of a Logo primitive procedure.

Selecting an appropriate variable name can help students understand the function of the input. For instance, STEPS is more descriptive than XXX.

We refer to the symbol (:) in front of the variable name as "dots." Because the variable sign is in a different position than a colon in relation to a word, and has a different purpose, it seems best to give the (:) symbol a new name as it is used here.

The STAR procedure draws stars exactly the same size every time. The VSTAR procedure requires the user to input the number of steps (length of side) when it is run, making stars of any size specified. The VSTAR command is followed by the input, in much the same way as the FORWARD command is used (e.g., FORWARD 30).

```
VSTAR 30
VSTAR 70
VSTAR 100
```



### When Should Variables Be Taught?

When children are confident procedure writers and demonstrate an understanding of commands and inputs within a procedure, they are ready to learn about Logo variables. Children have usually worked with variables before, although this term was probably not used.

The spaces in a fill-in-the-blanks sentence are placeholders for variable input:

My name is \_\_\_\_\_ and I am \_\_\_\_\_ years old.

The box and letter symbols used in equations are also placeholders:

times  = 12

$x + 9 =$

$2x + y = 13$

Look around the classroom to see examples of other variables children use frequently. A review of familiar uses of changeable inputs provides a connection to Logo variables. We've found that, in order for children to make the connection among types of variables, however, it is necessary to point out and work with various examples.

Before students go to the computer, help to reinforce their understanding of variable concepts with some concrete activities:

1. Place cards numbered 1 through 10 in a box. Ask students to turtle-walk a procedure such as this:

```
TO SQV :STEPS
REPEAT 4 [FD :STEPS RT 90]
END
```

The "turtle" must pick a number from the box to obtain the input for :STEPS before completing the procedure. Show the differences in the sizes by marking where the "turtle" walked with tape or chalk on the floor.

2. Ask students to write a procedure for an action on the chalkboard. Use a variable for the input following REPEAT. Take turns following the procedures, picking the input number from the box each time.

```
TO PAT :NUMBER
REPEAT :NUMBER [PAT.YOUR.HEAD]
END
```

```
TO JUMP :NUMBER
REPEAT :NUMBER [HOP]
END
```

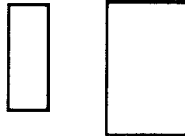
More than one variable can be used in a procedure; in fact, even second and third graders can manage multiple variables after a sufficient amount of experience with a single variable.

```
TO RECTANGLE :SIDE1 :SIDE2
REPEAT 2 [FD :SIDE1 RT 90 FD :SIDE2 RT 90]

END
```

Try:

```
RECTANGLE 40 15
RECTANGLE 50 30
```



Here is a useful procedure with two variables.

```
TO POLYGON :NUM :STEPS
REPEAT :NUM [FD :STEPS RT 360 / :NUM]
END
```

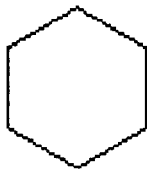
Regular polygons of any size can be made with this procedure. For example, POLYGON 5 30 makes a pentagon and POLYGON 8 30 makes an octagon. Challenge students to find the correct name for the polygons they make. What do you call a regular polygon with 6, 9 or 11 sides? What do you call a figure with 50 sides?

Color can become a variable:

```
TO POLY :NUM :STEPS :COLOR
SETPC :COLOR
REPEAT :NUM [FD :STEPS RT 360 / :NUM]
END
```

Try:

```
POLY 6 50 3
```



When writing Logo music, a procedure can be written for each note, using a variable for the duration. This allows the same procedure to be used for whole, half, quarter, eighth, and sixteenth notes:

```
TO F# :DURATION
TONE 657 :DURATION
END
```

Try:

```
F# 24
F# 18
F# 6
```

Hear the differences? The next procedure shows how notes are combined to play a scale. Notice the use of the variable to change the length of the notes from one scale to the other.

```
TO SCALE
C 24 D 24 E 24 F 24 G 24 A 24 B 24 C.HI 24
C 6 D 6 E 6 F 6 G 6 A 6 B 6 C.HI 6
END
```

```
TO C :DUR
TONE 523 :DUR
END
```

```
TO G :DUR
TONE 784 :DUR
END
```

```
TO D :DUR
TONE 587 :DUR
END
```

```
TO A :DUR
TONE 880 :DUR
END
```

```
TO E :DUR
TONE 659 :DUR
END
```

```
TO B :DUR
TONE 988 :DUR
END
```

```
TO F :DUR
TONE 698 :DUR
END
```

```
TO C.HI :DUR
TONE 1046
END
```

Variable subprocedures can be used within superprocedures. A familiar example of this is the HOUSE project found in many Logo books. By designing a variable procedure to make houses of different sizes, a neighborhood or town can be constructed.

Variables play a major role in words and lists procedures. A good understanding of variables in turtle graphics can transfer to words and lists concepts.

### Challenge Activities

Challenges, whether posed by students or teachers, require problem solving and should include good writing habits. After solutions have been found, students should edit their programs to achieve elegant, concise, and easy-to-read forms that others can readily understand. Subprocedures and variable procedures should be incorporated wherever possible.

Write procedures using variables for the following:



Create a "variable" creature that can be drawn in several sizes. Write a history describing the creature at different stages of its life.

Next month: Circles, arcs, and curves with variables.

*Elaine Blitman and Barbara Jamile are the K-2 and 3-4 supervisors at the Punahou School in Honolulu, HI. They have been using Logo with young children since 1982. Their CompuServe number is 76067,211.*



# Logo LinX

by Judi Harris

## From A Different Angle

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.

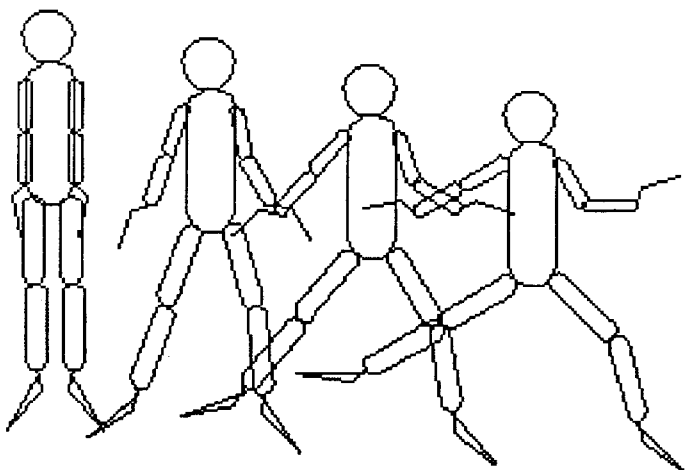
Voices over: *We wrote the dance like we wrote the procedures for the computer.*

---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*



Logo drawing by Larry Robertshaw, Beaver College, 1984

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?

We are all familiar with the facilitative effects of kinesthetic experiences of abstract concepts for learners. Encouraging children to "play turtle" as an integral part of the Logo

graphics problem solving process is probably a well-established part of your "facilitator's repertoire" by now. Why not capitalize upon this symbiotic relationship between cognitive and physical activity?

### 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 semi-circles 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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Judi Harris was an elementary school computer use facilitator, graduate education instructor, and computer consultant for a number of public and private schools in Pennsylvania. She is now a doctoral student in education at the University of Virginia. Her CompuServe electronic mail address is 75116,1207.

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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.

## 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

some students is discussed in a section called "Visual Narratives." Although the activities described were implemented through Logo sprites, new animation software could easily be used in a similar way (such as Take One for the Apple, or IBM's MPAL -- Multi-Purpose Authoring Language).

A major section of *Cultivating Minds* deals with the differential diagnosis of learning disabilities, and the unusual spatial abilities observed in many learning disabled students. Weir suggests that the ability to visualize and make accurate judgments regarding spatial relationships is an often ignored strength in some students. Such students tend to have weak language skills, toward which most instruction is geared. Weir suggests several characteristics of spatially-gifted learning disabled students which may predict success with Logo. In this way, Logo can be used as a visually-oriented bridge to content areas such as mathematics.

### Trapped Intelligence

The idea of untrapping intelligence through Logo is one of the major themes in *Cultivating Minds*. Weir reviews some of her own early work with autistic children, as well as that of Jose Valente with cerebral palsied students. She suggests some ways in which computer-based activities can assist in assessing the intellectual abilities and deficits of severely physically impaired learners. These are among the most memorable of the children described in Weir's book. Here we meet Michael, a 17-yr. old severely cerebral palsied child, with limited communication and academic skills. Turtle graphics became a medium of expression as well as instruction for Michael, whose high intelligence became evident through his Logo projects. We watch as a seven-year old cerebral palsied child named Nicky learns number concepts, planning skills, and spatial awareness.

Weir is aware of the danger of adding to the hype about Logo, and of implying that Logo is a magical elixir for learning problems. Not all children respond positively to Logo activities. Weir cites a project completed with 12 children in a special school. Of the 12, five who were diagnosed as autistic made good progress during their work with Logo. Of the seven non-autistic children, five failed to make any progress, Weir explains, either because of extremely low cognitive level or extreme emotional disturbance.

One of the aspects of *Cultivating Minds* that teachers and researchers will appreciate is that Weir presents her sample cases in context. That is, she provides many details about interaction between teacher, student, and the computer. Rather than describing only what happens on the computer screen, Weir lets us see other aspects of the learning environment that are important. The integral role of the teacher in successful Logo activities is apparent.

Weir begins her book with a warning to educators: she fears that teachers may abandon the decisions about the use of computer technology in education to non-educators. That is, experts in the computer industry, rather than educators, may continue to determine what is available in the classroom. Weir

hopes that if teachers become familiar with the possibilities afforded by a computer, they will be more active in determining its future role in education. *Cultivating Minds* confirms the experiences many of us have had as Logo learners and teachers. It provides informative and inviting glimpses of children actively participating in learning.

### And Now For Something Completely Different: Teaching Logo to Talk

Over the years many special educators have asked us how to make Logo talk. Many of the best applications for Logo with special populations can be enhanced through the addition of synthesized speech. Here are some basic pointers.

There's no special magic. If you can hook a printer to your computer and make it work, you have all the skills you need to use a speech synthesizer. But it is necessary to have a speech synthesizer that can talk by itself. Some synthesizers rely on the resources of the computer in order to talk, and can't speak at the same time that Logo is using the computer. Unfortunately, the popular Echo + speech synthesizer falls in this category. The Echo + (Street Electronics) is an inexpensive card which fits in a slot in the Apple.

The kind of speech synthesizer which is most likely to work with Logo consists of a self-contained unit which can be connected to the computer by means of a cable. Speech synthesizers which fall in this category include the Echo GP (General Purpose), Echo PC, and the Votrax Type 'n Talk or the Votrax Personal Speech System (PSS). These stand-alone speech synthesizers often contain their own microprocessor, which allows them to talk without using the resources of the host computer that Logo needs. This kind of synthesizer is connected to the computer's serial port. If you have a serial printer, you can often unplug the printer cable from the printer and plug it directly into the speech synthesizer.

The computer and the speech synthesizer must be set to send and receive information at the same speed. This is accomplished by matching the switch settings on the speech synthesizer with similar settings on the serial card in the computer. If you can't identify the switch settings on the serial card, we suggest setting the speech synthesizer as follows:

	First Try	Second Try
Baud Rate	9600	9600
Parity	Even	None
Data Bits	7	8
Stop Bits	1	1

You will find sets of small switches on the synthesizer in clusters of 4 to 8. In your manual, these are often referred to as DIP switches. The manual will explain how to set these switches (on or off) to obtain the settings listed above. You can't harm the computer or the synthesizer by getting the wrong settings. However, if you find that you are having

difficulty matching the settings for the speech synthesizer with the settings for the computer, it is probably best to enlist the help of a knowledgeable friend or dealer. After you see it done the first time, you'll be a pro, too.

### Making Connections

The Echo GP and the Echo PC each come with their own cable. In fact, that is the only difference between them. The Echo PC comes with a cable which plugs into a serial port on an IBM computer. The Echo GP comes with a cable compatible with serial ports on most other computers. For a small additional fee, you can obtain both cables when you order an Echo, if you plan to use the Echo with IBM and other computers.

The chances are that you could use your serial printer cable with both external Votrax speech synthesizers. The Votrax PSS can be connected to a parallel port as well as a serial port. Of course, if you select the parallel option, you will need a parallel cable and a parallel interface card in the computer.

### Talking With Logo

Once you have your speech synthesizer connected, the rest is easy. Imagine that you were going to use Logo to print a message on the printer. The text sent over the printer cable would appear on the printer paper. The only difference now is that a speech synthesizer is at the end of the cable, and it is going to say the words instead of print them. Here are SAY procedures in various versions of Logo, that will let you turn text into speech.

To use the SAY procedure, you simply type what you want to hear in brackets after SAY:

? SAY [HELLO, I AM TALKING!]

HELLO, I AM TALKING! (said aloud by synthesizer)

It is easy to go through your old Logo programs and make them talk. Just replace the PRINT command with SAY.

Terrapin Logo	Apple Logo II	IBM Logo
TO SAY :LIST	TO SAY :LIST	TO SAY :LIST
PRINT :LIST	PRINT :LIST	PRINT :LIST
OUTDEV 1	OPEN 1	OPEN "COM1
PRINT :LIST	SETWRITE 1	SETWRITE"COM1
OUTDEV 0	PRINT :LIST	PRINT :LIST
END	CLOSE 1	CLOSE "COM1
	END	END

The versions for Terrapin Logo and Apple Logo II assume that your serial interface is in slot 1. If your interface card is in a different slot, change the number in SAY to match that slot number. Apple Logo (the version before Apple Logo II) does not lend itself to a SAY procedure.

On the IBM, serial cards can be set to COM1 or COM2 (communication card 1 or 2). If COM1 in SAY doesn't work, try COM2.

Votrax Synthesizers: Votrax, 1394 Rankin, Troy MI 48083

Echo Synthesizers: Street Electronics 1140 Mark Ave., Carpinteria, CA 93013

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## Microworlds of the Month Club

by Michael Friendly

In the July 1986 issue of the *International Logo Exchange* newsletter, I mentioned the possibility of starting a project to catalog Logo microworlds which have been developed in various curriculum areas by people throughout the world. The idea was to publish a catalog similar in scope to Alan Bundy's *Catalog of Artificial Intelligence Tools* (Springer-Verlag, 1984), to encourage the sharing of representative and exemplary Logo work, make the reinvention of wheels less necessary, and catalog the educational concepts and domains to which Logo has been applied.

Catalog entries would contain a brief description of a microworld and an indication of the intended audience and content area. Whether and how the software and other materials would be made available to others would be left to the individual contributors. The submissions to the catalog should most likely be reviewed by a committee made up of Logo teachers and educators in a wide variety of curriculum areas. Any volunteers to serve on such a committee?

Since the original announcement, I've received a number of replies, suggestions for the project, and several packages of Logo microworlds and teacher resource material. I do not have space to describe them here, but I did want to thank those who sent their thoughts and work. Perhaps in future *Logo Exchange* issues, we can highlight some of these. Stay in touch.

Please send me your thoughts on the microworld catalog idea. If you have developed microworlds for use in your teaching area, I would appreciate any information you would be willing to share. If you have access to a computer network (e.g., ARPA, UUCP, BITNET, MAILNET, etc.) you can send E-mail to FRIENDLY @ YORKVM1.BITNET, or on CompuServe, [72777,253]. Send ordinary mail to me at: Psychology Department, York University, Toronto, Ontario, Canada M3J 1P3.

# LXionary

## A Lectionary of Selected Logo Readings

*with Commentary and Opinion  
by Bill Craig*

>>"Different Visions of Logo." by Seymour Papert,  
*Classroom Computer Learning*, Nov. / Dec., 1986.

"Logo is not a person, it neither promises or delivers ... It's a medium of expression for both children and teachers." With this introduction, Papert begins a description of different ways Logo is being used. He emphasizes that while he can prescribe no "right" ways of using Logo, there certainly are wrong ways. Papert quotes one young student who saw a difference between time spent during the summer learning to program as opposed to being taught at school to write a program. Both the student and Papert prefer the spirit of the summer learning.

All Logo users will benefit from Papert's discussions of Logo applications which he finds "exciting and instructive." The first example is Leslie Thyberg's "Ask three before me" rule used in her K-3 classroom in Pittsburgh (Ed. note: See "Too Many Questions, Not Enough Me." by Leslie Thyberg, NLX, May 1985). Students asking students encourages a classroom climate in which a healthy computer culture can grow.

The second example comes from The Computer School in New York, where students used Logo to time the speed of sprites moving across the computer screen. The result was a Logo program which was used as a tool for doing something else, not a programming exercise whose completion was an end in itself.

The third example is the use of Logo to help determine how long it takes to count to a million. The investigation allowed students to comprehend the speed of different computers as well as compare human counting to computer counting. Again, Papert sees value in programming the computer to help learn something as opposed to simply learning to program.

I really like the classroom examples that Papert describes and agree that they represent productive uses of classroom computers. But I have a problem with the statement that Papert uses to preface these descriptions:

*... there is, of course, no "right way" of using Logo ...  
But there are ways of "using it wrong" which I'd like to  
clarify.*

Are we saying that we really cannot tell how to teach with Logo, but we can surely tell when it is being done incorrectly? It seems to me that statements like this do nothing to encourage teachers to explore the use of Logo. If there are "wrong" ways of using Logo, then there must be

right ways; teachers need to be provided with models of these right ways. I am not suggesting detailed scripts, but I am suggesting concrete guidelines which distinguish productive uses of Logo from non-productive uses.

While Papert's article describes excellent examples and hints at some guidelines, the examples have few common threads. One is a classroom management technique and the other two involve students using the computer to investigate a question. For the experienced Logo teacher, these examples are rich with ideas. The Logo novice deserves more guidance. Few teachers have time to make guesses about what makes for good Logo instruction. It is not enough to sneer at the teacher who asks every student to write a house procedure after drawing a square and a triangle. If this is an example of bad Logo, we need to provide this teacher with many more examples of good Logo.

I welcome your comments on this issue.

In a short companion article, "Notes on the Logo 86 Conference: Whatever Happened to the Logo Revolution?" Judy Sapeter gives an insightful summary of this summer's conference. Her conclusion is that as a religion, Logo may be dying, but as a valuable teaching tool to be used in many ways, Logo is "alive and well."

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the Chesterfield County Schools, Chesterfield, VA 23832.*

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## Miscellaneous Notes

The International Computer Problem Solving Contest (ICPSC) announces a special Logo division for grades 4 - 6 in the 1987 contest. Details are available in a special brochure. The ICPSC now actively supports Logo as a problem solving language. Let's take advantage of this activity. For a brochure, write to: ICPSC: Logo, University of Wisconsin-Parkside, Box 2000, Kenosha, WI 53141.

Do you or any of your students or colleagues have accounts on CompuServe? If so, then you should know about the Logo Forum. Hosted by Jim Muller of the Young Peoples' Logo Association, the Logo Forum has become a popular "electronic meeting place" for Logo users from all over. To join the Logo Forum, just type GO LOGOFORUM at the "!" prompt, and CompuServe will take care of the rest.

Do you use Appleworks in your teaching? If so, then you might be interested in *Home and School Works*, a newsletter featuring Appleworks educational applications. Each issue includes articles about Appleworks uses, Appleworks tips, and reviews of hardware, software, and books supporting Appleworks. The subscription rate is \$19.95 per year for 10 issues. A sample issue is available for \$2.00. School purchase orders are accepted. For more information, write to: Home and School Works, PO Box 72, Leetsdale, PA 15056.

# Testudinal Testimony

by Douglas H. Clements

## Social Cognition: An Updated Perspective

Social cognition used to be the study of children's learning about social situations. Recently, it has included the study of children's learning as facilitated by social situations. In other words, social cognition has expanded from the development of social knowledge to the social development of knowledge (Bearison, 1982). From the traditional perspective, social cognition mediates behavior, enabling the development of social competence (Damon, 1982). That is, what children know about social situations affects what they do in those situations, and this permits further social development. However, from the expanded perspective, the knowledge developed in interactive situations is not limited to the social domain.

Cognitive development is also facilitated by peer interaction, especially interaction that requires children to coordinate their actions and thoughts. When children plan problem solving strategies with each other, they often have opposite views — their own egocentric perspective. This "conflict of centrations" must be resolved if they are to "get together" to solve the problem (Perret-Clermont, 1980). Awareness of one's own problem solving processes, also may have origins in such interaction.

*In so far as he is thinking only for himself, the child has no need to be aware of the mechanism of his reasoning.*

--Piaget, 1928

### Social-Cognitive Interactions in Logo Programming

Logo work can engage children in every step of problem solving. Children working together must continually negotiate their problem definition and solution strategies to proceed. Participants in a coherent social problem solving interaction attempt to make sense of (give meaning to) the actions of others, continually modifying their own goals in the process (Cobb, in press). If their goals or solution processes diverge too radically, their actions will interfere with each other. Thus, children must continually validate their own problem solving activity in light of their partners' activity, always striving toward mutual agreement. To do so, they verbalize aloud their thought processes as they engage in problem solving activities.

### Sounds Promising, But... What Does the Research Say?

There is some evidence that Logo facilitates this type of social-cognitive interaction. Clements and Nastasi (1986) found that children working with Logo exhibited a significant-

ly higher frequency of behaviors indicative of this type of high-level processing than those working with CAI programs. It appears children engage in more conflicts; but they also resolve them more frequently.

In an investigation of Logo's use in the mathematics classroom, Hoyles (1984) concluded that students were provoked to create and struggle with challenging goals of a mathematical nature and, in so doing, learned to articulate their thoughts and communicate and negotiate with their partners. She hypothesized that the frequent use of "exploratory" talk helped students reconsider their thought processes.

Lehrer and Smith (1986) did not find that students working together solved a problem more efficiently than students working alone. Importantly, however, those working together elaborated their representation of the program in several ways. They were more likely to decompose the problem into subproblems, shown by their propensity to use procedures and planning statements. They spent a significant proportion of their time agreeing on a course of action when such agreements were necessary to successful solution of the problem. It was speculated that procedures served as a shared referent and thus facilitated joint participation in problem solving.

Taking a Vygotskian perspective, Emihovich, Miller, and Clare (1985) are studying the process of learning Logo as mediated through the teacher's and children's interaction, as well as relating these process variables to outcomes on specific performance measures on a transfer task. Their work has not been completed, but preliminary results suggest that teacher and peer interactions within the Logo environment are instrumental in developing the types of skills (e.g., detecting errors) that were measured on a transfer task.

In a similar vein, Harckham et al. (1985) observed that teachers initiated more high-level interactions in Logo environments than in CAI or control settings.

In sum, in requiring the coordination of actions and thought, the types of interactions engendered by the Logo environment may be responsible for the development and transfer of higher-order thinking skills.

### In the Classroom

When children disagree, you may wish to act as a catalyst, not an arbitrator. You might say, "This is your people's program, not mine. You must agree with each other. Try to convince each other that your idea is best." As a catalyst, encourage high-level peer interaction through high-level questioning.

Piagetian researchers have shown that such questions are often sufficient for students to build higher mathematical knowledge. In addition, use whole-class discussions to encourage transfer of ideas. Use questions such as:

- What else could be made from Rebecca's procedures?
- Susan, would that help you with your program?
- What are you planning to do now to extend your work?
- Who has a suggestions on how she might do that?



How is this similar to other procedures you have written? How is this different?

How is that procedure similar to the process we used yesterday to solve the mathematics problem?

In general, encourage social collaboration in your classroom. Educators probably do not have to have one computer per student (nor even close to that ideal) to construct a meaningful, collaborative Logo environment. This collective nature of Logo may argue against a non-classroom (e.g., laboratory) setting.

### Social Issues: Final Words

It is important to reiterate that Logo, as conceived by Papert (1980), is more than a programming language; it is a catalyst for the generation of a learning / teaching culture. This culture includes as a necessary component children's interaction with others.

Further, one of Papert's principles of Logo learning is "cultural resonance": the ideas learned within Logo should make sense in terms of a larger social context. One implication is that future research on Logo should consider the social context in which the teaching / learning is embedded.

It is, perhaps, not surprising that research results, especially concerning cognitive benefits, have been inconsistent. Several evaluation efforts have disassociated the Logo language from its sociocultural roots, placing it within the traditional classroom context. Their findings are frequently "No significant differences."

The social interactions that occur in Logo environments may be qualitatively different from those in other environments. In fact, child-child and child-teacher interactions during Logo programming may be as significant for social, emotional, and cognitive development as are the child-computer interactions.

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## Logo Disserts: Dissertations Dealing with Logo by Barbara Elias

The importance of problem solving experiences for elementary school children cannot be overstated. Computer programming has been proposed as one means of teaching problem solving because the two activities seem to share many common elements. H. J. Bamberger investigated the effect of learning to program in Logo on the problem solving strategies of fourth grade children as they solved non-computer mathematical word problems. The primary purposes of the study were to determine which problem solving strategies children used and to determine whether children who had studied Logo applied strategies taught while learning Logo. An additional purpose was to investigate if children who had learned Logo would have a more favorable attitude toward mathematics.

Fifteen fourth grade girls and boys in an independent school were randomly selected for participation in this eleven week study. Logo instruction was provided during part of the scheduled mathematics class. The first 20 minutes of a 45-minute class period were spent in the classroom on mathematics. The latter portion of each period was spent in a nearby computer lab.

Logo experiences included the basic commands, editing and saving procedures, variables, and recursion. The students



worked individually or with a partner and kept a daily journal or written notes and illustrations. Students in the control group spent the entire class period on mathematics instruction supplemented with hands-on materials and games. Both groups were given the same homework assignments and quizzes. The Logo group was given additional tests on Logo materials.

At the end of eleven weeks, a mathematics attitude scale, the *Riedesel Inventory of Children's Attitude Toward Mathematics*, and a four problem posttest were administered to the experimental and control groups. Problems in the posttest were selected by the investigator because they included strategies similar to those used in Logo programming: drawing a diagram, breaking a large problem into manageable parts, guessing and checking, checking over completed work, and deductive reasoning. The posttest was administered to each child individually by a trained teacher. An audio tape was made of each child's verbalizations as the problems were solved. This information was then coded and analyzed.

Children in the experimental group were able to use some of the strategies from Logo in solving non-computer problems. They performed significantly better on several problems using two strategies: checking and looking back, and correcting errors. They used checking and looking back more than children in the control group to solve every problem. Significant differences on the attitude scale were noted only on their general attitude toward school; however, a number of positive shifts in attitude were observed. Computer shy students became eager participants and children who initially were anxious about bugs appeared less nervous as the study progressed.

All of the students expressed enthusiasm about using the computer. They wanted to remain in the lab after class. They used their break time to work on projects and eagerly invited parents to an exhibition of their work.

Perhaps the positive signs which resulted from this study will encourage elementary teachers in their informal research efforts and generate further interest in experimental work in exploring the programming / problem solving relationship.

>>>Bamberger, Honi Joyce (1984). *The Effect of Logo (Turtle Graphics) on the Problem Solving Strategies Used by Fourth grade Children* (Doctoral Dissertation), University of Maryland, 1984.

Ed. note: Each month, Barbara Elias highlights a dissertation or thesis dealing with Logo. She is accepting copies of recent research results for the LX Dissertation and Thesis Repository. Reports may be mailed to Barbara Elias, 4223 Hickory Road, Ettrick, VA 23803.)

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## Welcome Back to LogoWriter

by Sharon Burrowes

This is the second in a series of four articles on LCSi's newest version of Logo, appropriately named LogoWriter. Each article is divided into three parts: a section for those training others in the use of LogoWriter, some hints for those making the switch from "traditional" Logos to LogoWriter, and, finally, suggestions for classroom teachers. This last section will focus more on primary and secondary uses of LogoWriter since the printed materials furnished with LogoWriter are aimed at the middle school level.

### Teacher Trainers

If your experience with teacher training has been like mine, you have no doubt been thrilled by the enthusiasm and excitement among new LogoWriter users, whether they are new to Logo or not. Even teachers who have previously been reluctant to use the computer see immediate classroom applications. All of this initial excitement and success has generated an unexpected problem among teachers in our school system. They seem to feel that LogoWriter is so perfect that it will "teach itself."

For example, a number of teachers have noted that students do not read all of the steps in the booklets and thus get themselves into trouble when developing projects. In any other subject, they would simply counsel the student to review earlier written instructions. They seem reluctant to do this with LogoWriter, as if study skills necessary in other curriculum materials are not necessary to use LogoWriter materials.

As you are training teachers, it is important to take a break from the exuberance LogoWriter generates. Take some time to get everyone's feet on the ground and discuss such mundane matters as management of computer time, study skills when using LogoWriter booklets, and possible evaluation schemes. Send your "charges" away from a training session excited, but with a realistic outlook on classroom mechanics.

There are also some specific software problems which you may have encountered as teachers produce early projects. In traditional Logos, an early question is often, "How do I erase the lines the turtle drew?" With LogoWriter, the problem expands from "turtle tracks" to stamped shapes and text created using *Label* that has been improperly or incompletely "erased." Some specific solutions for these problems are given in detail at the end of this article.

Have you ever started to show a neat program to a group, only to find that the wrong shapes are being displayed on the screen? This is caused by the way LogoWriter handles the *Shapes* page. When you boot LogoWriter, you see an initial screen that asks you to press *Return*. Whatever *Shapes* page is on the disk in the drive is then loaded into memory. Switching disks and accessing the new *Contents* page does not

change the shapes in memory. You must type "Shapes" in the *Command Center* to get the shapes from the current disk into memory.

Finally, don't forget the word processor that LogoWriter offers. Traditional Logo users sometimes become so enamored with *Label* that they don't discover the power inherent in using *Up* to put text directly on screen. Unlike *Label*, the word processor mode includes word wrap and allows editing using the arrow keys, the *Delete* key, and *Replace*. Perhaps you might even consider a workshop in which you use nothing but the word processing capabilities of LogoWriter!

### Making the Switch

Are you still typing too much? The November article in this series challenged you to make use of the *Command Center* to avoid retyping commands that you used earlier. Now another challenge: make maximum use of *Select*, *Cut*, *Copy*, and *Paste*. These four functions allow a flexibility undreamed of by traditional Logo users. You can *Cut* or *Copy* from almost anywhere to anywhere. You can *Copy* a procedure from the flip side of the page and *Paste* it on the front so the user can see the procedure code while it runs. You can *Copy* commands from the *Command Center* to the *Flip* side of the page, add *TO*, a title, and *END* and you have a procedure. You can put text from the *Command Center* onto the page for safe keeping until the next time you want to work with the page. You can *Cut* the body of a procedure from the *Flip* side and put in the *Command Center* in order to run a trace. Before you retype anything, consider using these word processing capabilities of LogoWriter to save you time.

*Cut*, *Copy*, and *Paste* also work on the *Shapes* page. Moving to a shape on the *Flip* side of the *Shapes* page amounts to "selecting" it. You can then use *Copy* and *Paste* to make multiple copies of a shape in order to modify them for an animation. You can use *Cut* to get rid of a shape you no longer want. To move a shape from one disk to another, you can *Copy* it from the first disk, insert the second disk, and *Paste* it in the location of your choice. Be careful, though. You can easily erase a shape you want this way.

There are a couple of undocumented editing keys. Have you also discovered them? *Control-D* on the Apple works to delete the character under the cursor. In addition, *Open Apple-O* to open up a new line is also available. This is particularly important in the *Command Center* where pressing *Return* causes a command to be run.

Have you discovered the four turtles that LogoWriter offers? This is a delightful change if you have never used a version of Logo with multiple turtles. The four turtles are numbered 0, 1, 2, and 3. They appear at the corners of a square in clockwise order, with Turtle 0 being the one that appears when you boot LogoWriter. There are a few commands that you need to know to work with these four delightful little creatures. *Tell* makes turtles active until another *Tell* command is issued. For example, if you type

```
TELL [0 2]
```

any turtle graphics commands activate both Turtle 0 and Turtle 2 at the same time. These two remain active until another *Tell* is entered or *RG* (the Reset Graphics command) is typed.

A second command for working with multiple turtles is *Each*. *Each* instructs the active turtles to follow a series of commands, one turtle after another. For example,

```
TELL [0 2 3]
```

followed by

```
EACH [FD 50 RT 90]
```

causes Turtle 0 to go forward 50 and turn right 90, then Turtle 2 goes forward and right, and finally Turtle 3 follows the commands.

The third multiple turtle command is *Ask*. *Ask* does not affect the "active" turtles. For example

```
TELL [0 3] ASK 1 [FD 50] FORWARD 25
```

causes Turtle 1 to move forward 50. But Turtle 1 does not become activated, so only Turtles 0 and 3 move forward 25 units.

There is also a reporter for multiple turtles which you should know about. *Who* returns the numbers of the active turtles. So, for example, if you have

```
TELL [1 2]
```

and then later type

```
SHOW WHO
```

Logo prints in the *Command Center*

```
[1 2]
```

Spend some time with these new LogoWriter ideas. The word processing capabilities open up many new doors. The ability to *Cut*, *Copy*, and *Paste* shapes speeds up the creation of animations, and multiple turtles add a new dimension of fun to LogoWriter.

### In the Classroom

The projects generated by beginning LogoWriter students are nothing short of amazing. The ability to save pages, mix text and graphics, and write freely on the screen allows students of all ages to create exciting projects from almost the first day.

Of course, implementing LogoWriter is not without problems, whatever age group you may be teaching. Almost without exception, students have trouble with *Label*. No matter how carefully they are taught, they inevitably erase in the *Label* mode incorrectly. Unfortunately, the last addition to a student masterpiece is often the label on the project. What is

needed is an eraser ... no sooner said than done! At the end of this article is a listing of an eraser program which you can enter, save as *Eraser*, and then instruct students to type

## GETTOOLS "ERASER

followed by

### ER

The arrow keys move the Eraser around the screen, and pressing E erases any graphics (including text placed with *Label*) underneath. This eraser will also work for stamped shapes that are no longer wanted, another problem for beginners.

Older students who make the transition rather quickly from creating pages to writing procedures often want to know how to "translate" *Turtle-Cursor* mode into procedures. This can be accomplished as follows:

1. Place the turtle using *Turtle-Cursor* mode and press *Esc*.
2. Type **SHOW POS** and a list of coordinates appears in the *Command Center*.
3. Put the command **SETPOS** followed by the list from the *Command Center* (use *Copy* and *Paste*) into your procedure.

Now the turtle will move directly to the location established with *Turtle-Cursor*.

How have you provided feedback to your students on Logo or other computer projects in the past? Did you have students print pictures or procedures? Did you look at their disks and provide written feedback? The LogoWriter page is a perfect vehicle for providing comments, suggestions, and even grades. Anything you add becomes a permanent part of the page when you save it. You can add a "NEAT WORK" in text to a graphics picture ... and the student can simply type CT if s/he doesn't want it there. If students are using only the front of the page, commentary can go on the flip side. This can be particularly valuable for giving suggestions about a student paper, book report, or poem. If your students are writing programs, comments on programming style or design can be embedded between the procedures themselves. It seems likely that teacher feedback which becomes a part of a student's page is more likely to be viewed as personal attention from the teacher and perhaps taken more to heart by the student!

## Conclusion

Much has been covered in this article ... whether you are new to Logo or an "old hand." It might be a good idea to reread this article again in a month or so. In the meantime, if you have any ideas that you would like to share with others, drop me a line. I'd like to include your thoughts in a future article.

## Eraser Program

This program will erase stamped shapes or text put on the screen with *Label*. When asked for the background color, be sure to type the color number of the background where you want to erase.

```
TO ER SET.UP
ASK.COLOR
MENU
GET.KEY READCHAR
CLEAN.UP
END
```

```
TO SET.UP
MAKE "ORIG.SHAPE SHAPE
ST SETSH 11
PU HOME
END
```

```
TO ASK.COLOR
TYPE [WHAT IS THE BACKGROUND COLOR? ]
SHOW "
MAKE "BG READCHAR
SETC :BG + 1
END
```

```
TO MENU
SHOW " TYPE [USE ARROW KEYS TO MOVE]
SHOW " TYPE [E= ERASE S=STOP]
SHOW "
END
```

```
TO GET.KEY :KEY
IF EQUAL? :KEY "S [STOP]
IF EQUAL? :KEY "E [SETC :BG PD STAMP PU
SETC :BG + 1]
IF EQUAL? ASCII :KEY 8 [SETH 270 FD 20]
IF EQUAL? ASCII :KEY 21 [SETH 90 FD 20]
IF EQUAL? ASCII :KEY 10 [SETH 180 FD 20]
IF EQUAL? ASCII :KEY 11 [SETH 0 FD 20]
GET.KEY READCHAR
END
```

```
TO CLEAN.UP
SETSH :ORIG.SHAPE
END
```

The above eraser uses Shape 11 which fills the entire shape grid. Sometimes you may want a "finer" eraser. First, define a shape that is about 1/3rd to 1/4th of a shape grid. You may need to do some experimenting. (I defined Shape 1 to be a small vertical rectangle, 3 blocks wide and 8 blocks high.)

Then change the procedures given above as follows:

```

TO SET.UP
MAKE "ORIG.SHAPE SHAPE
ST SETSH 1 <-- Shape number of your "mini-eraser"
PU HOME
END

TO GET.KEY :KEY
IF EQUAL? :KEY "S [STOP]
IF EQUAL? :KEY "E [SETC :BG PD STAMP PU
SETC :BG + 1]
IF EQUAL? ASCII :KEY 8 [SETH 270 FORWARD 2]
IF EQUAL? ASCII :KEY 21 [SETH 90 FORWARD 2]
IF EQUAL? ASCII :KEY 10 [SETH 180 FORWARD 10]
IF EQUAL? ASCII :KEY 11 [SETH 0 FORWARD 10]
GET.KEY READCHAR
END

```

Note: The idea of an Eraser first came to my attention when some of my high school students developed erasing techniques in the Spring of 1986. This idea was again pursued by several participants in a workshop in which I assisted, presented by LCSi in New Ulm, Minnesota. These ideas buzzed around in my head for some time before taking the above concrete form. My thanks both to my students and the Minnesota workshop participants.

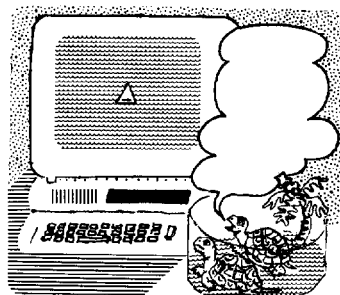
Sharon Burrowes is a computer coordinator for the Wooster (OH) Public Schools, and the author or co-author of numerous books and articles on Logo. Her address is 807 College Avenue, Wooster, OH 44691, and her CompuServe number is 73007,1645.

## The Adventures of Jacques and Elsie

drawings by  
Linda Sherman

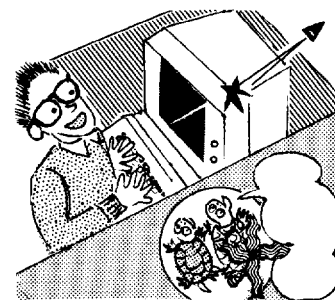
When the caption was reported for the September cartoon in the November issue, the cartoon was somehow "dropped" from the printing process. We'd like to try again. In our September cartoon, Jacques was making a comment to Elsie upon their first encounter with the Logo turtle. Our favorite caption was submitted by Andy David, of Chicago, Illinois.

"Isn't it  
amazing what a  
little artificial  
intelligence will  
do for a fella?"

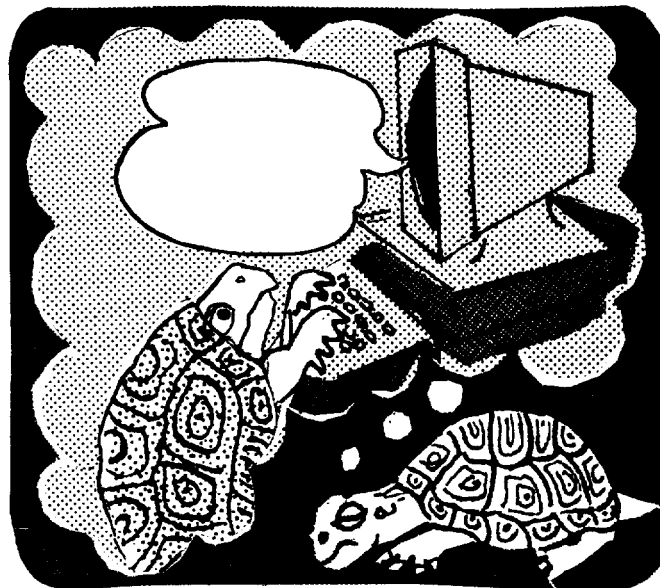


In our November cartoon, a young man was working at the computer with Logo. Apparently he typed in a rather powerful command, because the Logo turtle is seen blasting its way off the screen, up through the top of the monitor, and out into the great beyond. Jacques is making a comment to Elsie as they observe this somewhat unusual phenomenon. Our favorite caption was submitted by Sandy Towberman of Springfield, Ohio.

"It looks as  
if he got tired of  
wrapping around!"



In this month's cartoon, Elsie's dream continues. What is the computer communicating to her that causes her to pull in her head so?



Please send your caption suggestions no later than January 23, 1987, to: Jacques and Elsie, Logo Exchange, PO Box 5341, Charlottesville, VA 22905. Include your name and address so that we can give proper credit should your caption be chosen.

All captions become the property of Meckler Publishing. None can be returned.

Linda Sherman is a freelance author and artist living in Shipman, VA, with her husband and two-year-old son.

## LIFT's

## Teacher to Teacher

by James Fry

### Logo Cards and Mac Logo

#### Pass the Cards

*Logo Steps into the Curriculum*, by Helen Bistriz and Peggy Lahs, 1985, published by Incentives For Learning, Inc., 600 West Van Buren Street, Chicago, IL 60607, (312) 726-3200.

**Target Audience:** Logo students and teachers of students in upper elementary and middle school grades. The set of cards is designed for LCSi Logo on the Apple and IBM computers.

**Content:** *Logo Steps into the Curriculum* comes with 72 lessons on heavy 8 1/2" by 11" cards. The cards may be reproduced for classroom use. They are divided into three main sections: Mathematics and Art, Language Arts, and Social Studies. Also included are eight map transparencies that are used with the social studies section. The cards cover the teaching of Logo primitives and how they are used along with Logo activities to explore areas of the curriculum. There is also a small set of reference cards that cover Logo error messages, primitives, Logo editor commands, and a list of procedures that have been defined in each section.

**Strengths:** For a classroom teacher who likes to use centers and activity cards, this set might be of interest. Teachers have permission to reproduce the cards for their class, but the cards are heavy enough that they could be laminated and used in a computer or Logo center on an individual basis. I found the reference cards on Logo error messages, primitives, and Logo editor commands to be very interesting. A "What To Do" hint is given for each error message. For a student to have all of this information on one card is very handy. The cards with commands and operations do not list every Logo primitive, but list all the ones that are used with this kit. The short form is given along with an example instead of the usual type of examples found in the manuals. Instead of "IF predicate List (List)," the examples are real, as in IF EMPTY :CODE [STOP].

If you are the type of teacher that likes activity cards for the students to work on, then *Logo Steps into the Curriculum* is a set of cards that could save you the time of making your own, or give you some starting ideas to create your own.

#### Mac Logo

*Macintosh Logo: A Self-Teaching Guide*, by Roger W. Haigh and Loren E. Radford, 1986, published by John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158. \$18.95.

**Target Audience:** For individuals with their own Macintosh or as a student text in a classroom. The book is written for use with the LCSi Logo formerly sold by the Microsoft Corporation and known as Microsoft Logo. (LCSi has taken over the marketing of the Logo as of this writing.

Also, there is an updated version available which will run on the Macintosh Plus computer. Contact LCSi for details.)

**Content:** *Macintosh Logo: A Self-Teaching Guide* is composed of 10 chapters, a prefix, an appendix, and a general index which includes the primitives. It has the look and organization of a textbook, which complements the self-teaching claim of the title.

In the Introductory chapter, the authors talk briefly about the Macintosh interface, the origins of Logo, and the philosophy of Logo. The types of hardware and software required are also discussed, along with a brief lesson on the keyboard and using diskettes.

Chapters Two through Six follow the "traditional" sequence of teaching the different components of Logo: turtle graphics, defining and editing procedures, variables, conditionals and recursion, and words and lists. Chapters Seven and Eight contain examples or mathematical applications of lists and non-mathematical applications of lists. Chapter Nine is called Newton's Turtle and gives examples and problems on using Logo with Physics. Chapter ten is on Logo applications using files. It gives examples problems that can use text files of data from disk.

At the end of each chapter is a review section and a chart that gives the Logo operations or commands that were introduced in that chapter. The name of the operation or command is given along with any input and output it may have. The short name is also given for the commands that have one.

The chapters contain many diagrams, problem examples, and printouts of the screen. There are also sections called YOUR TURN and OUR TURN. These present problems and solutions or explanations.

**Strengths:** For the person who likes a fairly straightforward self-teaching type of book, this manual could be useful. If you have already a fairly good grasp of Logo, many of the exercises may not be new to you. It could be useful as a reference on some of the properties that are special to the Macintosh.

The book has good examples of how to draw solid figures with the Macintosh quickdraw routines that are part of Microsoft Logo and not found in the other Apple Logos as primitives. The quickdraw routines also have a much greater drawing speed because of the special graphics capabilities of the Macintosh. The use of a mouse and the capabilities that you have with using it in your programs is also covered. The managing of windows which is very much a part of the Macintosh environment is also discussed and is included in many examples.

If you are a novice or intermediate user of Logo or maybe just looking for a computer language to use with your Macintosh, then *Macintosh Logo: A Self-Teaching Guide* should be part of your Logo resource collection.

---

*James Fry uses Logo with his Chapter 1 remedial mathematics students at Novi Community School, Novi, MI, and is a co-founder of the LIFT group. His CompuServe number is 76317,565.*

Q

and

A

by  
Jim

McCauley

Q. Look at this procedure:

```

TO HOW.MANY :LST
  IF :LST = [ ] [ OUTPUT 0 ]
  OUTPUT 1 + HOW.MANY
  BUTFIRST :LST
END

```

I say this procedure is tail-recursive, but a friend of mine disagrees. Who is right, and why?

A. If you're thinking you have seen this question somewhere before, you are right! It appeared in the October

Q and A column. I've received some interesting mail concerning it, and I'd like to extend my original response.

Several LX readers disagreed with my definition of tail-recursiveness. As I understand it, a procedure is tail-recursive if and *only* if there are *no* computational tasks left suspended. The procedure above is *not* tail-recursive because the operation "+" is not completed before the recursive call is made. In other words, "+" has to wait for a value which will be returned by the recursive call to HOW.MANY. This means that each call upon HOW.MANY must be "remembered" by the computer so that the values computed by each copy can be returned to the copy that called it into existence. It's rather like the trail of breadcrumbs left by Hansel and Gretel as they wandered through the forest, in hopes that it would serve as a path home.

All of those copies of HOW.MANY take up a lot of space in the computer's memory as they wait for the copies they have created to "return" to them. Here is another way to write HOW.MANY that *may* result in great savings of memory use:

```

TO HOW.MANY :LST
  OUTPUT DO.HOW.MANY :LST 0
END

```

```

TO DO.HOW.MANY :LST :COUNTER
  IF :LST = [ ] [ OUTPUT :COUNTER ]
  OUTPUT DO.HOW.MANY BUTFIRST :LST
  :COUNTER + 1
END

```

HOW.MANY sets up DO.HOW.MANY by passing on the list and an initial value of 0 for :COUNTER. Notice that every time that DO.HOW.MANY runs, the value associated with :COUNTER is incremented by 1. Also notice that the addition takes place *before* a new copy of DO.HOW.MANY has to be created. As soon as :LST is empty, the value of :COUNTER may be passed as output immediately; there's no need to trace back through many copies of DO.HOW.MANY.

The people who create versions of Logo often take advantage of this property by making it possible for Logo to

recognize this kind of procedure. In many versions, they arrange to set up procedures such as DO.HOW.MANY as loops, so that they can run in a small area of memory without creating copies. Even though DO.HOW.MANY looks like it's creating many copies, it isn't. It's running as a loop.

This version of HOW.MANY and DO.HOW.MANY is quite different from the one that appeared in the October Q and A column, reproduced below.

```

TO HOW.MANY :LST
  MAKE "COUNTER 0
  DO.HOW.MANY :LST
  OUTPUT :COUNTER
END

```

```

TO DO.HOW.MANY :LST
  IF :LST = [ ] [ STOP ]
  MAKE "COUNTER :COUNTER + 1
  DO.HOW.MANY BUTFIRST :LST
END

```

The reason that Tom Lough and I used that version (in which MAKE stored the value computed by each call) was due to the fact that not all versions of Logo run this month's DO.HOW.MANY in a way that actually saves memory! It happens that the LCS versions that I am most accustomed to *can* recognize DO.HOW.MANY as a tail-recursive procedure and can convert it to run as a loop. However, this is not true for all Logo versions. So, although the October code will work as a tail-recursive procedure with a larger number of Logo versions, the code included this month is also "valid" for many versions.

The fact that some Logo implementations can automatically convert tail-recursive procedures into loops is really not well-described as "a programmer's trick," an unfortunate turn of phrase that I used in the October column. Its real value is that a programmer can retain the elegance of recursive expression without having to pay an enormous penalty in memory usage.

I hope that this additional example has made the concept clearer.

Each month, I will answer a selected question related to Logo. If you have a question, send it along with a stamped self-addressed envelope to:

Jim McCauley  
Logo Exchange Q and A  
876 East 12th Avenue, #4  
Eugene, OR 97401

---

*Jim McCauley is a graduate student at the University of Oregon, studying with David Moursund, and has written Logo articles for many national publications. His CompuServe number is 70014,1136.*

# IntLXual Challenges

by Robs Muir

## Totemic Turtles

In our Brave New World of high tech and high science, people still need to find Meaning in their lives. In earlier times, this meaning was found in magic and primitive religion. We supplant old beliefs with our new science. Yet this rational empiricism has stripped away magic's vitality without providing any comforting ultimate answers. Animism still has a hold.

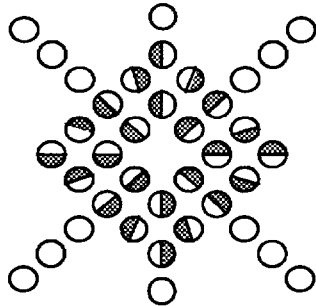
Logo will remain alive and vital as long as its users can use it as a vehicle to build connections between diverse subjects. Creative synthesis is at the core of computer education; we need to look for ways to link new technologies to traditional thinking. Additionally, we need to forge new ideas with these new tools. Sometimes these new ideas arrive in unanticipated form.

### Any Mail Today?

I'm never quite sure how these things happen, but recently I received an advertisement of a new book titled "Amer-Ind Gestural Code Based on Universal American Indian Hand Talk." Written by Madge Skelly, Ph.D., the book is of use for clinical speech / language pathologists interested in American Hand Talk (*Amer-Ind*) and its application for speechless clients. Not a word about Logo anywhere.

As my interests aren't inclined in this direction, normally this would have been lost in the flood of information that inundates the desk of a computer teacher -- this is the Information Age, right?. However, the topic was intriguing and the cover was about Logo! Well, kind of...

Adorning the cover of this advertisement from the publishing house of Elsevier North Holland, Inc., was an abstract yet unmistakable picture of a turtle! It was, in fact, the American Indian representation of a turtle.



A note within the flyer stated:

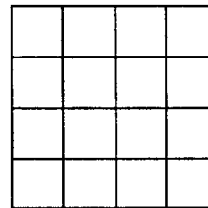
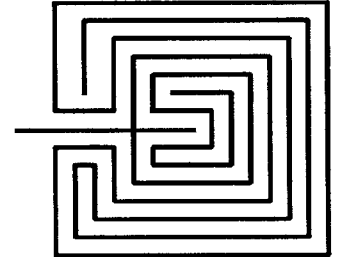
*Of profound significance in Dr. Skelly's personal and professional life, the turtle is her personal totem. In Indian tradition, the turtle is one who walks on water, therefore 'accomplishing the impossible.'*

Nice, huh?

Here is an interesting geometry problem that connects the old world of totems, animism, and the great unknown with the brave new world of Logo and computers. Can you build a Logo program to create this American representation of a turtle?

## Mother Earth

Life here on Earth has many interesting facets. It is filled with twists and turns and many blind corners. The Hopi symbol for Mother Earth can be drawn with a turtle. Can it be built with some iterative (or recursive) code, or must each line in the symbol procedure be built sequentially?



I've decided to adopt the suburb as my 20th Century totem. It has some magic properties of its own and it can also be written as a Logo procedure!

With apologies to Malvina Rynolds, there are many "little boxes on the hillside" in my totem. How many can you count? (Hint: More than 20.) Do you see them all? First the little ones, then the 2x2s, the 3x3s and one 4x4. Now, how many squares would there be in, say, a 15x15 matrix? Can you write a procedure to calculate the total for any given totem of  $n$  dimensions?

Send your solutions (along with a self-addressed stamped envelope) to:

IntLXual Challenges  
Attn: Robs Muir  
1688 Denver Avenue  
Claremont, CA 91711

We will compile several of the more interesting challenge solutions and redistribute them to those who contributed solutions.

---

*Robs Muir is a physics and computer science teacher in Claremont, CA, and an instructor at the Claremont Graduate School. His CompuServe number is 70357,3403, and his BITnet address is MUIR@CLARGRAD.*





# International Logo News



Dennis Harper  
Logo Exchange International Editor

## Global Comments

by Dennis Harper  
Institute of Education  
469 Bukit Timah Road  
Singapore 1025, Republic of Singapore

This month's international selection describes Logo activity in Togo, Senegal, Liberia, North America, and Australia. The African column is an exciting example of how a few dedicated people given some support, can influence Logo's growth on a wide scale. Africa, with its variety of languages, tribes, religions, and politics, is not an area of the world which comes to any easy consensus on many topics. But in this issue of the LX we see, despite political unrest, French, English, German, and Arabic speaking countries combining in mutual cooperation to introduce Logo into their school systems.

Presently, they are working with only a few students, but the word of Logo's power is spreading rapidly in Africa. Most encouraging is the spirit of sharing knowledge and expertise, which increases the potential for cooperative Logo research and development among African nations, a financial necessity for most of them.

There are international organizations dealing with the task of helping developing nations use technology effectively. One such organization is the International Federation of Information Processing (IFIP) and its TC3 education committee. Much effort is being made to provide assistance to developing nations. The World Conferences on Computer Education (WCCE) are organized by this group.

Another agency dealing with the problem is the Economic Development Institute of the World Bank. They are helping to organize and sponsor the World Council on Comparative Education Societies' 6th World Congress of Comparative Education in Rio de Janeiro next July 6-10. The Congress will be divided into six Commissions, one of which will emphasize computers in education in the perspective of comparative education. A major question behind the sessions would be the extent to which developing countries should (or should not) worry about missing this bandwagon. Would that be a major loss? Would computers increase the gap between developed and developing countries? Are there sensible things they could do with limited resources?

If any LX readers are interested in sharing views and/or experiences on the above questions, please send them to me. In addition, if you are interested in delivering a paper at the Congress or becoming a participant, let me know.

The Australian column reports on a refreshingly new way to use Logo with first grade students; techniques used in this research study could be of wide interest elsewhere.

The last six weeks of 1986 found me taking part in conferences in Kuala Lumpur, Malaysia, Perth, Western Australia, and Honolulu, Hawaii which hosted the Comparative and International Education Society meeting. Honolulu was also the site of the World Conference on Thinking where Seymour Papert and other Logoites spoke. The LX will be reporting on developments at these widely diverse conferences in coming issues.

FD 100 in 87!

## AFRICA

by Fatimata Seye Sylla  
Laboratoire Informatique et Education  
Ecole Normale Supérieure  
BP 5036 Dakar, Senegal, West Africa

**Senegal:** Since January 2, 1986, the Ministry of Scientific and Technical Research, which created the Senegalese Logo project, has been eliminated. The project team panicked and wondered whether or not the project would also disappear with the Ministry. Fortunately, it did not. Moreover, two ministries were trying to get the project: the Ministry of Planning and Cooperation (MPC), which inherited several departments from the former Research Ministry, and the Ministry of Education (MOE). The government decided to give the project to the MPC for two years, and then the case will be discussed again. Since the project is located in Ecole Normale Supérieure, which is a department of the MOE, a compromise had to be found.

Thus, the MPC invited the Ministry of Education to join it in overseeing the project. This solution seemed the best for the project team since some of the researchers depend on the MPC and others on the MOE.

This change actually increased the activities of the

project. Beside the research activities with children in primary schools, the Logo team will organize seminars to inform and initiate teachers to the use of computers in education. These seminars will be sponsored by the Intergovernmental Bureau for Informatics. A first seminar for the teachers and inspectors of elementary schools will be held in February, 1987, and another one for high school teachers later in 1987. Even though MOE is planning to introduce computers in high schools, it has not yet decided which machines and software will be used. The Logo project personnel are supposed to participate in the decision making.

Within the Ecole Normale Supérieure (school for high school teachers and inspectors), Logo courses will be organized for all the students starting in 1987. The decision was made after the students themselves came to the Logo laboratory and asked for training.

Another long term project in the University of Dakar may be the creation of a department of Learning Technologies, an idea some of the Logo team discussed with University members. The issue will be raised again soon.

A more real project is the creation of a Senegalese Islamic Institute, a project sponsored by Arabic countries. The building of the school is going on, and the opening is planned for September 1987. This Institute will include a complete academic course, from kindergarten to college. Graduate courses in Agriculture and Technology will be provided. All the courses will be bilingual: in French and Arabic.

One of the future directors of the department came to the Logo laboratory to find out what Logo and computer aided instruction are about. The team gave him the information he needed, some documentation on the topic, and the first issues of the *International Logo Exchange*. He was mainly interested in Arabic versions of computer software. That was the right moment to talk to him about Al Alamiah, the company whose Logo and other educational software run on MSX computers. It was unfortunate that the Senegalese Logo project had not yet received from Al Alamiah the complete MSX system and the Arabic Logo version to make some demonstrations on this occasion.

This Arabic Institute plans to buy computers and be responsible for investigating ways of choosing the right hardware and software for the purpose of education.

**Togo:** The Intergovernmental Bureau for Informatics organized a seminar in Lomé, the capital of the Republic of Togo (West Africa). The seminar was intended for teachers and was on the use of computers in education. Two members of the Senegalese Logo project were invited to present their Logo works for one full day. After presenting the Senegalese project, they discussed the Senegalese children's reactions to computers and Logo, made some Logo demonstrations, showed some children's procedures and some teachers' work. They talked about animating a Logo class, discussed the pedagogical acquisitions with Logo, and answered questions dealing with specific African problems (cost of computers, lack of schools and teachers, school failure, etc.).

The seminar was first planned for October 28-31 but, because of the political problems occurring now in Lomé, the seminar was postponed until December. I hope that this seminar will help the government of Togo to start some activities in the use of computers in education. Thus, a new African Logo project might get started in Lomé.

**Liberia:** Recently, I received some news from Mr. Ounzuba of Computer Consultants Inc. He is still trying to get his Logo project funded by UNESCO and he is very optimistic about that. He is very thankful for the offer the Senegalese project made to train his Liberian project workers in Logo. This will be one first step toward an African collaboration in the use of computers to enhance education.

Meanwhile, Mr. Ounzuba is having some Logo activities in Liberia. He wrote: "I had a 14-year-old student (Wilfred Boayue) experimenting with Logo. The results are fascinating. I am including a diskette containing samples of his work ... when he achieved his original objective for entering the program, learning to write a video game RATS. Subsequently, we have exposed him to word processing and BASIC on our Wang PC. The Logo concept of procedures, subprocedures, and superprocedures can clearly be seen in his methodology for learning. I was hoping he would help me with the research, but his parents are moving over to Zambia."

Mr. Ounzuba wished to have a Logo contact in Zambia so that he could put Wilfred in touch with them. LX readers are invited to write to me or Mr. Ounzuba (PO Box 1343, Carey Street, Clave's Pharmacy Bldg., Suite 4, Monrovia, Liberia) if they know of any Zambian Logo contacts.

**Beyond Africa:** The Senegalese project owes respect and thanks to Dr. Papert at MIT and Kiyoko Montpetit, Effie Maniatis, and Michael Tempel of LCSi for their constant support to the Senegalese project. Thanks to these people, our project has acquired software and some equipment. Recently, we acquired a package of LogoWriter, and our researchers are now enjoying it. This is really the right moment for them to have something absolutely up to date in Logo. They are very eager to get the French version of LogoWriter to start experimenting with it in the primary schools with teachers and children. This will allow the teachers and children to do some word processing and be in contact with another aspect of Logo. The researchers will study the impact of this new Logo version on its users. They will study whether or not LogoWriter is more meaningful, more interesting and provides more motivation for learning in the Senegalese schools.

### Australia

by Anne McDougall  
Faculty of Education  
Monash University  
Clayton, Victoria 3168, Australia

**Literacy, Numeracy, and Color through Logo:** A recent study based in an Australian grade one classroom has shown some interesting ways in which Logo can provide opportunities for children of this age to explore the curriculum areas of literacy, numeracy, and color. The study was carried out by Jeff Richardson, an elementary school teacher who already had a good deal of Logo experience, as part of his Master of Educational Studies degree.

The theme of the project was learner autonomy. Jeff wants to reshape the mathematics curriculum to resolve its contradictions with the existing language curriculum in which a process model provides optimum autonomy for learners. He sees Logo as well suited for this.

A computer was included among the resources provided in the classroom, and for one school term Jeff team-taught with the children's regular teacher. The children were rostered to work in pairs at the computer; help was available, but they were encouraged to work independently at the machine on projects of their own devising.

The children at first used the computer like a typewriter, writing their names, the names of family members and things around them, and sentences. Some learned to read the error messages, and would type in words, predicting that the computer wouldn't know how to MOTBIC (motor bike) or whatever. Even after they had been shown turtle geometry commands, many children continued these reading and writing activities.

Jeff defined procedures, "on the run," for words the children wanted to use to control the movements of the turtle. For example UP, DAN (down), UKRS (across), TEN (turn), SKL (circle) and HFSKL (half-circle) were some of the commands provided on request for various children.

TO UP	TO DAN	TO TEN
SETH 0	SETH 180	RT 90
FD 25	FD 25	END
END	END	

Later, correct spelling for the commands were introduced. The children had dictionaries (blank exercise books with one page allocated for each letter of the alphabet) into which new words they needed in their regular writing work were entered by the teacher on request. They added a page for computer commands, and each built up a list of commands which was his or her own set.

A technique Jeff developed was the use of brief conferences with pairs of children, just before or just after their turn at the computer. These conferences would be from 30 seconds to 5 minutes in length, and would enable the children to verbally anticipate or recapitulate their computer work.

Before a session, talking partly in English and partly in Logo, they might rehearse their interaction with the machine, facilitating their fluency in both English and the surface structure of Logo; after a session, they would again process their experiences, successes, and failures into language.

The children enjoyed covering the screen completely with very long turtle trips. Jeff introduced SETPC (so the turtle's path could be seen after the screen was filled) and then SETBG. He wrote procedures to define the color names, so that children could specify the background color using either words or numbers.

TO BLACK	TO RED	TO GREEN
SETBG 0	SETBG 4	SETBG 2
END	END	END

Jeff found that color was able to match the turtle in both the children's preference and in the educational experiences it offered. Of course, color is a traditional part of the Grade One curriculum, and Logo provided a valuable engagement with color itself. But, at the same time, other areas of the curriculum were integrated with color. Using the color control primitives, numeration used as a code was engaged in purposeful context, and reading, recognising, and typing the color names were purposeful and authentic experiences of reading and writing.

The project is reported in full in "Introducing Logo to a Year One Curriculum," by Jeff Richardson, unpublished Master of Educational Studies Project, Faculty of Education, Monash University, Clayton, Victoria 3168, Australia.

**Not Another Logo Conference:** The Not Another Logo Conference was held in Melbourne from December 14-17, 1986. This working conference was organized by the Computer Education Group of Victoria. The focus was on the interaction of Logo and mathematical learning, and the major guest speaker was Richard Noss from the Logo and Mathematics Project at the Institute of Education at London University. Richard is no stranger to Logo Exchange readers as he is our European Editor. Since I am running out of space, I will report some details of this conference next time.

### North America

by  
Michael Friendly  
Psychology Department  
York University  
Toronto, Ontario M3J 1P3 Canada

### CUE Conference Report

Linda Stone, my West Coast correspondent and networker extraordinaire, attended the Conference of Computer Using Educators in San Jose, CA. In a session on "The Latest in Computer Education Research," the panelists presented an overview and categorization of recent research on computers in education.

Linda Polin of Pepperdine University looked at Logo research in terms of the effects of Logo on cognitive skills, achievement in content areas, and affective development; the relationship between Logo and cognitive styles, background variables, and problem solving strategies. She also discussed research on Logo teaching and learning and comparisons of various means of implementing a Logo-based learning environment. Other panelists, Sandy Wagner of IBM, and Saul Rockman of the Far West Labs, discussed research in microcomputer education in more general terms, and provided useful annotated bibliographies.

Linda also reports an interesting presentation by Stan Pogrow of the University of Arizona on the Higher Order Thinking Skills (HOTS) Project. This project works with compensatory education students in grades 3-6 and replaces compensatory content instruction with computer-involved thinking activities. The project's philosophy is to use a wide variety of computer software to create and "learning dramas" which motivate children to use a variety of thinking strategies and skills suggested by recent cognitive learning theory.

Pogrow eschews the open-ended use of computer software, including Logo, which he believes does not spontaneously lead to better thinking skills. Instead, he has developed detailed teaching techniques and lesson scripts designed to place students in situations which will challenge them to figure things out, motivate them to link concepts across domains, and test and articulate their hypotheses about how things work, when given incomplete information.

"In the HOTS program, the explicit goal of software is merely a behavioral device to hook students into participating in the sideshow learning dramas, much as an actor participates in the traumatic activities of preparing to play a role for the reward of hoped for applause," he explains.

I'm not sure I agree with all of this, but there are perhaps some interesting teaching ideas for Logo-using educators in the HOTS program. More detailed information about the curriculum development techniques, along with lesson plans, are available from: Thinking with Computers, Inc., PO Box 22801, Tucson, AZ 85706.

### ECOO SigLogo Conference

Plans are underway for the third annual conference sponsored by the Logo Special Interest Group of the Educational Computing Organization of Ontario (ECOO). This one-day conference, to be held Saturday, April 4, 1987, at Northview Computer Centre in Toronto, will address the theme, "LOGOWORKS: A Showcase."

Peter Skillen, the conference chairman, extends an invitation to Logo Exchange readers to participate in the conference by attending, submitting a poster or showcase display of student's work, or submitting a proposal for a presentation at the conference. Submit papers (3-5 pages) for presentation and/or inclusion in the conference proceedings no later than January 30 to: Linda Colgan, Computers in Education, 39 Highbrook Drive, Scarborough, Ontario M1P 3L2.

Registration for the conference costs \$25.00 and includes the conference proceedings, lunch, and four sessions. To register for the conference, write to: Peter Skillen, Computers in Education Centre, Northview Secondary School, 550 Finch Ave. West, North York, Ontario.

### Logo Spreads in Ontario

The following is abstracted from a report on the Computers and Children Project sent to me by Serafim Gascoigne of the Ontario Ministry of Citizenship and Culture.

While some educational organizations "decide against" Logo (see Richard Noss' January 1986 ILX column, for example), the Ministry of Citizenship and Culture of Ontario chose Logo as the core language of its Computers and Children Project. Over several years, the Ministry opened 331 community computer centres throughout the province, in diverse locations from large metropolitan centres such as Toronto and Ottawa to remote reserves in the far north.

Statistics show that about 5400 children are using Logo on a regular basis.

The project initially provided access to microcomputers for children between the ages of 4 and 12. But, as was perhaps inevitable, their teachers, parents, and grandparents became equally enthusiastic, with the result that the whole community began to subscribe to computer courses. As one coordinator explained, "When the kids go home, the senior citizens come in for a go."

Funding for the project totalled \$8 million in hardware and software, and a training team travelled across the province running Logo workshops and training coordinators for each center. For further information on the project, contact:

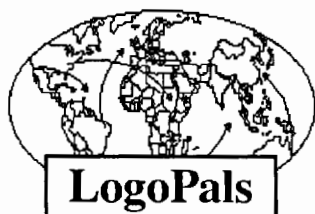
Serafim Gascoigne  
Ministry of Citizenship and Culture  
454 University Avenue  
Toronto, Ontario M5G 1R6

### MACUL 87 Logo Action

On March 26-27, 1987, the Michigan Association of Computer Users in Learning (MACUL) is holding their annual conference at the Westin Hotel in Detroit, MI. The two-day conference will have eight Logo sessions sponsored by the SigLogo Special Interest Group, plus additional sessions devoted to other aspects of computers in education. A double session entitled "Developing Thinking Across the Curriculum" features presentations by specialists in social studies, science, and mathematics.

For registration information, write to:

Chris Canning  
MACUL 87  
PO Box 628  
Westland, MI 48185



by Barbara Randolph

- Place: Chicago, Illinois, USA  
 Time: Br-r-r-r! The heart of winter.
- 3:15 P.M. Time to bid my classroom "Goodnight" and prepare for the drive home in the slush and snow.
- 4:00 P.M. Enter through the front hall doorway. Close the door quickly to keep "the hawk" out. (That's what some people call our Chicago winter wind!)
- 4:01 P.M. Insert the key in the mailbox. Eureka! Letters from new LogoPals. That certainly takes the chill off the day!

Here are a few samples from my recent mail. There just is not room enough to print them all!

I would like to have a Logo penpal. How about one from Japan or France or Africa? I am 11 years old and in the sixth grade. I like Logo and the game called Dungeons and Dragons. I am learning to play violin and also soccer.

Ethan Roberts, Los Angeles, California, USA

I am working with computers. I am a Logo beginner. I enjoy playing soccer, hockey, basketball and other sports. I want to be a doctor someday. I am 11 years old and in the sixth grade.

Kyriacos Parayldes, Edmonton, Alberta, Canada

I like to ski and to work with computers. I am a Logo beginner. I am 8 years old and in the third grade.

Wendy Benbow, Edmonton, Alberta, Canada

I am in the fourth grade. I like to draw. I love Logo. Please send me a penpal.

Jeremy Macrae, Los Angeles, California, USA

I am in the 5th grade. I enjoy Logo. I like animation! Please send me a penpal.

Zev Birnbaum, Sherman Oaks, California, USA

My name is Rebecca, and I would like to write to a girl from France. I am nine years old and like soccer, baseball, and reading.

Rebecca Naftzger, Chicago, Illinois, USA

Hi! I'm a third grade girl, and I would like a Logo penpal from Japan or China or even Hong Kong. I like writing and math. I really like Logo

Sarah Hanck, Chicago, Illinois, USA

I like Logo computer programming, playing dungeons and dragons and other games. I enjoy chess, model rocketry, and robotics. I like to swim and ride my bicycle. I am the systems operator of a computer bulletin board with a Logo Conference Board. I am 10 years old.

Michael Gelman, Wayne, New Jersey, USA

I like waterskiing, motorbiking, and snowmobiling. I like working with computers. I am a Logo beginner. I am in 6th grade and age eleven.

Kevin Bikkholz, Edmonton, Alberta, Canada

I am 9-1/4 years old. I have been doing a lot of Logo lately, especially 3-d rectangular prisms. How about a penpal from England or Egypt? I like playing kickball and basketball. I also collect stickers - 2400 of them.

Jeffrey D. Harris, Chicago, Illinois, USA

Please send me a penpal. I like football! I love Logo. I am in the third grade.

Kevin Lewis, Los Angeles, California, USA

would like a penpal from England or France. I use Logo a lot. I play football and sometimes I go swimming. I am in the fourth grade. I moved from New York City to Chicago.

Jimmy Gray III, Chicago, Illinois, USA

I am a Logo beginner. I am 8 years old and in the third grade. I like art!

Scott Gilroy, Edmonton, Alberta, Canada

My big hobby is football. I like Logo. I am in the 3rd grade. Please send me a penpal.

Patrick Green, Los Angeles, California, USA

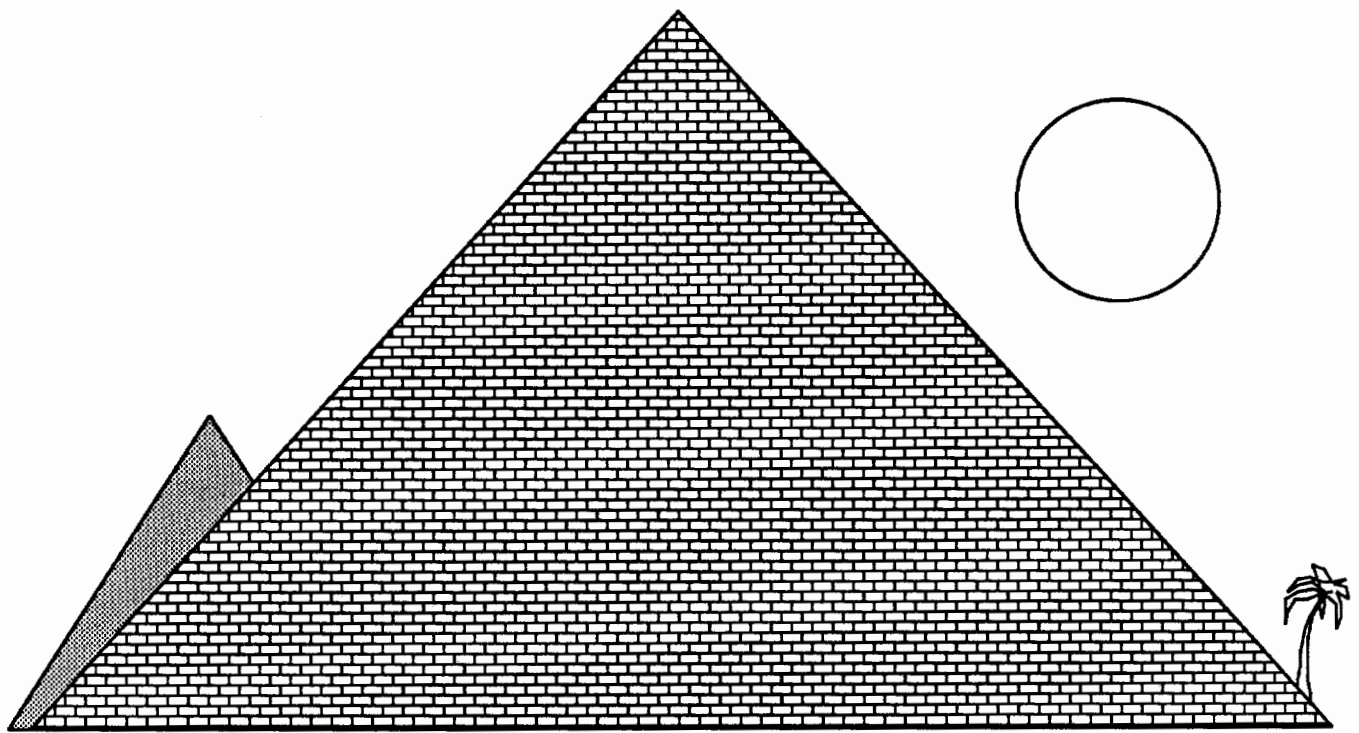
Teachers, share these ads with your students. If they are interested in the LogoPal program, have them send their own brief ads to me at the address below. (Do not write to the students at the incomplete addresses provided above.) I will match them up with other LogoPals. They can request one of the LogoPals featured in this column, if they like, but they may be asked to accept one of the many others available. Once the match is made, they can begin corresponding and sharing Logo ideas. What a Logo adventure!

I will print a number of ads in the LogoPals column each month. I'm sure your students would enjoy the thrill of seeing their ads featured!

Remember to have them enclose a stamped self-addressed envelope. If they are writing from outside the USA, please ask them to enclose international postal coupons (they can be purchased at the post office) for a 1-ounce or 28-gram reply. I'm eagerly waiting to hear from your students! Write to: Barbara Randolph, LogoPals, 1455 East 56th Street, Chicago, IL 60637, USA.

*Barbara Randolph is a librarian and instructional media center teacher in the Chicago Public Schools.*





“If something’s not broken, don’t try to fix it . . . support it!”

- Ancient Turtylonian

Terrapin™ Logo, from the original Logo people, is the Logo of choice in education. Terrapin has developed the **LogoWorks™** series of curriculum support materials including *Logo Works: Lessons in Logo* and *The Logo Project Book: Exploring Words and Lists*. Terrapin is also developing a host of Logo tools and applications for its new **Logoware™** product line including *The Logo Data Toolkit*—many more are on the way. So you can be sure that Terrapin Logo is the best possible Logo to use as a foundation for *your* choice of Logo activities—to suit *your* classroom needs. Plus, with Terrapin’s 10-Paks, 20-Paks, networked version and district pricing, Terrapin is the best value for your money. Terrapin. The support you’ve been looking for!

***Terrapin Logo***  
***The Original Logo People***

Terrapin, Inc., 222 Third Street, Cambridge, MA, 02142 (617) 492-8816

# **\*\* Teacher's Pet \*\***



*"...the best robot I've ever seen..."*

—Seymour Papert, M.I.T. LOGO '85 Conference, Cambridge, Massachusetts.

*"We have found the Valiant Turtle's presence has increased the interest level of students and teachers in Logo, facilitated the understanding of Logo commands, and changed personal interaction during Logo work, providing students more time to share and discuss their observations."*

—June 1986 review in *The Computing Teacher* by Jim Ellickson-Brown, Mountain View Elementary School and Doris Mimnaugh, 4th grade teacher, Wilson Elementary School, Corvallis, Oregon.

Meet Valiant Turtle, state of the art in Logo programming! Controlled from your Apple II+, IIe, IIc, IBM PC, PCjr or Commodore 64 computer by an infrared beam, the Valiant Turtle requires no cords or wires to move. Create a design on the screen and watch Valiant draw it on paper! Watch as Valiant executes your commands in three dimensions. Plan some fancy footwork and choreograph a dance in Logo!

Valiant Turtle is the ideal learning tool for students learning Logo as well as a great introduction to the world of robotics. Valiant is simple to use and easy for even the very youngest Logo learner to understand. Complicated and sophisticated ideas are presented in simple, graphic form. Students build artificial intelligence concepts and learn to think about space and spatial relationships.

Valiant Turtle operates with most popular versions of the Logo language. Watch through Valiant's transparent plexiglass dome as the Valiant Turtle draws with extreme accuracy with its built-in pen. Valiant comes completely assembled with easy-to-read instructions and control software. Because it's so easy to set up and use, the Valiant generates much enthusiasm in the classroom! Young imaginations fly whenever Valiant Turtle enters the room!

The Valiant Turtle is available from Harvard Associates, Inc., 260 Beacon Street, Somerville, Massachusetts 02143. Harvard Associates provides full technical support for the Valiant. For more information, or to order your Valiant Turtle, please call (617) 492-0660.