

THE NATIONAL  
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FORWARD 100!

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## Sometimes Logo Teachers Should Teach

by Marge Stouffer

*"That's not what I wanted the turtle to draw. There's something wrong with my procedure!"*

*"Well, why not change it? You can use the editing commands. Just type EDIT and the name of your procedure."*

*"Like this?"*

*"Don't forget the quotation mark."*

*"Now what do I do? I see the line I want to change. How do I erase that line and put something in its place?"*

My fifth grade students are eager Logo users. They enjoy the experience of experimenting. But, I found they become frustrated when they have to "discover" things like Logo syntax or how to use the Logo editor. They have difficulty making corrections and changing their procedures. They get discouraged and sometimes give up.

The philosophy of Logo includes, "It's OK to make mistakes." Students are invited to experiment, to make errors, to change procedures, and to correct their mistakes in order to nurture their imagination and originality. All of this requires a working knowledge of the editing process.

I believe that working with Logo increases students' creativity. I have seen it help develop individuality and foster logical thinking skills. It gives my students the opportunity to experiment. But, until my students learned how to use the editing tools to make their changes, they were not able to edit their work effectively.

Some teachers suggest giving students a copy of the editing commands and letting them "discover" how to use them. However, I have found it more effective to teach these specific skills and how to use this specific Logo tool.

Giving such direct Logo instruction does not provide for a lot of experimentation at first. But it does help students to experiment more freely later, since the frustrations of having to "discover" the proper use of the editing tools will not get in their way.

By teaching this part of Logo instead of asking the students to "discover" it on their own, I believe my

students have become much more open to making changes and corrections than they would have been.

I would like to share a 16-step Logo editing exercise I have developed for use with my fifth graders. It has been effective in helping them learn how to use the various capabilities of the Logo editor, and has helped to avoid many confusing and frustrating situations which arose in the past.

When I see that a number of my students are ready for editing, I set aside a period of instruction specifically for teaching how to use the Logo editor. After distributing a handout to the students, I ask them to complete each of the 16 short activities one at a time. I keep the class together this first time through, making sure that everyone's screen looks as it should. When the class has completed the set of activities, I work with smaller groups of students who may need help on particular instructions or concepts. Sometimes I need to re-teach the entire set of activities.

**Logo Teachers continued**

The students who are ready for the editing skills begin using them immediately. Others postpone using them until the appropriate time.

Here are my 16 activities for Apple Logo. If you use them with your students, you might want to add additional keys or change them to suit your grade level.

1. Type a simple procedure:  
TO SQUARE  
REPEAT 4 [ FD 30 RT 90 ]  
END
2. Type EDIT "SQUARE
3. Make the cursor move to the second line of the procedure by typing CTRL-N.
4. Make the cursor move to the end of this line by typing CTRL-E.
5. Erase this line by using the left arrow.
6. Type: REPEAT 3 [ FD 30 RT 120 ]
7. Type CTRL-C to define the new procedure. Type SQUARE and watch the screen.
8. Type EDIT "SQUARE.
9. Move the cursor to the line after END by typing CTRL-N.
10. Move the cursor back to the second line by typing CTRL-P.
11. Make the cursor move to the beginning of this line by typing CTRL-A.
12. Type: REPEAT 6 [ FD 20 RT 60 ]
13. Make the cursor move to the end of this line by typing CTRL-E.
14. Erase the extra words by using the left arrow.
15. Type CTRL-C to define the procedure. Type SQUARE and watch the screen.
16. Practice changing the SQUARE procedure in other ways using CTRL-N, CTRL-E, CTRL-A, CTRL-P, and the left arrow key.

Marge Stouffer has taught elementary grades for the Palos Verdes (CA) Unified School district for 19 years, and has used Logo with her 5th grade math class for 3 years.

## *From The Editor*

by Tom Lough

*"Why have you remained so enthusiastic about Logo for so long? Don't you ever get tired of it?"*

I had asked for questions from the persons attending my session at a recent educational computing conference. I expected and received the usual questions dealing with methods of teaching, teacher training, and capabilities of specific Logo versions. But here was a question of a different sort!

I hesitated for a moment, not because I had not thought about the question before, or that I did not have a ready answer. During that pause, my mind went back to a particular meeting of a human development course I was taking at the University of Virginia.

The instructor had introduced an idea for discussion: "Why is it that we can purchase a painting, hang it in the foyer of our home, and then move it to the attic a few months later, while we purchase another, hang it, and never tire of looking at it?" After several class members had discussed their responses, the instructor suggested: "For me, it seems to be because I never reach closure on the message of the second painting."

At the time I thought that was an interesting idea. Never reaching closure on the message means there is always something else to think about. That is how it is with Logo for me! Before addressing the question on the floor, I paused to savor that idea once more. Popping back to the present, I tried to convey this feeling somehow in my response.


Yes, my interest in Logo continues in large part because I "never reach closure on the message." No matter what I do, there is always another aspect to explore or another enhancement to consider. I have never written a program which is "complete." Every day, I think up new projects to explore with Logo. And just when I feel that I am getting close to understanding a concept (such as recursion), along comes a new idea forcing me to rethink everything I thought I "knew."

In addition to a personal dimension, my response also has a professional dimension. I never tire of Logo because of what I see it doing for students!

When taught in an accepting environment with the opportunity for student ownership of project work, Logo can help shape a more healthy attitude toward learning. With this attitude, students will never reach closure on the message of Logo ... that it is a language for lifelong learning.

My New Year's wish is that you, too, never reach closure on Logo's message!

FD 100!



# Tipps for Teachers

by Steve Tipps

## Overland Mapmaking Adventures

Spatial understanding has been explored in a number of ways in the past four columns. Drawing pictures with dots, making maps of the classroom or neighborhood, and creating a geoboard with Logo are different ways of emphasizing spatial relationships. Understanding of space and measurement are important prerequisites to understanding and using maps of cities, states, and nations.

Many geography curricula begin with the description and exploration of local neighborhoods, and progressively move to places which are more distant. The ideas of towns, cities, counties, states, and nations as more complex, and comprehensive units of government may be difficult for children. Maps, as representations of these units, may be very remote to them.

Coloring or drawing maps and map puzzles are usual activities for elementary children. The use of Logo is another way to explore ideas about maps. By creating maps, children become familiar with geographical ideas.

### Simple States

Although most states, provinces, counties and parishes do not come in regular square and rectangle shapes, simple shapes provide a good place to start drawing maps. Students can create their own imaginary states with the shapes they want. For example, the state of Centralia has the simple shape of a large rectangle, and is located in the middle of the screen.

```
TO CENTRALIA
PU HOME LT 90 FD 100 RT 90 BK 70 PD
REPEAT 2 [ FD 140 RT 90 FD 200 RT 90 ]
END
```

Students can name and draw their states. Octagonia and Triangula make good states. Jamesylvania and New Stacy are probably more exciting names.

### Moving Around

After the outline map is drawn, cities and towns can be added at selected locations. In last month's column, positions on the logogeoboard were designated with procedure names such as A2 or C5. When one of these procedures was called, the turtle moved directly to the corresponding spot on the geoboard. The same strategy can be used with place names.

The capital city of Centralia is called Metropolia and is located in the exact center of the state at position 0 0 (also known as HOME). A procedure for going home to Metropolia would move the turtle to that position.

### LCSI versions

```
TO METROPOLIA
SETPOS LIST 0 0
END
```

More cities can be added to the map with new procedures. Perhaps small circles could be drawn to mark the locations of the cities.

```
TO TURTLEBORO
SETPOS LIST 50 -70
END
```

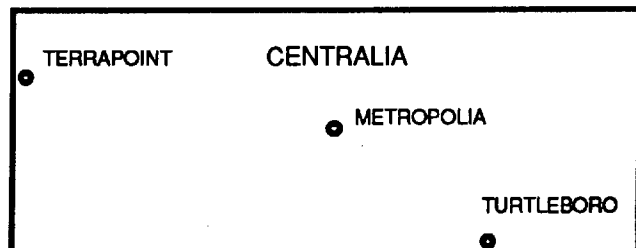
```
TO TERRAPOINT
SETPOS LIST -100 20
END
```

### MIT versions

```
TO METROPOLIA
SETXY 0 0
END
```

```
TO TURTLEBORO
SETXY 50 (-70)
END
```

```
TO TERRAPOINT
SETXY -100 20
END
```



As many places on the map can be added as students want to add. With each new city, they learn more about the coordinate system. Labeling the map with place names is typical on maps, and children will want to do this. Commodore Logo and IBM Logo have commands built-in to do this, but you may need the NLX alphabet for other versions.

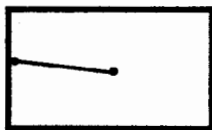
**Tips continued**

Lines between the cities become connecting roads. Which of the cities are big ones and which are small? Which roads are likely to be the most traveled and the least? Transportation is an important item in most elementary social studies curricula. By the fourth grade, students may be ready to talk about the importance of roads in the delivery of goods. Study of the Interstate Highway System is a natural extension of these road building experiences.

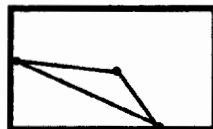
**Highway Networks**

Another extension of the roads drawn from city to city involves the study of networks. By starting out with only two cities, students can see that only one road is needed between them. With three cities, three roads are needed. How many roads are needed if you have four cities and want a road from each to each?

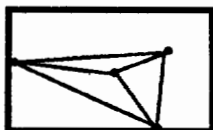
Number of Cities	Number of Roads Needed
2	1
3	3
4	_____
5	_____
6	_____



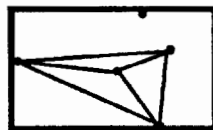
2 cities, 1 road



3 cities, 3 roads



4 cities, \_\_\_ roads



5 cities, \_\_\_ roads

What about five, six, or ten cities? Although the theory of networks is not included until high school or college, the experience of making all the possible combinations of road connections is quite within the grasp of elementary students.

**Geographic Features**

A map is not really interesting unless some geographic features are added. Mountains, rivers, lakes, and forests are easy to build in modular form and added

to the map. Students have control over all these elements and can place them anywhere they want. A blue line makes a good river, for example. The line can be placed specifically or generated randomly. Since most rivers are not straight, the random river generator is a lot of fun to design and run.

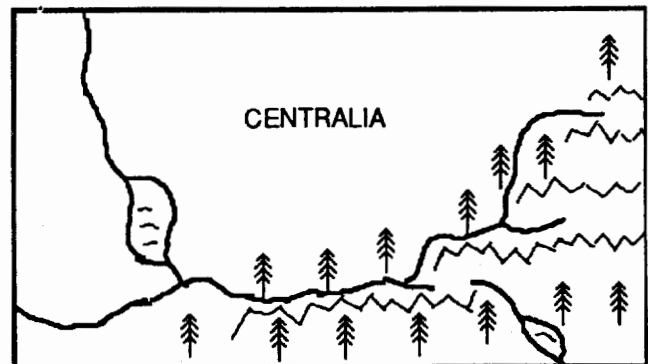
```
TO RIVER
REPEAT 10 [ FD (10 + RANDOM 10) RT (30 - RANDOM 60) ]
END
```

RANDOM in this procedure is used with offsets. Students want to know why you have added and subtracted from RANDOM. They usually start with a river procedure which includes only RANDOM numbers as inputs to FORWARD and BACK.

```
TO RANDOM.RIVER
REPEAT 10 [ FORWARD RANDOM 20 RT RANDOM 30 ]
END
```

Let students begin with a procedure like RANDOM.RIVER and find out what difficulties it presents in make a good looking river.

Mountains can also be drawn with a procedure using random. Glen Bull has an activity in *Nudges: Apple Logo Projects* (Holt, Rinehart and Winston, 1985) which creates the Blue Ridge Mountains in a random fashion similar to RIVER. Students might also try a random curve procedure to make rivers and mountains. Mountains can also be small triangles arranged to show a mountain range. A small tree can be drawn. Several of these trees would represent a forest.



**Rivers and Roads**

After the students have completed all their geographic features, they might try drawing the roads again. If they have added rivers and mountains and forests and lakes, they may find that the most direct route between places on the map poses environmental problems. What if the road goes right through the forest? What if the shortest route must go over the mountains or across the middle of a lake? The dilemmas are just like the adult problems involved in road construction.

**Tipps continued****See the USA**

Whether you want to try drawing real states with Logo is conditional on the time and patience of the students. (See Rebecca Poplin's "Teacher Feature" in this NLX issue for details of a class Logo project to draw the various states.) Although Wyoming should be an easy state, New York and Florida are quite a challenge. Students tend to get bogged down in exact drawings. These may take dozens or hundreds of little turtle moves. Instead, have students compare many different maps of the US or Canada to see how artists have "simplified" the shapes of the states. They can also compare the detail of a large map to the detail of a small map. From these comparisons, they should realize that it is the overall shape of the state that is important, rather than every little bend in a river or coast line.

Students may also notice that many states west of the Mississippi are more regular in shape. This observation leads to an interesting research problem involving the boundaries of the eastern versus the western states. How did they get their shapes? Why?

Some students draw their states in a "free turtle" style. By experimentally turning the turtle this way or that, the state is completed. Another way is to use a transparency overlay as a grid over a map. Put the transparency over the screen and duplicate the distances. Some states may also need to be drawn modularly. Hawaii, for instance, could have a different procedure for each major island. California might have modules such as NORTH.COAST, OREGON.BORDER, NEVADA.BORDER, ARIZONA.BORDER, MEXICO.BORDER, SOUTH.COAST.

Using the legend of the real map is another aspect of map reading which should be stimulated. A little table stands for a road side park and an airplane is an airport icon. Students may want to add more features to their maps.

**Maps are Everywhere**

Logo is another way of alerting children to the meaning and usefulness of maps. The invented states, mountains, cities, and roads have real counterparts that are represented on actual maps. Maps can also be found with varying amounts of complexity.

Maps are a primary method of communicating spatial information. Children need to be familiar with maps of their near and far environments. By creating and playing with personal maps, their use and enjoyment of actual maps should increase.

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.

**Logo Teacher Feature***by Rebecca Poplin***Featuring: Judith Harris**

Would you like to probe the mysteries of Halley's Comet, study the intricacies of music theory, or create a hieroglyphic typewriter? These are just a few examples of interdisciplinary learning projects in which students and teachers who work with Judith Harris are learning to use the computer as a multi-faceted tool. Judith is the Originator / Coordinator / Specialist teacher in the "Computer as Tool Program" at the Solomon Schechter Day Schools of Philadelphia, Pennsylvania. She is an author, consultant, and computer education instructor in addition to working at least three days a week with students at all grade levels.

**Out of This World**

In a just-completed solar system project, Judith and the science teachers really wanted the students to use up-to-date information about the solar system, not just encyclopedia-based facts, and they also wanted students to understand that knowledge is not static. Using *Bank Street Filer*, the group created a data base with most appropriate information, including a field for Halley's Comet and information on the space shuttle missions. As new information is gained, students change or add to the data base.

One part of the project was a Solar System Walk for the whole school, starting, of course, in the computer lab. Questions were answered using FIND or SORT operations in the data base. Those who took the four-block-long walk, four billion times smaller than the real solar system, truly felt how close the inner planets are to each other compared to the distances between planets past Jupiter. Small groups of students who had conducted research on particular planets did presentations for the tourists and answered their questions. Later on, students in the two branches of the school will use a modem and *Newsroom* by Springboard to create and exchange a science and technology newsletter for the two branches of the school.

**Logo a tempo**

Judith, an active musician, has had some interesting experiences with Logo music. She used pattern blocks to help students who were experiencing difficulty with equivalent and mixed fractions. She played a song on a recorder as she showed them a sequence of blocks, explaining that the song and the sequence of blocks were related to each other. In fact, the different blocks represented the time values in the melody. She then had them mix up the pattern blocks and she played the song with the new timing. The students related their

**Teacher Feature continued**

new understanding to dealing with duration in Logo music. Judith found that Logo music makes it easier for kids to understand half steps and to transpose. Discovering how many sixteenths are equal to a quarter note is a perfect model for division of fractions.

Through Logo music, Judith also learned not to tell students "It can't be done." Two of her students really wanted to do harmony, and persisted, despite Judith's warning, in transcribing a piano duet, one working on each part, into Logo, and typing the resulting procedures into two computers side by side. The girls had thought that pressing the RETURN key of each computer at the same time would start the programs together and create harmony. To their dismay, garbage collections created pauses at surprising places, distorting the timing of the music. They discovered that using .GCOLL instead of R for rest minimizes the pauses and coordinated them somewhat.

**Logoglyphics**

Sixth grade students, studying ancient civilizations, had been doing various other projects with Egyptian hieroglyphs, so they created a hieroglyphic typewriter with Logo as a group endeavor. The kids divided the 55 hieroglyphs into easy, medium and hard, based on the difficulty of doing them in Logo. The hieroglyphs were divided among the groups of students, but they did share various types of arc procedures. Some used graph paper plans, but others did not. An important discovery was that all students used the strategy of scaling down, that is, designing the hieroglyphs large and then reducing them later to the desired size of 30 by 30 turtle steps. The students found that they could never use HOME and that they had to orient the turtle to the same starting point; they selected the bottom right corner of the square. They also decided that they didn't want the hieroglyph to fill the entire 30 by 30 step block; border space was necessary.

Finally it was time to put all the hieroglyphs together. The teachers had decided that a recursive structure would actually be best, but they felt the students weren't ready to deal with it. They had decided instead to separate the screen into lines of hieroglyphs. Imagine their surprise and delight when they were discussing the overall structure and the kids noticed the inherent patterns. One of the girls said, "Isn't there some way to get the procedure to make a copy of itself as it goes?" The need for recursion was invented! What a powerful idea!

In fifth grade, the curriculum has a heavy geography emphasis. Teachers approached the study in different ways but always seemed to have difficulty helping students understand latitude and longitude. A major Logo project creating maps of the states helped tremendously. Each state map had to display the locations of five cities using SETX and SETY as the equivalent of

latitude and longitude. Students numbered their cities and made clues for each one, then challenged another group to identify the cities by clues. After using a National Council of Teachers of Mathematics activity which creates a different image of Morris the Cat by drawing a grid and distorting it, some groups extended this process to the maps. The students are now deeply involved in the process of cartography.

Another exciting development has been that classroom teachers observing Judith's work with students have begun to examine their own teaching and questioning processes. They are gaining a deeper understanding of teaching for thinking.

One group of fifth grade students is working with formal Euclidean geometry through Logo. Other students are studying truth tables through Logo. These are just a few of many interdisciplinary projects which are taking place at the Solomon Schechter Schools. If you are interested in further information about these or any of Judith Harris's other activities, she would be happy for you to contact her.

Judith Harris  
104 Woodside Road, Apt. B-306  
Haverford, PA 19041

If you know of teachers who are involved in exciting Logo projects that should be shared with NLX readers, please contact:

Rebecca Poplin  
2421 Fain Street  
Wichita Falls, TX 76308

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

**Logo Publications**

*Logo in the Schools*, a special double issue of the journal *Computers in the Schools*, contains 30 articles by Logo workers of many different orientations. This highly recommended volume of over 300 pages is available in softcover for \$7.95, with a minimum order of 5 or more copies. If you are involved with Logo teacher training, this is an excellent resource to consider. For more information, contact Haworth Press, Inc., 28 East 22nd Street, New York, NY 10010, or call (212) 228-2800.

Holt, Rinehart and Winston's series of books for IBM Logo includes *Nudges: IBM Logo Projects*, by Steve Tipps et al., *Exploring IBM Logo: A Guide for Adults*, by Sharon Burrowes et al., and *Beyond Mindstorms: Teaching with IBM Logo*, by Joyce Tobias, et al. An Apple version of *Nudges*, by Glen Bull et al., has been recently published. Also available is *Logo Physics*, by James Hurley. For more information, write to Holt, Rinehart and Winston, 383 Madison Avenue, New York, NY 10017.

## NLXionary A Lectionary of Selected Logo Readings

with Commentary and Opinion  
by Griff Wigley

"Interview: Seymour Papert," by Ron Schultz,  
*Omni*, October 1985.

>Feeling a sense of purpose. Seeing the big picture. Understanding the philosophy that guides one's daily efforts.

>What am I talking about? My reactions to Seymour Papert's comments in this lengthy *Omni* interview for their special 7th anniversary issue. If you find yourself languishing "spiritually" at times in your daily efforts with Logo or education in general, you might just get a needed boost from reading this article. It's heady stuff, though not complex. Read it slowly when you're well rested.

>Following a tidy biographical sketch of Papert, with a brief history of Logo, the interview begins with a discussion of Piaget, math, and microworlds. Papert argues that children who like to plan and decide exactly what should happen and then make it happen are more comfortable with typical school math because it emphasizes detail and rightness while minimizing play. Kids who like a more negotiable, consensual, interactive way of thinking have a harder time with math in typical schools. A computer with appropriate software can enable a student with this style to approach math in a "softer" context, allowing for self-determined manipulation without a right and a wrong.

>I love the metaphor for this line of thinking. "This is like a painter approaching a canvas with a general plan but without an absolutely worked-out top-down detailed anticipation of what it is going to be. You do something, look at it, stand back, do something else. It grows into your final product. School math doesn't let you do that very well. People who like to learn and master the world in this negotiational style can be very uncomfortable with the way that school makes you learn. For them, it is a harsh environment. Not for everybody."

>Reading frequently experiences a similar fate. Theories of decoding generate arguments about whether it is best to learn to read syllable by syllable, or with words as a whole. Papert says we seldom concern ourselves about children's *feelings* towards reading and writing. "The really important thing about learning to read and write is to love it!" (How many times do you hear of a school assessing their reading program by measuring the amount of reading for pleasure children do?

>In the same vein, he reminds us how much children are typically involved when doing art, and how this contrasts with their alienated approach when learning number facts or other basic skills. He believes that all learning can have the kind of involvement you see in art class. An aesthetic intent pervades Logo's turtle graphics environment, even though "what's happening on the screen is all sorts of geometry, number working, and other things you'd call math ... Aesthetic intent gives the integration its driving force and is, I think, a deep root of intellectual drive ... Schools also wrongly separate the aesthetic from the conceptual and so destroy this driving force of internal motivation." For those of you following the right / left brain learning movement, some of this should sound familiar.

>Computers can help fill in the gaps in what Papert calls *fractured knowledge*. He maintains that we cannot convey an idea to someone in the exact form that works for all of us. All we can give are pieces, and provide an environment where the person can build something with them. Computers can be used to provide the kind of environment that fosters experimenting and piecing things together. For example, he says if you do a lot of sailing, you've got a rich environment for understanding angles. Many abstract things we expect kids to learn are difficult because they have no frame of reference. Computers are flexible enough to provide children with many of those missing references. And Logo's many faces are a prime example of this flexibility.

>I've touched on only about half of the topics Papert covers in this interview. Some of the others may stimulate your interest more than they did mine. If you need to come alive a bit, and believe that getting in touch with your own sense of mission and vision can help, read the interview.

. . . . .

"Logo: A Language for Thinking about Thinking"  
by Robert Scarola, Learning Domain Editor, *Whole Earth Software Catalog* for 1986.

>The book is a gold mine, and Scarola's Logo contributions make it so. It contains a potpourri of Logo theory, books, and Jim McCauley's comments on all current implementations.

If you would like to respond to these articles and commentary, or know of other articles which may be of interest to our NLX readers, please write to: Griff Wigley, 918 College Street, Northfield, MN 55057, or send electronic mail to me on CompuServe at 72007,24.

Griff Wigley is a co-owner of Family Computing, Inc., a facilitator in the Faribault (MN) Public Schools, and a school board member of Prairie Creek Community School.

# Listful Thinking

by Glen Bull and Paula Cochran

## Anatomy of a Procedure

A new year is a time to consider new beginnings. This year, we're going to begin by showing you what the inside of a procedure is really like. Usually this column is focused on Logo applications in English and other subjects. However, many of the applications we develop are based on Logo's list processing capabilities. This month, we thought we would explore the structure of Logo, and show you how it is put together.

A procedure to make a SQUARE looks like this in the Logo editor. (Type in the procedure at this time.)

```
TO SQUARE :SIZE
REPEAT 4 [ FD :SIZE RT 90 ]
END
```

What does this procedure look like to Logo? To find out, we'll use the TEXT command.

```
PRINT TEXT "SQUARE
[ SIZE ] [ REPEAT 4 [ FD :SIZE RT 90 ] ]
```

A procedure is really a series of lists! (Of course! Isn't everything in Logo a list?) The first list contains the names of variable inputs, such as [ SIZE ]. Each line of the procedure is another list.

### The Text of a Procedure

Let's verify this with another procedure. Here's a Logo procedure to make a house. It looks like this in the Logo Editor. (Type it in now, since you'll need it in a moment.)

```
TO HOUSE
SQUARE 50
FD 50 RT 30
TRIANGLE 50
LT 30 BK 50
END
```

You'll also need a triangle procedure. This probably is familiar to most of you.

```
TO TRIANGLE :SIZE
REPEAT 3 [ FD :SIZE RT 120 ]
END
```

Now use the TEXT command to discover the true nature of the HOUSE procedure.

```
PRINT TEXT "HOUSE
[ ] [ SQUARE 50 ] [ FD 50 RT 30 ] [ TRIANGLE 50 ] [ LT 30 BK 50 ]
```

Once again we see that each line in the procedure is actually a list. The first line in the procedure is [ SQUARE 50 ]. The next line in the procedure is [ FD 50 RT 30 ], and so on. The set of empty brackets [ ] at the beginning of the procedure is for variable names (if HOUSE had any variable inputs).

### The Basic List Machine

Once we know that a procedure is really a series of lists, a whole realm of possibilities appear. Before we go on, we need to show you how to make a basic list processing machine.

In cooking, a basic mix or sauce is frequently used as the base for a wide range of other recipes. For example, many recipes start with a "basic white sauce".

White sauce is the basic ingredient for other sauces ranging from Florentine sauce (for Eggs Florentine) to Mornay sauce.

In the same way, there is a basic machine which is used to process lists. It appears in a variety of guises, but generally looks like this:

### To Process Lists

- (1) If the list is empty, stop.
- (2) Do something to the first item in the list.
- (3) Process the remaining items in the list.

Let's look at a Logo procedure which performs the steps indicated above. One of the simplest list processing machines inspects a series of lists and prints the contents one at a time.

```
TO INSPECT :LIST
IF EMPTY? :LIST [ STOP ]
PRINT FIRST :LIST
INSPECT BUTFIRST :LIST
END
```



If you have Terrapin Logo, use this version of INSPECT.  
 TO INSPECT :LIST  
 IF :LIST = [] STOP  
 PRINT FIRST :LIST  
 INSPECT BUTFIRST :LIST  
 END

As you can see, the INSPECT procedure follows the three steps of a basic list processing machine. In the first line, it checks to see if the list is empty. In the second line, it prints the first item in the list. In the third line, it goes on to inspect everything else in the list.

### Processing Procedures

Let's put the INSPECT procedure to work.

```
INSPECT [[ APPLE PIE ] [ ICE CREAM ] [ A B C ]]
APPLE PIE
ICE CREAM
A B C
```

As you can see, it prints out each item in the list on a separate line. Now apply INSPECT to a procedure. First, look at the TEXT of HOUSE to remind ourselves that it's just a series of lists.

```
PRINT TEXT "HOUSE
[] [ SQUARE 50 ] [ FD 50 RT 30 ] [ TRIANGLE 50 ] [ LT
30 BK 50 ]
```

Then inspect the lists in the procedure.

```
INSPECT TEXT "HOUSE
```

```
SQUARE 50
FD 50 RT 30
TRIANGLE 50
LT 30 BK 50
```

(Note that the empty brackets [ ] at the beginning of the TEXT "HOUSE list is INSPECTed and printed as a blank line.)

### An Adventure

A colleague recently learned Logo, and spent six weeks constructing an adventure story. The story contained considerable text. One of the procedures looked like this:

```
TO INTRODUCTION
PRINT [THIS IS THE STORY]
PRINT [OF THE ODYSSEY.]
PRINT [ALONG THE WAY YOU]
PRINT [WILL HAVE THE CHANCE]
PRINT [TO MAKE SOME RIGHT]
PRINT [CHOICES AND SOME]
PRINT [WRONG CHOICES.]
END
```

If you know that a procedure is only a series of lists, another way to print text is possible. First, use the Logo editor to write the story, just as though it were a word processor. Press RETURN at the end of each line.

```
TO INTRO.TXT
THIS IS THE STORY
OF THE ODYSSEY.
ALONG THE WAY YOU
WILL HAVE THE CHANCE
TO MAKE SOME RIGHT
CHOICES AND SOME
WRONG CHOICES.
END
```

Then use INSPECT to print the text in the procedure.

```
INSPECT TEXT "INTRO.TXT
```

```
THIS IS THE STORY
OF THE ODDESSY.
ALONG THE WAY YOU
WILL HAVE THE CHANCE
TO MAKE SOME RIGHT
CHOICES AND SOME
WRONG CHOICES.
```

Knowing that a procedure is a series of lists can save hundreds of PRINT statements. It is only necessary to type PRINT once, in the middle of the list processing machine INSPECT. (For more information and details about the use of INSPECT, see the Listful Thinking column, "Power Tools," in the February 1985 NLX.)

### Florentine Sauce

The INSPECT procedure is like the basic white sauce recipe. Let's modify it to make the Logo equivalent of Florentine sauce: a list machine which will allow a child to watch each successive step of a procedure "magically" happen each time the space bar is pressed.

First, change INSPECT so that a new line of text appears each time the space bar is pressed. This is accomplished by the SPACE.BAR procedure below.

```
TO SLOW.INSPECT :LIST
IF EMPTY? :LIST [ STOP ]
PRINT FIRST :LIST
SPACE.BAR
SLOW.INSPECT BUTFIRST :LIST
END
```

```
TO SPACE.BAR
IF RC = CHAR 32 [ STOP ]
SPACE.BAR
END
```

## Listful Thinking continued

If you are using Terrapin Logo, use the following versions of SLOW.INSPECT and SPACE.BAR.

```
TO SLOW.INSPECT :LIST
IF :LIST = [] STOP
PRINT FIRST :LIST
SPACE.BAR
SLOW.INSPECT BUTFIRST :LIST
END
```

```
TO SPACE.BAR
IF RC = CHAR 32 STOP
END
```

The SLOW.INSPECT procedure works just the same as the INSPECT procedure, except that it necessary to press the space bar between each line. Try the SLOW.INSPECT procedure with the text of the HOUSE procedure.

## SLOW.INSPECT TEXT "HOUSE

Did you have to press the space bar before each line of the procedure appeared on the screen? (You probably had to press the space bar before anything happened, because of the empty brackets [ ] at the beginning of TEXT "HOUSE.)

If the SLOW.INSPECT procedure worked, we're ready to go on to Mornay sauce. Mornay sauce is just a slight twist on white sauce. Our next procedure, which *executes* a procedure one line at a time, is just a slight variation on SLOW.INSPECT. Simply replace the word PRINT with RUN.

```
TO EXECUTE :LIST
IF EMPTY? :LIST [STOP]
RUN FIRST :LIST
SPACE.BAR
EXECUTE BUTFIRST :LIST
END
```

If you are using Terrapin Logo, use the following version of EXECUTE.

```
TO EXECUTE :LIST
IF :LIST = [] STOP
RUN FIRST :LIST
SPACE.BAR
EXECUTE BUTFIRST :LIST
END
```

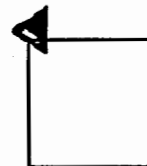
Try out EXECUTE with the HOUSE procedure.

## EXECUTE TEXT "HOUSE

After typing in the line above, press the space bar. The turtle should draw a square.



After the next press of the space bar, the turtle will shoot up to the top of the square.



After the next press, the turtle draws the roof.



When the space bar is pressed again, the turtle goes back down to the bottom of the house.



The Captain Kangaroo television show used to have a magic slate, in which a drawing slowly appeared on the television screen as a story was read. The EXECUTE procedure can be used to create a similar magic slate, in which more parts of a drawing appear after each press of the space bar. (Many versions of Logo have a built-in command to allow you to execute a procedure one line at a time. Look for a name such as TRACE or STEP in the index of your Logo manual.)

## Random Procedures

In Logo workshops, teachers frequently ask us for a way to randomly pick a procedure, and then run the procedure. If you are aware that a procedure is just a series of lists, it's easy to do this.

First we need a procedure to pick an item randomly from a list. Past readers of this column will be familiar with this procedure. (If you are using Version 1 of Terrapin Logo, you will need to write procedures for ITEM and COUNT. These procedures are found at the end of the Listful Thinking columns in the September, October, and November 1985 NLX.)

**Listful Thinking continued**

```
TO PICK :LIST
OP ITEM (1 + RANDOM COUNT :LIST) :LIST
END
```

The PICK procedure allows us to randomly pick an item from a list.

```
PRINT PICK [[APPLE PIE] [ICE CREAM] [A B C]]
ICE CREAM
```

Since we know that a procedure is just a series of lists, we can use PICK to pick a line at random from a procedure.

```
PRINT PICK TEXT "HOUSE
FD 50 RT 90
```

(Since PICK chooses randomly, it may pick a different line of HOUSE for you than it did for us. It may even pick the empty brackets.)

Create a procedure that contains a different shape on each line. You will have to write procedures for the PENTAGON, HEXAGON, and OCTAGON shapes.

```
TO SHAPES
TRIANGLE 50
SQUARE 50
PENTAGON 50
HEXAGON 50
OCTAGON 50
END
```

Now randomly pick different shapes from the SHAPES procedure.

```
PRINT PICK TEXT "SHAPES
PENTAGON 50
PRINT PICK TEXT "SHAPES
OCTAGON 50
```

To execute the picked procedure instead of printing it, simply substitute RUN for PRINT. This is the same trick that we used to change INSPECT into EXECUTE.

```
RUN PICK TEXT "SHAPES
```

What happened? Logo should have randomly picked and drawn a shape. Once again, one small change (substituting RUN for PRINT) allows us to obtain a different effect.

**A Gourmet Logo Cookbook**

What else can you do with the text of a procedure? We discussed ways to use a list of stars to create a star map in the November 1985 Listful Thinking column. The list of stars could be placed in a procedure. (Astute readers will note that the SPRINKLE procedure to sprinkle stars in that column is just a slight variation on the INSPECT recipe. The only change is substitution of DOT in place of PRINT.)

Some versions of Logo provide a mechanism for playing musical notes. Substitution of the command for playing a note in place of PRINT can change INSPECT into a procedure for playing notes. This revised INSPECT procedure might be called PLAY. Then a procedure of musical notes can be constructed.

```
TO TWINKLE.SONG
CCGGAAG
FFEEDDC
etc.
END
```

The procedure might work like this:

```
PLAY TEXT "TWINKLE.SONG
```

**A Context for a Contest**

Each month Robs Muir presents an NLXual (Intellectual ... get it?) Challenge. We thought that we were missing out on all the fun, so this month we are having a Logo contest of our own.

The National Logo Exchange will award a Koala Pad for the best procedure which makes use of the fact that a procedure is just a series of lists. Send your procedure listings to:

Glen Bull and Paula Cochran  
University of Virginia Curry School of Education  
109 New Cabell Hall  
Charlottesville, VA 22903

The deadline for submissions is February 28th, 1986. The winner will be announced in the April NLX. We have decided to call this contest the N-L-TEXT-ual Challenge. Eat your heart out, Robs!

---

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. Paula Cochran is a doctoral student in the Curry School of Education at the University of Virginia. She is interested in Logo applications in language arts and speech-language pathology.

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## TurtleTips

by Jane Toth  
and Donna Lanyi

*"Isn't there an easier way to do this?"*

Have your students posed this question to you after repeatedly (no pun intended) typing in the same commands? If so, this is the signal that the time is ripe to introduce the REPEAT command. Students are always excited about being let in on a "shortcut," especially if they have had to "do it the long way" for a while.

### The Turtle Teacher

Students love using the REPEAT command because it cuts down on typing. We have found that they sometimes have difficulty deciding when to use this command. In order to help the children with this idea, we like to give them opportunities for discovering patterns.

An excellent precomputer activity suggested to us by Pat Arnold, a first grade teacher here in Wooster, was the use of string and different colored and shaped beads. Pat has her class sit around her in a half circle. Each student has a set of beads and string. Pat creates a pattern using colors first. She then has her students copy the pattern.

Of course, Pat encourages the children to verbalize the patterns; this reinforces the color concepts. After they've mastered color patterns, she leads them into shape patterns. She says that they have difficulties at first in determining shape patterns but that someone eventually gets the ball rolling. After many experiences with this activity, she starts to mix the patterns with color and shape. What a challenge to those first graders!

We like our fourth graders to identify patterns from their life experiences. In one of our activities, we arrange students in patterns according to hair color, shirt color, types of clothing, or gender. We have them analyze the pattern and write it down. We also look at patterns in material. Students love to identify color striped patterns in shirts and jeans. After identifying many patterns, the students are encouraged to create their own color and shape designs using graph paper.

After studying patterns for a while, it is time to extend the activity to the computer. On the chalkboard, we have the students write the commands to create a square. Next, we ask them to look for the commands that have been repeated. How many times did we repeat those commands?

Then, we show them the form for using the REPEAT command:

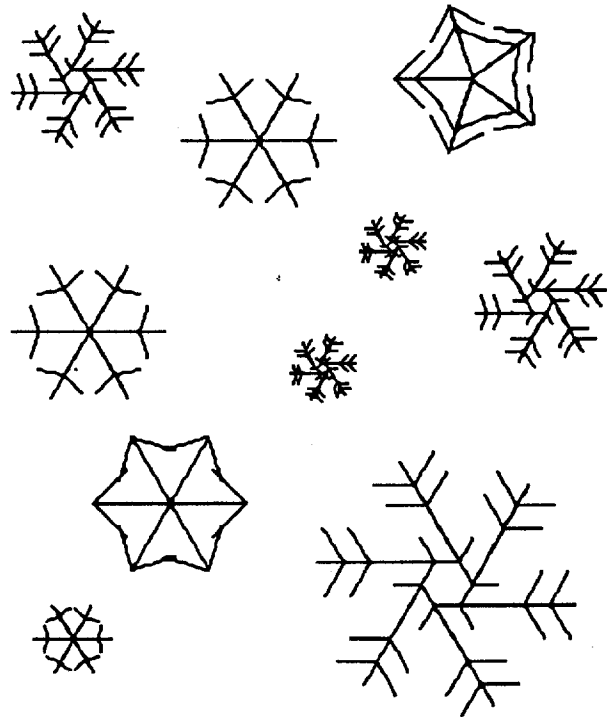
REPEAT (# of times) [ commands to be repeated ]

We brainstorm for other ideas for which we might be able to use REPEAT. Using a large screen monitor for demonstration, we have the students type in various REPEAT commands to explore what happens. Next month, we'll talk about having our students use the REPEAT command to make circles and arcs.

### Procedure of the Month

Do you like to have objects hanging from your ceiling as a decorations? Why not go with the traditional snowflake, only this time from the computer? No two snowflakes are alike. Ask your students to create their own. Print them out, have the students color them in, and hang them from the ceiling. For those of you in the warmer climates, what better way to bring a bit of the chilly north to your classroom?

If you are interested in a copy of our snowflake procedures, please send us a self-addressed stamped envelope.



We know that many of you have fantastic ideas for Logo procedures and projects. Let us help you share them with others. Send your procedures or ideas for projects to Jane Toth and Donna Lanyi, Beall Avenue School, 716 Beall Avenue, Wooster, OH 44691, or by electronic mail to us on CompuServe at 72477,2623.

Jane Toth and Donna Lanyi use Logo in their elementary classrooms in the Wooster (OH) City Schools.

LIFT's

## Teacher to Teacher A Review of New Logo Materials

by Regina M. Bowden

*Logoworlds*, by Rachelle S. Heller, C. Dianne Martin, and June L. Wright, 1985, published by Computer Science Press, 11 Taft Court, Rockville, MD 20850.

**Target audience:** elementary and middle school teachers who are computer novices

**Description:** *Logoworlds* is a 301-page comprehensive collection of concepts, procedures, teaching tips, and "quidnunc" (Latin for "what now") suggestions to round out guided discovery modules: For complete computer novices, there is a table of Logoworlds, or subsets of Logo, identified with new primitives and corresponding activities. For example, the first Logoworld listed is "Body Logo." The new primitives are Forward, Back, Right and Left. Activities involving Body Logo include human robot games, magnetic or stuffed turtles, and robot toys. These activities may be found in Chapters 2, 15, and 16. Some other Logoworlds are: Doodling, Graphics, Words, Languages, and Large Projects. With Logoworlds, the new user is able to conceptualize "modules" rather than viewing Logo as one large complex language. By building module upon module, the teacher (and students) become more and more immersed in the language in a natural way.

**Strengths:** The Logoworlds book is written well for its intended audience. The authors make use of the "guided discovery" method. They justify its use by comparing "discovery learning" (which requires unlimited computer availability to be most successful), and "guided learning" (which presumes each student will progress through the same learning tasks).

In contrast, the guided discovery method allows the teacher-learner to explore and become comfortable with a new concept, and then be challenged to "discover" through the "quidnunc" or suggested activities that incorporate the new concept into a larger problem. This seems like a fair compromise, considering the limitations of computers and time in the average classroom. The teacher could concentrate on one chapter and spend weeks exploring the "quidnunc" suggestions, which helps internalize the concept, rather than move quickly through the chapters.

Other applause goes to the well written chapter on preschool use of Logo, which includes off-computer activities, the chapter on the use of robots and Logo, and the chapter on large group projects. This latter

chapter stresses the use of Logo in creating micro-worlds for exploring many different ideas in science, social studies, and language units. This reinforces the philosophy that Logo is a language to learn with, rather than a language to learn!

What new Logo materials and books do you find useful in teaching? We invite you to send information to the Logo Information For Teachers (LIFT) group, PO Box 5396, Plymouth, MI 48170, or send electronic mail on CompuServe to 76317,565.

Regina M. Bowden is a microcomputer trainer for the Chrysler Corporation and a co-founder of the LIFT group.

## Logo Disserts: Dissertations Dealing with Logo

by Barbara Elias

What kind of mathematical environment is created when children learn the Logo programming language? This question was investigated by Richard Noss and the findings may offer some useful insights for elementary teachers. Noss, using a naturalistic and process-oriented approach, studied the Logo learning of 118 children in grades 3, 4, and 5 for 18 months. Children from inner-city, suburban, and rural schools were involved. Data were obtained from observation / participation, printed files, interviews, children's writing comments, and discussions with teachers.

One purpose was to determine the kind of learning strategies children use in their programming activities and how these activities constitute a mathematical environment. A second purpose was to determine the effect of the programming experience on the understanding of geometric concepts and elementary algebraic ideas.

The study involved three phases. The introductory and programming phases took place during a school year. The third phase involved testing and case studies.

The introductory phase (3 months) provided the fundamentals of Logo programming. The approach permitted children to pose their own problems, and encouraged them to work together and to learn from each other. An Apple II computer and a floor turtle were used in each classroom. Teachers and the researcher provided assistance and introduced programming techniques as needed. During this phase, children adopted three main strategies to avoid failure:

## Logo Disserts continued

- a. *homing-in* or a "guess and test" strategy,
- b. modification of goals rather than debugging (i.e., *degoalng*), and
- c. self-imposed *restrictions* in terms of inputs, commands and / or problems to be solved.

Although little planning was evident, goal-directed programming moved toward exploratory programming as children acquired more programming techniques. Mathematical activities of this phase included ideas about length and angle, circles, and turtle-based arithmetic.

During the programming phase (6 months), children were able to acquire important programming concepts in procedures, iteration, subprocedures, editing and debugging, inputs, and recursion. Learning strategies observed during this phase included making sense of a new idea, exploring, and problem solving.

(These strategies are proposed as a learning model since characteristic forms of mathematical and programming behavior are associated with each.)

During the third phase, a paper-pencil test on geometry concepts was given to 84 of the children and to a matched control group. In addition, data on the learning of algebraic concepts were obtained from case studies of eight of the participant children.

The results suggest that learning to program in Logo can serve as an effective means of creating a mathematical learning environment and can provide some benefit in the development of the concept of angle in geometry and the concept of variable in algebra. Of particular interest is the suggestion that children need support in overcoming "learning plateaus" while programming. In this study, it was found that teacher help, with new ideas, was more successful when given in an exploratory mode instead of a goal-directed mode.

>>>Noss, Richard (1985) *Creating a Mathematical Environment through Programming: A Study of Young Children Learning Logo*. Ph. D. thesis, University of London, 1985. (ISBN 0-85473-238-1). Copies are available for £20.00 (air mail) or £15.00 (surface mail) from the University of London Institute of Education, Department of Mathematics, Statistics, and Computing, 20 Bedford Way, London, England WC1 HOAL.

(Ed. note: Each month, Barbara Elias highlights a dissertation or thesis dealing with Logo. She is accepting copies of recent research results for the NLX Dissertation and Thesis Repository. Reports may be mailed to her in care of NLX, PO Box 5341, Charlottesville, VA 22905.)

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Barbara Elias is an assistant professor in the Education Department of Virginia State University in Petersburg, VA, and a doctoral candidate at the University of VA.

---

Q

and

A

by

Jim

McCauley

Q. In BASIC, I am familiar with measuring the amount of memory that is available in bytes. In Logo, memory is measured in nodes. What are nodes, and how do they work?

A. In order to do a good job of explaining about nodes in Logo, I must first tell you a bit (please, no pun) about BASIC. You are correct that BASIC measures memory space in terms of bytes. This is a handy way to measure in BASIC because the ordinary way of storing collections of information in BASIC is in a data structure called an array.

Many different kinds of information can be stored in arrays, and each usually demands that a fixed amount of memory be set aside to store each piece of information. For example, integers take two bytes each, floating-point numbers require four bytes, and strings often call for 256 bytes to be reserved. Regardless of the size of the string or number to be stored, the same amount of space must be set aside for each, because BASIC accesses information in arrays by making jumps in memory equal to the fixed number of bytes allotted to each element of the data structure. This can be a good thing, since information stored in an array can be accessed very quickly.

But it is not such a good idea for some tasks (especially string storage) because it can be wasteful of memory. Also, the maximum length of the array must usually be specified before data is put into it. This means that problems which need dynamic data structures (that can grow or shrink as needed) cannot be represented conveniently.

### The Node Mode

In Logo, the usual way of storing collections of data is in linked lists. There are many ways to create linked lists, and some versions of Logo use several at the same time. I'll explain a fairly simple technique here.

Logo lists are made up of nodes. Each node is made up of four bytes organized in pairs. Each pair of bytes can represent any number from 0 to 65,536 (that's 2 to the 16th power). This means that each pair can be a *pointer* to a location in the computer's memory. The first pair may point to the FIRST object in a list, while the second pair always points to the BUTFIRST of the list. The first pair may also play other roles; it might store an integer, part of a floating-point number, or part of a word. The last pair can have special properties, too. It may point to a special value, called "nil," which can represent either an empty list or the end of a list.

If you stop and think about it for a moment, these nodes are very flexible. They can represent any information in Logo: numbers, words, or lists. They have another key advantage in that a node that points to the BUTFIRST of a list does not have to be right next to the

© and A continued

object that it points to. It can be anywhere in memory. For some computational tasks, this is a great advantage. Lists can grow or shrink as the problem demands, and this is much more useful than using arrays of fixed size. Indeed, to use linked lists in most computer languages, you actually must write a simple list processor into your program!

### The Price You Pay

This flexibility has its costs, though. Lists usually take up more space than arrays, and to get to a particular item in the list, you must go through all the ones "in front" of it. Also, Logo's usual way of computing things is to make many copies of the things it is computing with (particularly in recursion). This tends to fill up the memory quickly, and it's possible to run out of nodes to compute with before the program is finished. In many kinds of problems, the Logo interpreter can detect when it's running out of nodes and actually recycle the nodes that it doesn't need any more, turning them into "fresh" nodes through a process called "garbage collection" or recycling. You can usually tell when Logo is almost "out of space," because the program will stop altogether while the unneeded nodes are converted to fresh ones available for use.

Sometimes, though, even recycling won't help. This is especially true of recursive programs. If you find that you are running out of space, it's usually due to one of two things. You may have a buggy recursive procedure that doesn't have a good stop rule (an IF statement that tells it when to stop "recursing"). Or, you may be trying to write a program that is just too big and complicated for the number of nodes available in your version of Logo. In those cases, you can get some practice in developing debugging strategies, and in Logo file management.

Each month, I will answer selected questions in this column about Logo programming techniques and the thinking which leads to programming. If you have a question, send it to: Jim McCauley, 876 East 12th Avenue, #4, Eugene, OR 97401. Please enclose a self-addressed stamped envelope. You may also send questions to me on Compu Serve at 70014,1136.

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

### Terrapin Materials Announced

*Logo Works: Lessons in Logo*, a set of teacher developed curriculum materials, is being offered by Terrapin, Inc. Student books (\$29.95) and Teacher Manuals (\$12.95) are available. For more information, write to Terrapin, Inc., 222 Third Street, Cambridge, MA 02142, or call (617) 492-8816.

## NLXual Challenges

by Robs Muir

### It's Only Words

National education policy oftentimes appears to be based on large, ill-defined games that are extra-national in nature. John von Neumann called games such as these "zero-sum" games, because they always have exactly one winner and one loser.

The Space Race we lost; Sputnik got there first. In the meantime, we taught (or attempted to teach) New Math. The Race to the Moon we won, with a giant step for Neil Armstrong and company. During this game, we tried to revitalize science instruction in our schools. The newest game is already having an impact on school policy. It is called, "Which Nation's Schools Turn Out The Best Educated Students?" We might also call this the "Schools as Factories" game. The stakes? Leadership in technology for the next decade.

According to some policy analysts, we are currently losing to the Japanese. One proposed answer is to increase the amount of science and math instruction our students receive. I have no real problem with increasing science instruction in schools. I just wonder what we'll need to drop from an already overburdened daily schedule to make room for MORE SCIENCE.

What is science, anyway? I won't bore you with Webster's definition. But let me propose that science can be done in any part of a curriculum. Science isn't just a subject such as chemistry or physics; science is a *method of inquiry* that transcends curricular boundaries. It is just that we are unaccustomed to doing science in an English class.

### What's in a Word?

Let's do some science on five-letter words.

What is a word? Last year, my sixth graders and I concluded that a word is any group of letters and symbols (with no intervening spaces) that has a meaning associated with it. This is true of both English words and Logo words. English, unlike Logo, is a natural language; there are some random words built of English letters that are decidedly *not* English words. Let's build some Logo words (using LCSI Logo) that will build random five-letter English words.

```
TO RANDOMWORD
OUTPUT (WORD LETTER LETTER LETTER LETTER LETTER)
END
```

```
TO LETTER
OUTPUT SENTENCE PICK [A B C D E F G H I J K L M N O P Q
R S T U V W X Y Z]
END
```

**NLXual Challenges continued**

TO PICK :OBJ  
 OUTPUT (ITEM (1 + RANDOM COUNT :OBJ) :OBJ)  
 END

REPEAT 5 [PR RANDOMWORD]

TSQUT  
 CKXGE  
 QUARK  
 LSJGL  
 SMOTF

Some of these are clearly non-English! (English is, after all, fundamentally pronounceable!) But what about QUARK and TSQUT? In an informal poll taken last year, 70 percent of my 5th and 6th graders correctly identified QUARK as the *rea*/English word.

What rules govern the English-ness of five-letter groups? The placement of vowels may be a good starting point.

After this poll, I challenged my students (all 63 of them) to write Logo programs that would generate five-letter words that really were English. The rules were simple: generate 1000 distinctly different words with your program and calculate the percentage of those that could be found in an English dictionary (or be a recognized colloquialism). In this way, I could also introduce simple statistics; how often do 6th graders get exposed to statistics, especially in an English lesson?

Several students developed programs that utilized good techniques for building English-like words. They incorporated rules developed through experimentation that were not even introduced in the language text we were using. Without exception, these students learned more about the structure of language than they would have by simply reading the book. However, they never exceeded a success rate of 10% with their Logo programs.

This project was suggested by E. Paul Goldenberg during the course of work on his forthcoming book, *Exploring Language with Logo*. (Goldenberg, Feurzeig)

The best efforts of his high school students with this problem are in the 17% range. Can you or your students exceed this?

It may be helpful to refer to the "Listful Thinking" columns in the September and October 1985 NLX for some additional ideas for starters.

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

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

We will compile several interesting solutions and redistribute them to all contributors. Please do *not* send your 1000-word program runs! The procedure code and your percentage results will be sufficient. By the way, you may send solutions to any past NLXual Challenges at any time. There is no "deadline."

Robs Muir is a teacher in the Claremont (CA) Unified School District and Claremont Graduate School.

## Logo 86 Announced

Logo 86, the third annual international Logo conference, is scheduled for July 9 - 11, 1986 at the Massachusetts Institute of Technology (MIT) in Cambridge, MA. The program will offer major speakers, presentations, poster sessions, and special interest groups.

The conference will be preceded by two days of Logo tutorials.

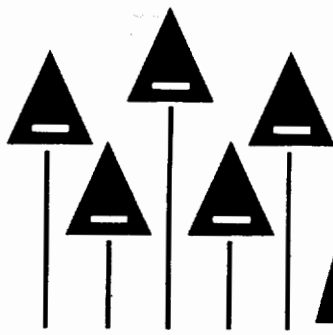
Papers for presentations and poster sessions are invited from both educators and especially students. Papers outlining the major features of presentations (not more than 3 pages) or poster sessions (not more than 1 page) should be submitted by **March 1, 1986** to:

Brian Harvey  
 Logo 86 Program Chairperson  
 Massachusetts Institute of Technology  
 E15-309, 20 Ames Street  
 Cambridge, MA 02139

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Editor.....Tom Lough





# NLXtra

A Supplement to the National Logo Exchange Newsletter

Volume 4 Number 5

FORWARD 100!

January 1986 Page 1

## West Coast Logo Conference Enjoyed by All

by Parnelli Sharp  
and Gail Lovely

You should have been there!

Culver City, California, was the site of the first West Coast Logo Conference, held on November 21 - 23, 1985. Sponsored by Pepperdine University, International Council for Computers in Education (ICCE), Computer Using Educators (CUE), and the Los Angeles County Teacher Education and Computer Center, the three day event drew a crowd of over 900 attendees. A variety of Logo activities were offered, from beginning turtle graphics to advanced list processing.

Comments from the participants ranged from "Fabulous!" to "When is the next one?" Everyone was enthusiastic and seeking ideas about Logo use in the schools at all levels.

The conference consisted of concurrent events from which attendees selected activities to suit their needs. Such activities included demonstrations from teachers using Logo in their classrooms, hands-on workshops, vendor displays of the most current Logo materials and resources, Logo leaders speaking on Logo topics, panel discussions focusing on a variety of Logo issues, sessions in which you could chat informally with well known Logo workers, and presentations from such noted people as John Allen, David Thornburg, and Seymour Papert.

As one of the main after-dinner speakers, David Thornburg realized that his job was to inform and to entertain. He succeeded supremely at both! If you have not yet heard his "praises" of BASIC, you are missing a fantastic talk.

Some feel that the highlight of the conference was Prof. Papert's keynote address. He demonstrated (and debugged!) the latest development from Logo Computer Systems, Inc. ... a combination of Logo and a programmable word processor! Following his address,

he answered a variety of questions from the audience. One of his most enlightening responses was to the question, "What advice do you have for a teacher just starting out with Logo?" He answered without any hesitation, "Just have faith in the kids!"

Conference proceedings are to be published by the ICCE. Details will be forthcoming.

Will there be a second West Coast Logo Conference? No one can say for sure right now. Stay tuned to the NLX for further information.

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Parnelli Sharp is a kindergarten teacher in the Santa Monica (CA) Unified School District, and a mentor teacher in Logo. Gail Lovely teaches second grade in the Los Angeles (CA) Unified School District, is a mentor teacher in computers, and a consultant for Walt Disney Educational Media Company. Both Parnelli and Gail served as coordinators for the West Coast Logo Conference.

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## International Logo Exchange Newsletter Begins Publication

The National Logo Exchange extends a warm welcome its new sister publication, *The International Logo Exchange* (ILX) newsletter! With its January 1986 premiere issue, the ILX begins a bimonthly publication schedule to bring Logo news from an international perspective to readers around the world. ILX editor Dennis Harper has assembled an outstanding staff of field editors on each continent to provide timely reports on Logo activity in their area.

NLX readers everywhere are invited to provide their field editors with information about their Logo work. Write to the field editors at the following addresses.

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

Asia: Hillel Weintraub, Doshisha International High School, Tatara, Tanabe-cho, Tsuzuki-gun, Kyoto-fu, 610-03 Japan.

**ILX continued**

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

Europe: Richard Noss et al., London University Logo Group, University of London Institute of Education, Department of Mathematics, Statistics, and Computing, 20 Bedford Way, London, England WC1 HOAL.

Latin America: Horacio Reggini, Av. Alem 1074, 1001 Buenos Aires, Argentina, South America.

North America: Michael Friendly, York University, Psychology Department, Room 210 BSB, Downsview, Ontario M3J 1P3 Canada. Canadian and USA NLX readers are especially encouraged to send information about Logo activities on a regular basis to Michael.

Subscriptions to the ILX are available for US\$19.50 per year for addresses in the USA, Canada, and Mexico, and for US\$24.50 per year elsewhere. Send subscription orders to ILX, PO Box 5686, Charlottesville, VA 22905.

### 1986 ILX Tour to Iceland and Netherlands Announced

The International Logo Exchange (ILX) announces its 1986 Iceland / Netherlands Logo Tour. Led by ILX editor Dennis Harper, the 14-day tour will include Logo workshops, presentations, school site visits, lectures, dinners with host country Logo educators, and many other exciting Logo activities. Logo educators at all levels are invited to participate in this international Logo event.

The tour will visit both Iceland and the Netherlands, spending approximately one week in each country. All tour participants will deliver one workshop or paper to Icelandic or Dutch colleagues.

The tour departs New York on August 11, 1986, and returns on August 25. (Departures from other cities can be arranged easily.) The \$1589 price encompasses all air fares, transfers, tours, hotels, 2 meals per day, and all educational activities, including three quarter units of graduate credit through the University of California.

For more information on this exciting tour, write to Educational Spectrum, Inc., 188 Summerfield Street, Scarsdale, NY 10583, or call (914) 723-2242 (collect, if you wish).

### Logo Notes

Horacio Reggini's latest book, *Ideas y Formas*, contains a set of procedures recommended for anyone who uses Logo. Reggini's procedures permit one to draw with Logo in three dimensions, and then manipulate the drawing about any axis! Although the text of the book is in Spanish, the procedures are written in LCSI style Logo in English. For more information, write to Emece Distribuidora, Alsina 2062, Buenos Aires 1090, Argentina.

Professor Seymour Papert is collecting anecdotal information on Logo class happenings. He invites NLX readers to send him informal reports of interesting interactions observed in classroom settings and elsewhere as students are working with Logo. Write to: Prof. Seymour Papert, MIT E15-309, 20 Ames Street, Cambridge, MA 02139.

Tuttle Products announces Logo templates for the Apple and Commodore 64 computers. These colorful laminated overlays contain many Logo commands, with examples and diagrams. Templates cost \$5.95 each, plus \$1.50 for shipping and handling, and are available for Apple Logo, Krell and Terrapin Logo, and Commodore Logo. Tuttle Products, Inc., PC Box 26981, Tamarac, FL 33320-6981.

Logo Computer Systems Incorporated (LCSI) has verified a bug report on Apple Logo II. According to Ian Garmaise, LCSI Microsystems Manager, there is a small range of values returned by POS which are not useable by DOT. This is apparently due to the method used to calculate POS in conjunction with the current SETSCRUNCH. Ian sends the following range-adjusting procedure.

```
TO CORFIX :INLIST
IF (FIRST :INLIST) > 139 [MAKE "INLIST FPUT 139 BF :INLIST]
IF (FIRST :INLIST) < -140 [MAKE "INLIST FPUT -140 BF :INLIST]
IF (LAST :INLIST) > 119 [MAKE "INLIST LPUT 119 BL :INLIST]
IF (LAST :INLIST) < -120 [MAKE "INLIST LPUT -120 BL :INLIST]
OUTPUT :INLIST
END
```

Here is an example of use.

```
REPEAT 100 [FD 0.1 DOT CORFIX POS]
```

Ian suggests that the above values of YCOR (119, -120) in CORFIX are valid only for a SCRUNCH of 0.8, and Apple Logo II users would have to experiment to find the minimum and maximum YCOR values for SCRUNCHes other than 0.8.

*Logo Lessons: A Guided Curriculum* is available from John Glantz, PO Box 39, Liberty, PA 16930. Write for more information.

Sterling Swift announces the release of *Little Logo*, a package designed for young children with no computer experience, and *Computing in Logoland*, a self paced Logo tutorial course. For more information, write to Sterling Swift, 7901 South IH-35, Austin, TX 78744.

Are you using TI Logo and need to get your TI 99/4 or 99/4A serviced? Call (800) TI-CARES for information.