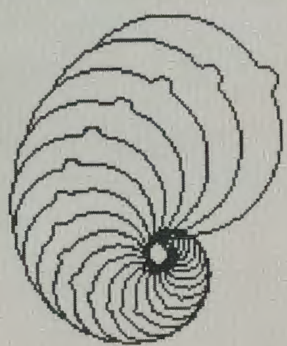
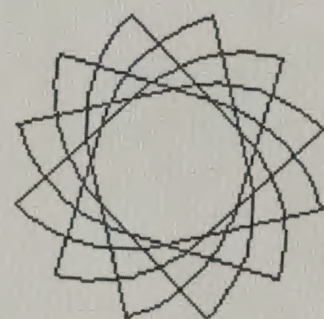
LOGO EXCHANGE

The Magazine for LOGO Activities Worldwide

ISSN 0888-6970 VOLUME 5 NUMBER 2 OCTOBER 1986





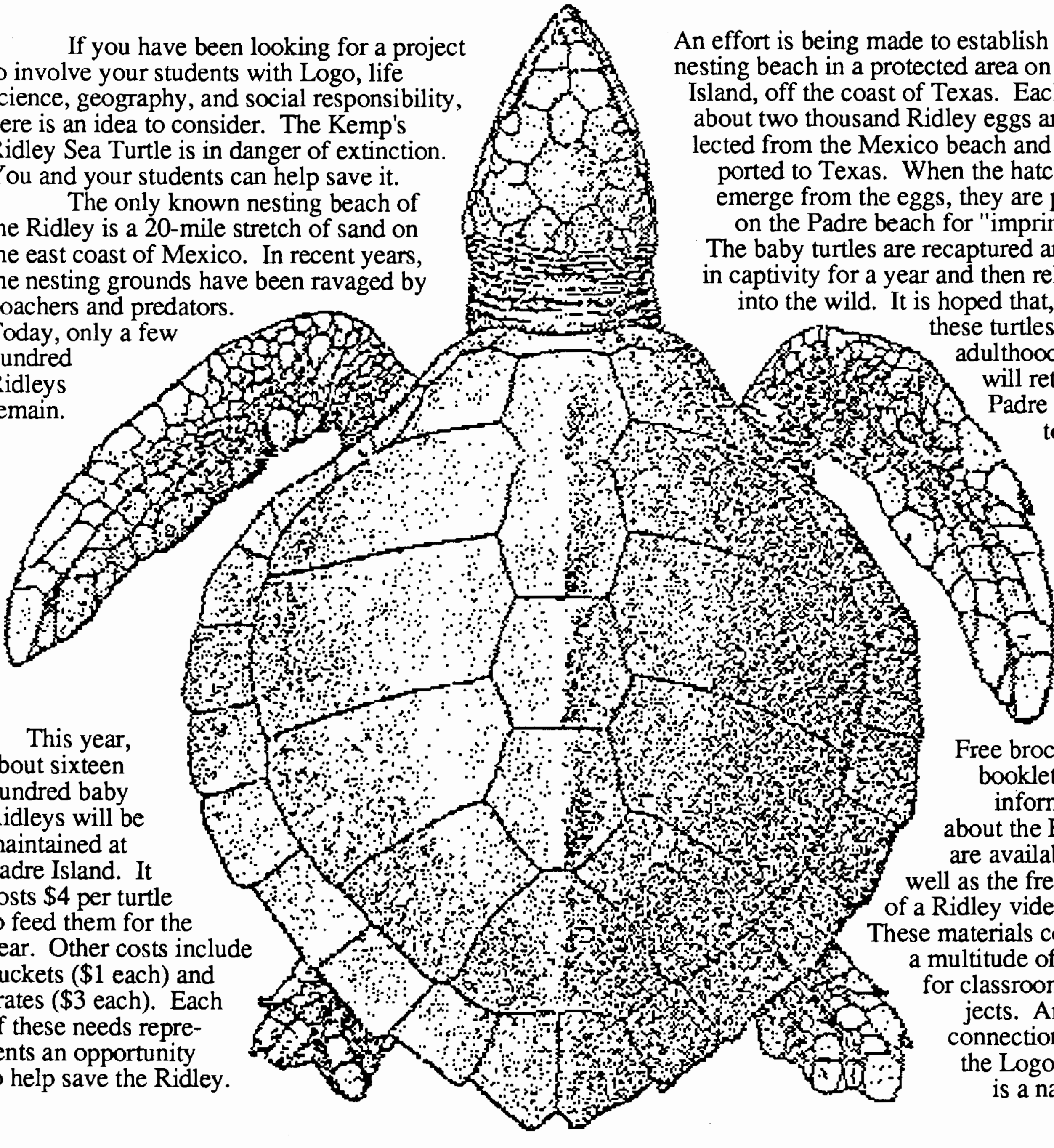
Meckler Publishing Corporation

Save the Turtle!

Help save the Kemp's Ridley Sea Turtle, an endangered species.

If you have been looking for a project to involve your students with Logo, life science, geography, and social responsibility, here is an idea to consider. The Kemp's Ridley Sea Turtle is in danger of extinction. You and your students can help save it.

The only known nesting beach of the Ridley is a 20-mile stretch of sand on the east coast of Mexico. In recent years, the nesting grounds have been ravaged by poachers and predators. Today, only a few hundred Ridleys remain.



An effort is being made to establish a new nesting beach in a protected area on Padre Island, off the coast of Texas. Each year about two thousand Ridley eggs are collected from the Mexico beach and transported to Texas. When the hatchlings emerge from the eggs, they are placed on the Padre beach for "imprinting." The baby turtles are recaptured and fed in captivity for a year and then released into the wild. It is hoped that, when these turtles reach adulthood, they will return to Padre Island to nest.

This year, about sixteen hundred baby Ridleys will be maintained at Padre Island. It costs $4 per turtle to feed them for the year. Other costs include buckets ($1 each) and crates ($3 each). Each of these needs represents an opportunity to help save the Ridley.

Free brochures, booklets, and information about the Ridley are available, as well as the free loan of a Ridley videotape. These materials contain a multitude of ideas for classroom projects. And the connection with the Logo turtle is a natural!

For information on the Kemp's Ridley Sea Turtle and what you can do to help keep it from becoming extinct, write to:

Help Endangered Animals Ridley Turtles (HEART)
PO Box 681231
Houston, TX 77268-1231

HEART is a Special Committee of the Piney Woods Wildlife Society of North Harris County College, Houston, TX.

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International Logo News

Cover: The Logo flower design on the cover was contributed by Erik Rushton, a fifth grade student at Tapley-Atwood School in Oakland, Maine. Erik has been working with Logo since the first grade.

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From the Editor

by Tom Lough

SETHEADING :WHITHER

When I have a quiet moment or two (which is rare, with an energetic three-year-old boy roaring through the house), I like to think about various Logo commands as separate entities. Often, I will surprise myself and "discover" several new and different aspects.

One of my favorite Logo commands to think about is SETHEADING. Learning more about Logo and SETHEADING helped me realize the importance of setting the correct direction in Logo before drawing a figure. But there is much more to it than that.

In science, we define a vector as a "quantity which has both magnitude and direction." To draw a vector, the first thing you must do is determine the direction. This is the first step, regardless of how big or small the vector is!

In our daily doings, this is important, also. For example, it really doesn't matter how far we drive in a day if we are not heading in the direction of our destination. (I understand that this fact is rediscovered by many families each summer as they set out on vacation.)

The same idea holds true for teaching, doesn't it? It matters little how hard we work if our personal educational orientation is faulty. Most LX readers in the northern hemisphere are back in school by now. Routines for reserving computers, taking up lunch money, conducting parent conferences, and, oh yes, teaching are probably pretty well established. In the rush and bustle to get the year off to a good start, most of you spent some time getting ready before school opened, determining the direction your teaching would take this year. Like drawing a vector, you did this first.

Another aspect of SETHEADING I like is that it is absolute. That is, it sets the direction of the turtle with respect to a reference which is constant: the direction toward the top of the screen. In that regard, some teachers suggest that SETHEADING is easier for young children to learn than the relative commands of LEFT and RIGHT. The reference direction is comfortingly consistent, yet each child can set the turtle to any desired direction using this common reference.

The command is a model for me when I want to organize something which involves the efforts of several people. In most cases, I like to give an initial orientation, akin to

TELL ALL SETHEADING 90

Then I encourage everyone to pursue his or her individual path towards accomplishing the goals. The common initial orientation gives an overall sense of direction to the project, yet the opportunity to "do it **my** way" is provided for each person. This is especially challenging (and rewarding) when I am attempting to apply the idea to a teaching situation.

We can think about the direction of Logo itself. Where can it take us? Is there a "right" direction, or even a "best" direction? The answer probably is different for each person.

Many teachers are just beginning to understand some of the curriculum applications of Logo. Others are exploring the potential of LogoWriter. A few are observing the LEGO and Logo system. Where is it all going? How can we as teachers set our heading for the benefit of our students?

The more I think about SETHEADING, the more I find I can learn from it, and the more questions I discover.

What about you? Do you have any favorite Logo commands? How do you think about them?

FD 100!

Tom

LEGO and Logo: Partnership of the Future

by
Joyce A. Tobias

When I read B. J. Barnes and Shirley Hill's article, "Should Young Children Work with Microcomputers - Logo before LEGO?" in the May 1983 issue of *The Computing Teacher*, I was struck by the interesting title they chose. Little did I realize that the title would take on a whole new meaning for me a few short years later. The LEGO/Logo system is on the way. Instead of debating the merits of Logo *before* LEGO, we soon will be exploring the benefits of Logo *with* LEGO. (Ed. note: LEGO is a registered trademark of INTERLEGO and LEGO Systems Inc.)

Just what is it about LEGO/Logo that causes everyone who tries it or sees it to become so enthusiastic? The LEGO/Logo system is just what the name implies. It is a learning environment that combines LEGO building bricks that children use to create houses, farms, and tractors, with the Logo programming language that children use to control the computer. The LEGO/Logo system uses the Logo programming language via an interface box to control LEGO motors that direct the movement of a LEGO object.

Both the LEGO system and the Logo language are construction sets in which one object, either a plastic LEGO brick or a Logo primitive, combines with another. Each system starts with these small building blocks, enabling the construction of a more complex structure. The similarities of the building block philosophy of both LEGO and Logo provide an underlying organization that makes design and invention seem natural and easy.

The beauty of the LEGO/Logo system is that it consists of a logical combination of media material: hands - on objects and a computer language. The LEGO/Logo system brings together the concrete world of building blocks with the abstract world of the computer. LEGO/Logo explores the relationships between control and feedback, and between sensors and external stimuli, that help children gain a better understanding of the nature of intelligence and how their own intelligence works. It is a system in which each new structure such as a small LEGO house or a Logo procedure becomes a building block for more complex structures or ideas that grow as the children grow.

STARTUP

After reading *Mindstorms*, Kjeld Kirk Kristiansen, the president of INTERLEGO in Denmark, visited Seymour Papert at MIT. He felt that the LEGO and Logo philosophies were complementary, bringing together two construction sets: the concrete world of LEGO building bricks and the abstract world of computer control with Logo as the programming language. This visit led eventually to a contract between INTERLEGO A/S (Denmark) with Microworlds Learning Inc. (Cambridge, MA) for the development of a LEGO/Logo learning environment, and a research grant to the Learning and Epistemology Group at MIT. The primary purpose of the research is to study the effect of the LEGO/Logo system on children's thinking and learning.

The LEGO/Logo system was first piloted in Project Headlight at the Hennigan School in Boston, an IBM / MIT five year research study on the use of technology in the schools. In the spring of 1986, further pilot tests were done in three schools: the Anne Fischer School in Hartford, CT, Whalen Junior High school in New York City, and the Trotter Elementary School in Boston. During the spring and summer of 1986, literature was developed that included a teacher's guide, 3 student activity booklets, and a reference guide. Further field tests are being done this school year to evaluate and refine the accompanying literature.

The first LEGO/Logo workshops outside the pilot schools were held at the Logo 86 conference at MIT in July. Classroom teachers and teacher trainers became students of the LEGO/Logo system and they proved to be as excited as the children. One group produced an inch worm, then used Logo to create a song to accompany the inch worm's Logo controlled movements. Other participants raced their LEGO vehicles down a ramp for time trials recorded in Logo, or used Logo to control LEGO amusement park rides or kitchen appliances.

The inch worm project made me realize how well the LEGO/Logo system fits not only into the science of physics with its gears, motors, and friction but also the area of life science. Just think of the excitement as students do the imaginary animal unit that is so popular not only in elementary schools but also in junior high life science classes. Students could use LEGO bricks to create their animal, then use Logo to write about the animal's characteristics and control it. They could also create a song in Logo and have it play as the animal moves, or create a sound pattern for their imaginary animal. Students could write stories about their animal and share them with the class in an oral presentation utilizing their language arts / communication skills.

Benefits and Observations

What children learn in LEGO and Logo is similar but enriched when both systems are interactive. The LEGO/Logo system provides for greater student involvement in the learning process because it is both process and project oriented. Children learn the key ideas of design, invention, and problem solving. They discover the power of simplicity, the importance of modularity, and the value of planning.

One of the major outcomes has been the children's engagement with the equipment. All students are captured by what is happening. In some instances, a reversal of the traditional sex roles occurs. For instance, at the Hennigan School, the gear expert was a fourth grade girl, while boys were building LEGO kitchen appliances.

Students use the building block concept when working with the LEGO/Logo system. They learn that any large problem can be solved if it is broken down into bite size chunks and done a step at a time. The pieces are then joined together in different ways for the best possible outcome.

Steve Ocko, one of the developers of the LEGO/Logo system from Microworlds Learning Inc., comments, "Most invention comes from putting things together in new ways; you could call it problem solving. It's close to what work is all about, but not usually what school is all about." Students perceive this as "authentic work" instead of doing something by rote where the answer is already known. When a problem occurs and the problem solving method is engaged, the true mystery of the answer makes the process seem valid to the students.

A scenario that might be followed in class goes like this: students build a robot, elevator, or any object; test it to see if it will stand on its own; add a battery operated motor to make sure it works; hook it up to the interface box for computer control; add feedback sensors such as touch or light that cause a reaction. In the process, the project is modified at each step as students test and retest their ideas or hypotheses.

Students develop an understanding of the process of science. They come up with their own theories or ideas rather than those of someone else. They test their ideas and change them based on the results of their experimentation, thereby intuitively using the scientific method.

How does this all fit into the curriculum? Teachers and school systems have to examine what they want their students to learn. One of the major objectives of education is to teach the lifelong skills students need to succeed in life. Schools have to reexamine their objectives and see what they are willing to let go in order for students to spend more time learning lifelong skills such as problem solving.

As students are creating their LEGO objects, such as vehicles, they must sometimes sacrifice power for speed or speed for power. Students see themselves as scientist since they make the decisions based on their desired goals. Also, the power / speed relationship can be changed as the students' goals are changed.

Through this process, students begin to develop the "big idea of trade-offs." Mitch Resnick of Microworlds Learning Inc. comments that, while students are working on things they care about, they are being exposed not only to "big ideas about friction, motion, speed, and acceleration, but also the bigger idea of trade-offs. For example, consider the trade-off of speed vs. power - the fact that there is no such thing as a free lunch. Another big idea is that complex things can be broken into smaller parts, the same as the complexities in life".

Mary Macchi, a fourth grade teacher at the Hennigan School says, "In many activities, children feel defeated if they don't succeed the first time. I find with the computer, Logo, and LEGO, that they're willing -- they're eager -- to go out and try again, even if it didn't work the first time, or the second time. They don't get that negative attitude." And that's one of the lifelong skills that students need to develop. Students learn to cope and build a tolerance for difficulty.

Steve Ocko summarizes what is for me one the most exciting outcome of the LEGO/Logo unit. "There are no failures; all students are able to do something powerful and beyond their own expectations."

Fourth grade students at the Hennigan School in Boston, MA, working on their LEGO/Logo projects. Photograph by David Whittier.

The Product

The LEGO/Logo system will contain two types of activities, according to Stuart McMeeking of LEGO Systems Inc. One will be a directed site where students are given blueprints to follow to create an object such as a washing machine or car. The other site will be an inventive or exploratory site where children will create objects of their own design, such as appliances for a kitchen of the future, rides for an amusement park, or their own inventions. Teachers may choose to use the directed or the exploratory approach, or a combination of the two methods.

The components of the LEGO/Logo system will include the LEGO TECHNIC CONTROL-O kit ($105), a computer interface box ($120), connecting card and cable ($36), and the literature and software package ($100). (Note: These are approximate prices from LEGO Systems Inc.) The literature presently includes a teacher's guide, two sets of three student booklets, and reference guide. The software contains the regular Logo primitives such as FOWARD, BACK, RIGHT, LEFT, and IF, but also some new primitives to control the LEGO object such as TALKTO, LISTENTO, WAITUNTIL, SENSOR, ONFOR, and OFF. The LEGO/Logo system for the Apple IIe computer is scheduled for delivery in August, 1987. For information or to be included on the LEGO/Logo mailing list, send your name and address to:

LEGO Systems Inc.
Educational Sales Dept.
555 Taylor Road
Enfield, CT 06082
800-243-4870
203-749-2291

Joyce Tobias is currently teaching computer courses and biology at Brookline High School and Boston University. She worked with Microworlds Learning Inc., who is developing the LEGO/Logo system with INTERLEGO and LEGO Systems Inc. She is a member of the NAEP Computer Competency Learning Area Advisory Board and has coauthored six books on Logo.

Turtle Information Wanted

If you are like most LX readers, anything having to do with turtles will probably capture your attention. Most likely, you have a small but growing turtle collection. Many of you use turtle paraphernalia (such as posters, models, rubber stamps, etc.) in your Logo teaching.

The *Logo Exchange* is compiling a list of sources of products and items related to turtles. If you have a favorite turtle item, please send us a description. It is important to include the complete address of the supplier, and any additional information, such as price, size, color, etc.

Of course, if any of you produce turtle related items, we would be particularly interested in adding them to our list. It is our hope to publish a compendium of these items at some future date. Thank you for your help.

Send your information to:

Turtle Information
Logo Exchange
PO Box 5341
Charlottesville, VA 22905.

Tipps for Teachers

by Steve Tipps

Funatic Fractions

The task this month is to create some procedures for fractional exploration. The procedures fall far short of a microworld in that they do not yet allow students to "create" new ideas with Logo, but the procedures are more flexible than strict fill-in-the-blank programs available for fraction teaching. These tools can be pretyped by the teacher or can serve as the basis of a programming challenge.

Parts of the Whole

Students have problems in several parts of understanding fractions. First, the idea of unit is different from their regular counting notion on unit. One is an ingrained idea, and in counting, one is the unit of interest. The idea of unit being one thing is carried over into fractions as parts of a whole -- the pizza pie picture. The pizza pie can be any size, but it is still one thing which can be cut up. Squares and rectangles are also unit wholes.

The stickier problem comes when units are collections or sets of objects. Half of the 24 children is 12. One third of the 30 turtles is 10 turtles. In these cases, the whole is a set of objects. The fractions are a subset of the whole set. The idea that 30 turtles is being talked about as one thing is difficult for many students and adults.

Another fractional idea which causes problems is comparison of fractional values. Is 2/3 greater or less than 7/13? than 18/27? Or are they the same? It is my experience that not enough is done with students for them to get a feel for fractions. Instead, GCF (greatest common factors) and LCM (lowest common multiple) are emphasized to the exclusion of GOCS (good old common sense). Making fraction strips is a good manipulative way of having students play with these comparison ideas. A picture in the textbook is not.

The next problem comes with operations on fractions. Addition and subtraction of fractions with the same denominators is relatively simple because it can be a naming process parallel to addition and subtraction of whole numbers.

"One apple and two apples are three apples."
"One sixth and two sixths are three sixths."

The difficulty comes when the denominators are not the same.

"One apple and three oranges are four fruit."
"One third and three fifths are chisidkl djisar ."

If we could only figure out what chisidkl djisar was, the problem would be fine. But students have so little experience with fractions that they don't even have a reasonable guess as to what chisidkl djisar might be. Is it close to 1 or close to 47? The problems with fraction operations do not even touch the issue of 3/4 times 248 or 100 divided by 3/5, much less 3/4 times 7/8 or 3/4 divided by 7/8.

Moving from simple naming of fractions to understanding is a difficult process as demonstrated by the kinds of problems which students have. When we wonder why children at the fifth and sixth grades have so much trouble "getting it," we need to remember what we know about cognitive development. Piaget found that *proportional thinking* was an important element in formal reasoning. Proportional thinking is fractional thinking. Fifth and sixth grade students are still typically and staunchly in concrete operations. Despite their conservation of number, length, and area, they need objects and models to manipulate to build their understandings to an abstract level. Fractions are the place where many students begin to abandon mathematics. Maybe Logo can provide some new way for students to explore fractions.

Making Units

The first fraction tool is a unit maker. Because students can be limited by the idea of pizza pie fractions, a unit maker should create several shapes. The unit should also be variable in size. This UNIT maker picks one of three shapes and uses a random size generator. SETUP clears the screen and moves the turtle to a starting position to the left of center. You may find other positions more suitable for your screen.

```
TO UNIT
SETUP
MAKE "FIGURE PICK [ SQUARE RECTANGLE
CIRCLE ]
MAKE "SIZE HOW.BIG
RUN LIST :FIGURE :SIZE
END

TO SETUP
CLEARSCREEN
PU LT 90 FD 50 RT 90 PD
END

TO PICK :LIST
OUTPUT ITEM 1 + RANDOM COUNT :LIST :LIST
END
```

```
TO HOW.BIG
OUTPUT  10 * ( 3 + RANDOM 5)
END
```

HOW.BIG is an OUTPUT function which returns values from 30 to 70. (Ed. note: See Glen Bull and Paula Cochran's "Teaching Tools" column in this issue for more details on OUTPUT functions.) The values for size were chosen for the screen. The Logo procedures for SQUARE, RECTANGLE, and CIRCLE are variable and adjusted to the size of the screen also.

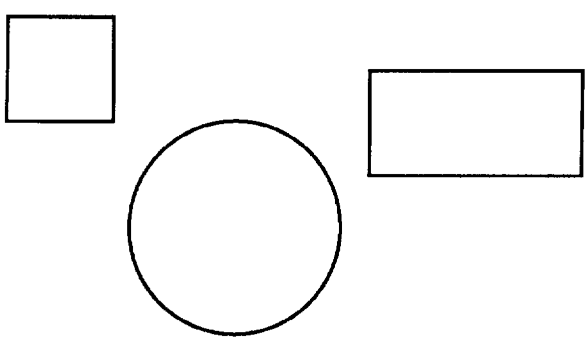
```
TO SQUARE :SIZE
REPEAT 4 [ FD :SIZE RT 90]
END

TO RECTANGLE :SIZE
REPEAT 2 [ FD :SIZE RT 90 FD :SIZE * 2 RT 90]
END

TO CIRCLE :SIZE
RT 9
REPEAT 20 [ FD :SIZE / PI RT 18]
LT 9
END
```

In CIRCLE, PI was chosen as the divisor of the :SIZE so that :SIZE would work as the radius. If your Logo does not have PI built in, define the following additional function.

```
TO PI
OUTPUT 3.14159
END
```

In addition, the CIRCLE procedure is written so that a "true radius" is possible on the horizontal plane. For more information on this puzzler, see "Tipps for Teachers: Circular Quirks," in the March 1986 issue of *The National Logo Exchange.*

Now you have all the parts needed for a unit maker. Squares, circles, and rectangles for various sizes are produced when the procedure UNIT is called. UNIT could be used just to draw the shapes and get use to the idea of a unit fraction.



How Many Parts?

After a unit is drawn, a cutting tool is needed to divided the unit into several different parts. The name of this tool is CUT, and it takes an input of the number of parts which are in the unit.

```
TO CUT :PARTS
CIRCLE.CUT
SQUARE.CUT
RECTANGLE.CUT
END
```

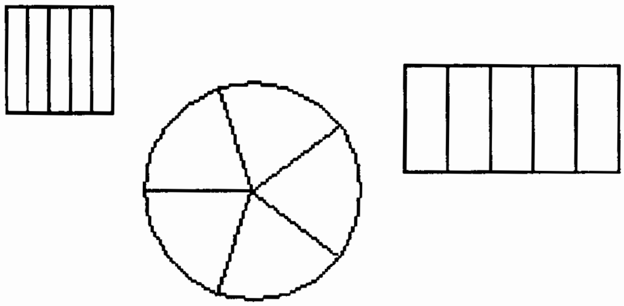
Separate procedures are used for each figure which could be drawn. The first line of each procedure determines whether the figure is the one which is drawn in UNIT. Then the correct cuts are made in the figure.

```
TO CIRCLE.CUT
TEST :FIGURE = "CIRCLE
IFTRUE [ PU LT 90 BACK :SIZE PD]
IFTRUE [ REPEAT :PARTS [ LINE :SIZE RT 360 /
:PARTS] ]
END

TO SQUARE.CUT
TEST :FIGURE = "SQUARE
IFTRUE [ REPEAT :PARTS [ RT 90 FD :SIZE /
:PARTS LT 90 LINE :SIZE]
END


TO RECTANGLE.CUT
TEST :FIGURE = "RECTANGLE
IFTRUE [ REPEAT :PARTS [ RT 90 FD :SIZE * 2 /
:PARTS LT 90  LINE :SIZE]
END

TO LINE :LENGTH
FD :LENGTH BK :LENGTH
END
```

These procedures depend on information from UNIT which specifies both the figure and the size being used. Second, the value :PARTS is available to all the procedures within CUT. Thirdly, :PARTS is used to determine the size of the cut on each figure and the number of cuts to be made. Notice how :PARTS is used each time. (Terrapin Logo users should omit the outside brackets in the IFTRUE statements.)

The cut tool is now available for playing with different fractions. If the figure is a square, then CUT 5 makes 5 equal cuts within the shape. If the figure is a circle, then CUT 12 makes 12 pizza slices.

If the figure is a rectangle, CUT 15 makes fifteen even cuts inside the rectangle. However, CUT 100 may be more cuts than you need.



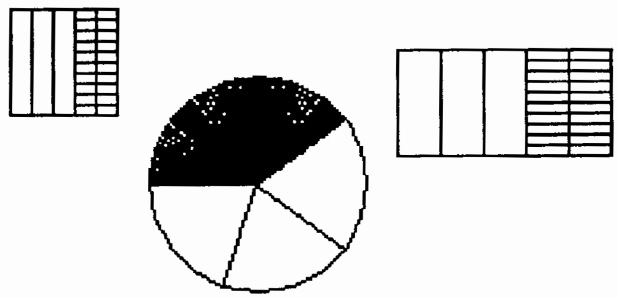
Color the Pieces

The last tools in this introductory fraction set are designed to color in a certain number of pieces of the divided unit. COLOR is the title of the procedure and it calls three different coloring procedures depending on the shape being used. Two input are needed. The first tells the number of pieces to be colored in. The second tell how many parts are in the figure.

```
TO COLOR :PIECES :PARTS
CIRCLE.COLOR
SQUARE.COLOR
RECTANGLE.COLOR
END

TO CIRCLE.COLOR
TEST :FIGURE = "CIRCLE
IFTRUE [ REPEAT :PIECES * 360 / :PARTS [ LINE
:SIZE RT 1 ]]
END

TO SQUARE.COLOR
TEST :FIGURE = "SQUARE
IFTRUE [ LT 90 ]
IFTRUE [ REPEAT 10 [ LINE :PIECES * :SIZE/
:PARTS RT 90 FD :SIZE / 10 LT 90]]
IFTRUE [ LT 90 FD :SIZE RT 90 FD :PIECES *
:SIZE/ :PARTS  RT 90]
END

TO RECTANGLE.COLOR
TEST :FIGURE = "RECTANGLE
IFTRUE [ LT 90 ]
IFTRUE [ REPEAT 10 [LINE :PIECES * :SIZE * 2/
:PARTS RT 90 FD :SIZE / 10 LT 90]]
IFTRUE [ LT 90 FD :SIZE RT 90 FD :PIECES *
:SIZE *2/ :PARTS RT 90]
END
```

The coloring section for each shape is determined by the size of the figure, the number of parts, and the number of pieces. The COLOR tool then can be used to overlay on the UNIT cut into fractional parts. Or it can be used to color in the UNIT without making prior cuts.

COLOR 3 4 tells the turtle to color 3 of 4 equal sections. The way this looks depends on the shape. Esoteric combinations can be tried out also. COLOR 13 17 and COLOR 4 12 and COLOR 1 9 are as easy as COLOR 1 2. From these explorations, students should focus on the number of parts in the whole (the denominator) and the number of pieces (the numerator). The transition to sets of objects used as a whole can be done by making up story problems about the fractions.



Try out the three fractions tools with your students. See how you can change the procedures to do other things. See if you can find ways of using COLOR for comparing and adding fractions. I have discovered several possibilities already which I did not anticipate at the beginning of the project.

Working with fractions may not always be fun, but your students might become fraction funatics with Logo fraction tools!

I would be interested in learning how you use these ideas. Please send mail to:

Steve Tipps
Midwestern State University
Wichita Falls, TX 76308

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.

Teacher Feature

by Rebecca Poplin

Featuring: America Foster

America Foster is a teacher who is a winner! In the spring of 1985, America won a brand new computer as first prize in an Apple-sponsored contest. She submitted Logo teaching materials for high school mathematics which she developed at her Martinsville, Virginia, school. In 1986, America became a winner in a different way. Her 16-year-old daughter, Jacqueline, who is also a member of the computer club America sponsors, won an all-expense paid trip to Washington, DC, as a prize for her science / mathematics / computer project.

A Multifaceted Project

Jacqueline developed an extensive project about conic solids. She included straw models and explanations of several mathematics concepts as well as computer diagrams programmed in Logo. These diagrams illustrated the patterns for the solids. Jacqueline entered her work in the mathematics section of the science fair and won first place in the school and the district. The project was one of six selected to go to the Western Virginia Regional Science Fair where it won *four* awards: the National Council of Teachers of Mathematics Award, the NASA Award for computers, the Army Award for mathematics and computers, and second place overall for mathematics and computers. Then the Fosters entered the computer part of the project with pictures of the other sections in the Apple contest where it won national recognition - second place in the judges' choice division!

The trip to Washington was a special treat for this mother-daughter team. Apple's conference included winners in the divisions of community service, integrating computers in the curriculum, BASIC programming, and judges' choice. There were opportunities to have pictures taken with Steve Wosniak, special tours of the nation's capital, show and tell of the winning projects, a press conference with people from national computer magazines, and a fabulous awards banquet as a finale. Jacqueline has a special plaque, lots of pictures, and wonderful memories. As Jacqueline's sponsor (and as her mother), America has a lot to be proud of.

One feature of the conference was the group's experience with software called "The Other Side," by Tom Snyder, developer of "Snooper Troops," The simulation involves building a bridge between Russia and the USA. A trip to Russia with the software has resulted in groups of young people actually playing the game across the Iron Curtain. After observing hours of play at the conference, America is excited about using "The Other Side" with her computer club.

Winners All

Those who receive prizes and plaques aren't the only winners associated with America Foster. Her enthusiasm for learning new things and sharing her experiences makes waves which spread to others. This past year, America and the computer club members made sharing computers with others a major priority. A grant from the Virginia Education Association enabled them to conduct workshops for parents who had not used computers. Club members helped others in the school use the computer to polish required science projects. Assistance was provided for about one third of the student population! America helped many of the teachers in her school become familiar with what the computer could do for them. The Martinsville pond has many ripples as a result of the pebbles cast in it by America Foster.

If you are interested in starting an Apple computer club at your school, information is available by writing Apple Computer Clubs International, PO Box 948, Lowell, MA 01852, or calling (800) 343-1425. If you would like to know more about America's work, you may write:

America Foster
Route 5, Box 675
Martinsville, Virginia 24112

If you know of a Logo teacher who should be featured in this column, please contact:

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Teaching Tools

by Glen Bull and Paula Cochran

Algebra Tools

A tool should be as unobtrusive as possible. If the class is learning algebra, Logo should be an aid to learning about equations, not a new subject which must be learned in addition to algebra. In algebra, variables are represented by letters, such as:

2X + 4Y + 2
7A + 3B + 5

Sometimes a tool can simply be a new way of looking at things. For example, it is possible to represent algebraic variables in Logo in this way.

```
TO X            TO Y
OUTPUT 5        OUTPUT 3
END             END
```

This allows the following form of representation:

```
?PRINT X
5
?PRINT Y
3
?PRINT X + Y
8
```

There are two advantages of representing X and Y in this way (rather than as :X and :Y) in an algebra class.

1. It is not necessary to teach the class the distinction between dots (:) and quotes (") in Logo. (Remember, we're going to teach the class algebra, not Logo programming.)
2. The representation of the symbols in Logo more nearly resembles the representation of the symbols in algebra. Thus, there is one less level of abstract algebraic concepts.

What can we do with X and Y in Logo? Here is a typical task from an algebra text.

"Find the value of each expression if X = - 2, Y = 3, and Z = - 4."

In order to use Logo, we can write procedures for X, Y, and Z which output the values given. Once this is done, we are ready to tackle the problems.

Let's look at Problem 1: X - Y + Z. Here's a way to solve the problem in Logo.

```
?PRINT X - Y + Z
-9
```

Problem 2 is tougher: 3X - Y + Z. This problem requires us to introduce a new nomenclature; the asterisk (*) is required to multiply 3 times X in Logo. However, the convention of an asterisk for multiplication in Logo is close to the convention of a dot for the same purpose in algebra.

Algebra	Logo
4 • 9 = 36	PRINT 4 * 9

Thus, in Logo we can represent 4 times 9 in the following way:

```
?PRINT 4 * 9
36
```

The same method can be used to represent 3 times X.

```
?PRINT 3 * X
-6
```

Thus, our problem (3X - Y + Z) can be represented in Logo this way:

```
?PRINT 3 * X - Y + Z
-13
```

LOGO + ALGEBRA = ?

Let's stop at this point, and compare the advantages and disadvantages of adding Logo to our algebra class. In order to use Logo, the class must learn three skills.

1. Members of the class must be able to create a simple Logo procedure.

```
TO X
OUTPUT 8
END
```

2. The class must be able to use the Logo editor to change a procedure.

3. The class must understand the convention of using an asterisk for multiplication.

The ability to create and edit a procedure can usually be taught in one class. Thus, the total overhead for using Logo with a class may be an hour or less. What is gained in returned for this expenditure of class time? Initially two benefits may be obtained.

1. Logo can shorten the feedback loop and encourage experimentation. It is well known that a faster feedback loop can increase the rate of learning. Not many years ago it was customary to create computer programs on punched cards which were fed to the computer in a batch mode. In some cases, a printout showing compilation errors might not be returned for several hours or even a day later. Needless to say, it took a long time to debug a program. A typical feedback loop for algebra homework is three days. The student completes the homework on Day 1. The homework is turned in the following morning (Day 2). The homework might be graded that night, and the student receives corrections on the following day (Day 3). Needless to say, it often takes a long time for a student to debug a homework error.

Logo can provide feedback in the immediate mode. Of course, some books have answers to even numbered problems in the back, but there is no way of finding out WHY you got the wrong answer. Logo permits experimentation. You can try stating the problem in a different way. You can try another problem almost like the first problem, with one small change.

For example, consider the problem of parentheses.

2 * (7 + 2) is not the same as (2 * 7) + 2

In this case, Logo can be used to explore seemingly arbitrary rules about operator precedence. It is possible to experiment to discover the effects of performing different orders of operation.

```
?PRINT 2 * (7 + 2)
18
?PRINT (2 * 7) + 2
16
```

Logo makes it possible to play with different ways of approaching a problem, without getting bogged down in computation.

2. Logo can validate the convention of using a symbol to represent a number. The use of a symbol to represent another object is not an intuitive concept. Take the case of a quadratic equation. A beginning student will find the equation easier to understand if it is represented by numbers.

Easier	Harder
(4 + 3) (4 + 2)	(X + 3) (X + 2)
7 * 6	$X^2 + 5X + 6$

If letters are used to represent numbers in Logo as well as algebra, it allows students to experience the concept in two domains rather than one.

More Than One Way to Skin a House

Algebra is a tool. This tool provides a way of manipulating numbers which is needed for other subjects such as calculus. However, there is no immediate payoff at the time algebra is learned. For many students this is the biggest barrier of all. They understand that it is possible to represent a number with a letter. They simply don't see the benefit.

In other words, algebra often is not empowering. It doesn't allow students to do anything they want to do - at least, not right away. Logo cannot solve this problem, but it can give the teacher a tool.

One of the benefits of using a variable is that it permits a small change to have a big effect. For example, remember the "classic" Logo house? Here is another way to create such a Logo house.

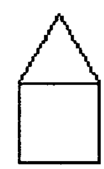
```
TO HOUSE
SQUARE
FD X RT 30
TRIANGLE
LT 30 BK X
END
```

```
TO X
OUTPUT 30
END
```

```
TO SQUARE
REPEAT 4 [ FD X RT 90 ]
END
```

```
TO TRIANGLE
REPEAT 3 [ FD X RT 120 ]
END
```

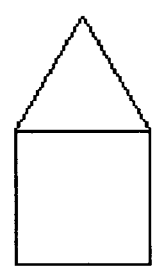
With these procedures, X = 30, and the house will look like this:



To change the value of X, edit the X procedure and change the value of X to 50:

```
TO X
OUTPUT 50
END
```

Now the house will look like this:



By changing just one value, the power of a variable is illustrated. Of course, to someone accustomed to Logo, changing the value by using the editor may seem clumsy. If Logo were to be used extensively throughout an algebra course, at some point you will want to introduce the Logo convention of dots and quotes, to mark Logo variables. However, by delaying the introduction of programming variables, the frustration of dealing with programming syntax *and* new mathematical concepts at the same time is avoided.

It is possible to change the value of X without using the Logo editor. Most programming languages make a distinction between data and programming instructions. LISP and Logo do not. That means we can write a procedure to change the contents of another procedure and bypass the editor.

```
TO CHANGE
(TYPE [ CHANGE ] SPACE)
MAKE "LETTER RC
(TYPE :LETTER SPACE [ TO ] SPACE)
MAKE "VALUE FIRST READLIST
DEFINE :LETTER LIST [ ] LIST "OUTPUT :VALUE
PRINT (SE :LETTER [ IS NOW ] :VALUE)
END

TO SPACE
OUTPUT CHAR 32
END
```

The CHANGE procedure types "CHANGE" and then stops until the user enters the letter of the variable to be changed. The CHANGE procedure then types "TO" and pauses while the user enters the new number. Let's CHANGE X to 80.

```
?CHANGE
CHANGE X TO 80   <-- The user entered X and 80
X IS NOW 80
```

After the CHANGE procedure is run, the change in the value for X can be verified.

```
?PRINT X
80
```

To save typing, we can write a shorthand procedure. Instead of having to type CHANGE, we just type C.

```
TO C
CHANGE
END
```

If that is done, what will happen in the following instance?

```
?C
CHANGE C TO 99   <-- The user entered C and 99
C IS NOW 99
```

If we print out the contents of the procedure C, we will find it has indeed changed:

```
?PO "C
TO C
OP 99
END
```

In languages in which the program can be treated as data, it is possible for a procedure to change itself to something else. This is known as "self-modifying code." This capability does not exist in most programming languages.

Logo Challenge

Can you think of a use for self-modifying code? Construct a program which is written so that the program changes itself.

Summary

The X procedure in this column is in the form of a Logo function. That is, it returns a value. Some Logo functions take an input, and then return a different value. Logo functions have many other uses in algebra instruction. (For example, see "The Functioning of OUTPUT," by Nancy Kovatch, *The National Logo Exchange*, December 1984.)

Is it better to use a Logo function or a Logo variable? They can both fill the same role in certain cases. Paul Goldenberg has addressed this question, and suggests that it depends on your end goal. For a Logo beginner, use of a function with OUTPUT may be easier. Goldenberg also notes that use of a function can eliminate the the SETUP step sometimes required with global variables. In some cases, this style of programming can more readily apply to advanced programs. (See Paul Goldenberg's article in the "MathWorlds" column in this LX issue, and "Iconic Programming" in the Logo 86 Proceedings, p. 32- 34.)

Often, teachers feel that they can not use Logo because they don't have time to teach a programming language. A collection of tools such as those we discussed can be used to make Logo match the content area, rather than making the students change the way they learn the subject.

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TO BEGIN :FIRST.STEPS

by Elaine Blitman and Barbara Jamile

As new Logo users meet the turtle and move it about, explorations usually take them in many different directions. If assistance cannot be completely individualized to follow each student's unique direction, teachers need to make decisions about the sequence of instruction. This month's column will discuss just one set of decisions you may soon face. Also, we have an off-computer activity that provides concrete experience in manipulating the turtle and some tips on disk use and management.

Which First?

Consider the sequence of instruction when you are planning to introduce new Logo commands or concepts. For example, some teachers suggest that the SETHEADING command is often easier for young children to understand than the RIGHT and LEFT commands. This is because the number of degrees following SETHEADING results in the turtle always heading in a uniquely specified direction relative to the screen. For example, SETHEADING 180 always turns the turtle so that it points towards the bottom of the screen.

Logo instruction manuals often present the commands for RIGHT and LEFT first because, in combination with FORWARD and BACK, it is easy to build figures using these commands. After one figure is made, procedures can be written, multiples of the figure can be constructed, and the idea of variables can even be introduced. However, using the RIGHT or LEFT commands can also be confusing because the turtle turns are added to or subtracted from the previous heading. For example, two right turns of 180 degrees make the turtle point in its original direction!

Either of the above options can be used first, depending on the students and the situation. Carefully consider the sequence that will stimulate and benefit your students most.

Here are some ways to demonstrate these commands off-computer:

Use the turtle direction finders in the September issue of *Logo Exchange* as the twirlers for a game. Place the SETHEADING finder on the floor or on an overhead projector. Determine a direction in the classroom for a heading of 0 and align the twirler and the turtle accordingly. One child calls out the SETHEADING commands and "turtle" children follow them, turning to the direction called. Other children can act as "checkers" by using the twirler to see if the "turtles" are facing the direction called out. The individual turtles illustrated in the "My Turtle" section below might help children to follow the action. Be sure they understand that the turtle sets its direction with respect to 0 when following the SETHEADING command. One way to do this is to have the children turn back to 0 as the first step in the next SETHEADING command.

Use the RIGHT twirler to play the same game. This time the "turtle" must add the new angle number to the previous heading before turning. Use masking tape to mark the angles and shapes on the floor. This is a good time to reinforce estimation skills involving angles and addition. When the LEFT command is tried, subtraction might be needed. Station a group of "checkers" at a computer to use the same Logo commands to compare the actions of the child turtles and the screen turtle.

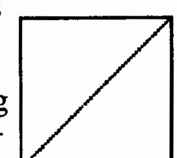
My Turtle

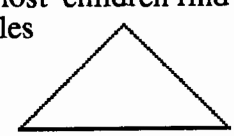
Make a turtle using a section of an egg carton, a colored pipe cleaner or craft chenille, a scrap of colored railroad board, and felt pens or paint.

1. Do some research about turtles as a class project: use them as the focus of a zoo trip; show films about turtles; share books and photos from the library. (Ed. note: One excellent source of turtle information for teachers is HEART, PO Box 681231, Houston, TX 77268-1231. They can provide brochures about the endangered Kemp's Ridley Sea Turtle, and have a free videotape available for loan.)

2. Compare various species of turtles and their colors, patterns and textures. Each child can decide how to color his / her egg carton turtle. The pipe cleaner can be pushed into the egg carton cup to provide a handle when coloring or painting.

3. Talk about and experiment with cutting triangles from squares and rectangles. Use one of these to make a triangle to fit on the back of the turtle. If you are using a version of Logo that has a realistic-looking turtle, you might skip this step, but most children find that it is fun to learn to create triangles from ordinary squares! This is also a good time for them to color their triangles.





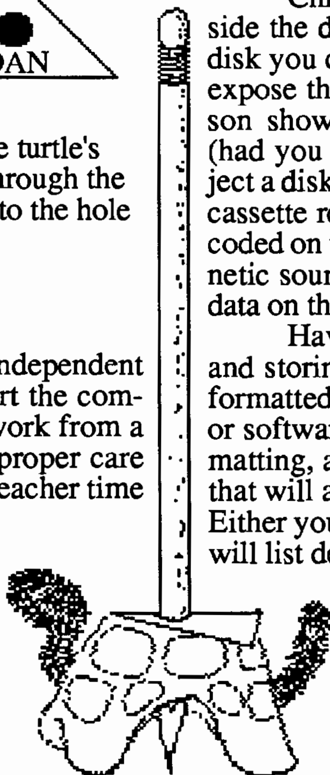
4. Punch a hole in the triangle to fit the diameter of a pencil. The child's name can also fit on the triangle.

5. Glue the triangle to the top of the turtle's back. Punch the hole the rest of the way through the egg carton body. Fit a sharpened pencil into the hole as shown.

Disk Doings

Students of all ages can be more independent on the computer if they know how to start the computer and how to save and retrieve their work from a disk. A few minutes spent teaching the proper care and use of a disk will save a great deal of teacher time later.

Student helpers can be put in charge of turning on the classroom computers each morning and booting (starting up) the program disks to be used. The program disk should be removed from the drive after booting to avoid confusion with personal file disks, unless the program disk is needed by the computer as the program runs.



Students need to know the value of software and be aware of the special care it needs. Keep program disks in an easily accessible, yet secure area. Share with students the difference between a program disk and a file disk. For example, you could emphasize the tremendous amount of information recorded on a program disk, and the effort it took to develop and debug it. This is what gives it its value.

Tips for proper care and handling of disks include:

1. Handle the disk from the label end only. Don't touch exposed parts of the disk.
2. Dust can damage the disk. Keep the disk in the paper jacket when not in use.
3. Keep disks away from the monitor, any electrical equipment, direct sunlight, and anything magnetic. Don't overlook such items as magnetic pencil box fasteners and purse clasps. We encountered a first grader whose magnetic belt buckle kept scrambling his disk. It took several days of investigation to discover why his procedures kept disappearing from the disk!
4. Keep the disk in a special box or container. Stacking books or other items on a disk could damage it.
5. Write on the disk label only with a felt tip pen. Pencils and ballpoint pins could damage the disk.

Children are always curious about what is inside the disk jacket. If you have an old or damaged disk you can sacrifice, open the cardboard jacket and expose the disk. This can be used for an object lesson showing students that the disk itself is round (had you ever wondered why they call a square object a disk?), and is made of material similar to that of cassette recording tape. Information is magnetically coded on the disk; thus, interaction with another magnetic source scrambles the information and ruins the data on the disk.

Have some blank file disks available for saving and storing data. These disks must be initialized or formatted to be compatible with your computer and / or software before they can be used. During the formatting, a specific filing system is set up on the disk that will allow information to be saved and retrieved. Either your Logo manual or operating system manual will list detailed formatting instructions.

When we began using Logo, our teachers made classroom file disks and students saved their work under their own names. We now find that many students prefer having their own personal disks, especially those with computers at home who take their work back and forth from school.

We've found that the combination of concrete off-computer experiences combined with Logo exploration on-computer is essential for children to become independent problem solvers. Children are proud of the responsibility for handling disk management tasks and follow through with care.

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 email address is 76067,211.

Logo Publication News

A new series of Logo Memos is being established by the Massachusetts Institute of Technology. The first two memos are by Seymour Papert and are entitled, "Microworlds: Transforming Education" and "New Theories for New Learning." A third memo by Horacio Reggini on 3-dimensional Logo is in preparation. For more information on this memo series, write to MIT Epistemology and Learning Group, Logo Memos, E15-309, 20 Ames Street, Cambridge, MA 02139.

Copies of Logo 86 materials are also available from the above address. The cost of the Logo 86 Proceedings is $25.00 for US addresses and $28.50 elsewhere. The Logo 86 Bibliography costs $12.50 for US addresses and $15.00 elsewhere.

Logo LinX

by Judi Harris

Hier and Hier: Logo and Ancient Egyptian Writing

It's a very ancient saying,
But a true and honest thought,
That if you become a teacher
By your pupils you'll be taught.
--Rodgers and Hammerstein,
"The King and I"

Did you ever have to write a sentence 100 times as punishment for an infraction of a classroom rule? As a teacher, have you ever (gasp!) given that task to an uncooperative student? I recently felt as if I deserved such a chastisement from a group of sixth graders who were using Logo to investigate hieroglyphic writing. My sentence should have read:

"I will never again underestimate the cognitive abilities of my students, especially when they are working with Logo."

Hieroglyphics (in Greek: "sacred carvings") were originally devised by the ancient Egyptians as picture symbols to represent objects, ideas and actions. Later, words that had no signs to represent them were expressed by existing ideograms that had different meanings, but the same sound. For example, the verb "to go out," pronounced "prj," was drawn as a house, because the word that meant "house" sounded similar to the verb. So many phonetic substitutions of this type were made that the ideograms gradually lost their original meanings, in favor of their phonetic functions. Scribes further developed the symbol system by combining pairs of letters into more than 80 "bilateral hieroglyphs," or shorthand pictures that represented blends. (Does this sound reminiscent of superprocedure structures?)

My sixth graders were immersed in an interdisciplinary exploration of ancient Egypt, and were particularly intrigued with the notion of hieroglyphic writing. They had already noticed that the symbols were representations of everyday objects and creatures found near a river. (Hieroglyphics first developed as a means to record trading transactions, and most barter occurred in the vicinity of the Nile.) The students were impressed by the numbers of complex drawings that Egyptian scribes had to memorize, and "hieroglyphic doodling" often appeared on their papers. We decided to capitalize upon this interest, while encouraging use of single-function Logo subprocedures, in a group programming project.

The idea was to use Logo to turn the computer into a "hieroglyphic typewriter." We wanted to help the children to plan, design, code, review, revise, and coalesce procedures that drew individual ideograms (developed by small groups of students) into a hierarchical succession of superprocedures. The resulting program would allow the user to phonetically encode any word(s) in hieroglyphics. The students decided to divide the 51 most frequently used single and blended sound-symbols by their "turtling difficulty," and groups chose whether they would rather work on a few difficult-to-draw, or many easy-to-draw hieroglyphs. They had pointed out, during the planning session, that it was important to agree upon a common size, final turtle heading, and avoidance of SETXY (SETPOS) and HOME commands, if the hieroglyphs were to be used at any location on the screen. We informed the sixth graders that these notions were called "state transparent procedures," and that we were impressed with their planning.

Hier Challenges

Interesting challenges presented themselves as the students began to write Logo procedures that drew the hieroglyphic symbols. The drawings were often larger than the agreed-upon 30 by 30 step size, and, when the students began to draw in a smaller space, most found it much harder to experiment graphically. They asked us for strategies that would help them to reduce their drawings to scale, and we were happy to oblige with several on- and off-computer math and art lessons and activities. Groups who finished their agreed-upon ideogram set quite naturally volunteered to assist other groups by drawing more signs, checking completed procedures for bugs, calculating scaled-down lengths, and compiling files of completed procedures. They happened upon quite a number of powerful ideas in the process, among them the notion of scale affecting FD and BK, not RT and LT, and the creation and use of tool procedures with variable inputs (namely, arc procedures that they wrote and shared with each other.)

After several weeks of work (usually twice weekly in the lab, plus many volunteer hours at home and during recess) we were ready to assemble the superprocedures. We hooked up a computer to the VCR monitor, loaded in all of the subprocedures, renamed them for greater clarity, and began to discuss the overall organization of the program. Since the kids had calculated the size of each hieroglyph to be 30 by 30 turtle steps, they already knew that the screen would hold 6 lines of 8 hieroglyphs each, including margins. We teachers had met prior to the group session, and had agreed that, though a recursive structure was the most economical and powerful for the overall code format, the students "weren't ready to really understand such a complicated idea." (They had been working with Logo for three years.) So, we reasoned, we should help them to create 6 superprocedures with similar structures for the 6 possible lines of hieroglyphs, or, perhaps, one procedure with variable inputs for X and Y coordinates used six times in a superprocedure.

That's when we should have gotten the 100-sentence punishment. No sooner had the students surmised the direction of my structure suggestions, that they began to murmur and protest.

"Isn't there an easier way, Miss Harris? That seems like a lot of typing the same idea with different numbers again and again."

"Well, there *is* an easier way, but Paula and I thought that you probably wouldn't like it. It's very hard to understand."

(Murmur, murmur....)

"Yes, Becca?"

"Couldn't you just tell the computer to make copies of the procedure [that we just wrote] and use different X and Y numbers in each of the copies?"

"Yeah!" (some classmates chimed in.)

I wouldn't have believed that it really happened, but the two other teachers in the room looked as shocked as I felt.

"YES!!" we all said together, and began talking about recursion in a modern computer language in terms of ancient Egyptian writing....

As a teacher I've been learning;
You'll forgive me if I boast,
And I've now become an expert
On the subject I like most:
Getting to Know you!
--Rodgers and Hammerstein,
"The King and I"

I'm having a hard time deciding who learned more during this excursion to ancient Egypt with Logo: the students or the teachers. Perhaps that is what being a facilitator is all about: the process more than the content; the questions more than the answers.

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 number is 75116,1207.

MathWorlds

edited by A. J. (Sandy) Dawson

This LX issue contains the first contributed article for the MathWorlds column. E. Paul Goldenberg's treatment of "thinking algebraically" fits well with the ideas suggested by Steve Tipps, Glen Bull, and Paula Cochran elsewhere in this issue.

If you are using Logo in mathematics teaching, or have some related ideas to share, please send them to the address at the end of the column.

Learning to Think Algebraically: Word Problems and Data Flow

by E. Paul Goldenberg

I was invited to consult on a project to integrate computers into a newly-formed school in New York's Harlem neighborhood. My task was to help design the introduction, and to do so from a perspective that would maximize the chances that these teachers could later become successful and creative designers of their own curricula. Integration meant that the computer was not to be seen as a new subject matter in its own right, but rather as a complement to the intellectual and academic goals otherwise deemed most important to these students.

Word Problems

To my surprise, I became fascinated with what has usually been for me one of the dullest school exercises of all: the word problem. Judy presented her students with a word problem about a child who wanted to plan for a party of 48 friends.

Dana has invited 48 people to a party and wants to know how much punch to buy. If each person is served a single 6 oz. cup of punch, how many quarts will Dana need?

At first, this problem, like so many word problems, seemed rather lifeless to me: there is a single answer, not much room to explore, not even rich imagery that might stimulate problem posing.

After the students had had the opportunity to think about the problem, Judy asked them what information one needs to know that is *not* stated in the problem.

It might have remained dull, but something in Judy's wording "information ... not stated in the problem" piqued my interest. When some of the children spontaneously embellished the problem by expressing the answer in gallons, I began thinking about all of the conversions involved: from ounces to gallons and back. I joined the students as they imagined what else was "not stated in the problem."

What if Dana happened to throw lots of parties, and needed to perform this kind of calculation on a regular basis? What if Dana learned by experience that about a quarter of any size crowd would always want seconds? In fact, what if Dana needed to adjust for 4 oz. juice servings or 8 oz. milk servings? The problem became less static.

Algebra vs Arithmetic

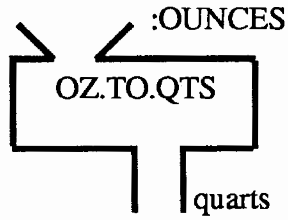
That way of thinking about the problem was algebraic rather than arithmetic. I didn't do any of the computation for their original problem or for the variants I imagined, but rather developed a framework for a range of similar problems in which only the numbers change. What might help these students think more algebraically?

Learning to design functions and playing with their interrelationships gives one an opportunity to develop a feel for how functions can be composed. By teaching students explicitly how to derive functions from fragments of problems starting with rather simple ones like the one I've just discussed, we provide them with strategies applicable to the decomposition of much more complex problems into manageable parts. I imagined the following scenario.

"Let's suppose that Dana had a machine something like an old style meat-grinder without a handle that converted numbers of ounces to numbers of quarts. It has a hopper on the top into which (numbers of) ounces can be thrown and a spout out the bottom from which emerges (numbers of) quarts.

"Shana has already told us how this machine does its job (by knowing the number of ounces in a quart), so let's not worry any more about that right now. All that we need to remember is that if we tell it how many ounces (if we toss the right number in its hopper), it will tell us how many quarts (the answer will drop out its spout)."

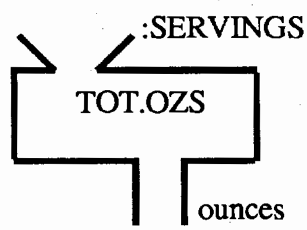
Dana's ounces-to-quarts machine is programmed by naming it, naming its hopper, declaring that it has a spout and describing what comes out the spout. The name of the machine might be something like OZS.TO.QTS. The name of its hopper might be :OUNCES (the colon being a designation that we are referring to a hopper and not to a machine).



The spout is indicated in Logo by the word OUTPUT, though in a picture it need not be labeled at all. What comes out the spout is the quotient of whatever came in the hopper and 32. Here it is in Logo.

```
TO OZS.TO.QTS :OUNCES
OUTPUT :OUNCES / 32
END
```

This machine tells us how many quarts Dana needs if we tell it how many ounces are needed. We can make another machine to figure out the ounces if we tell it the number of servings. Such a machine needs a hopper for the (number of) servings and a spout for the (number of) ounces.



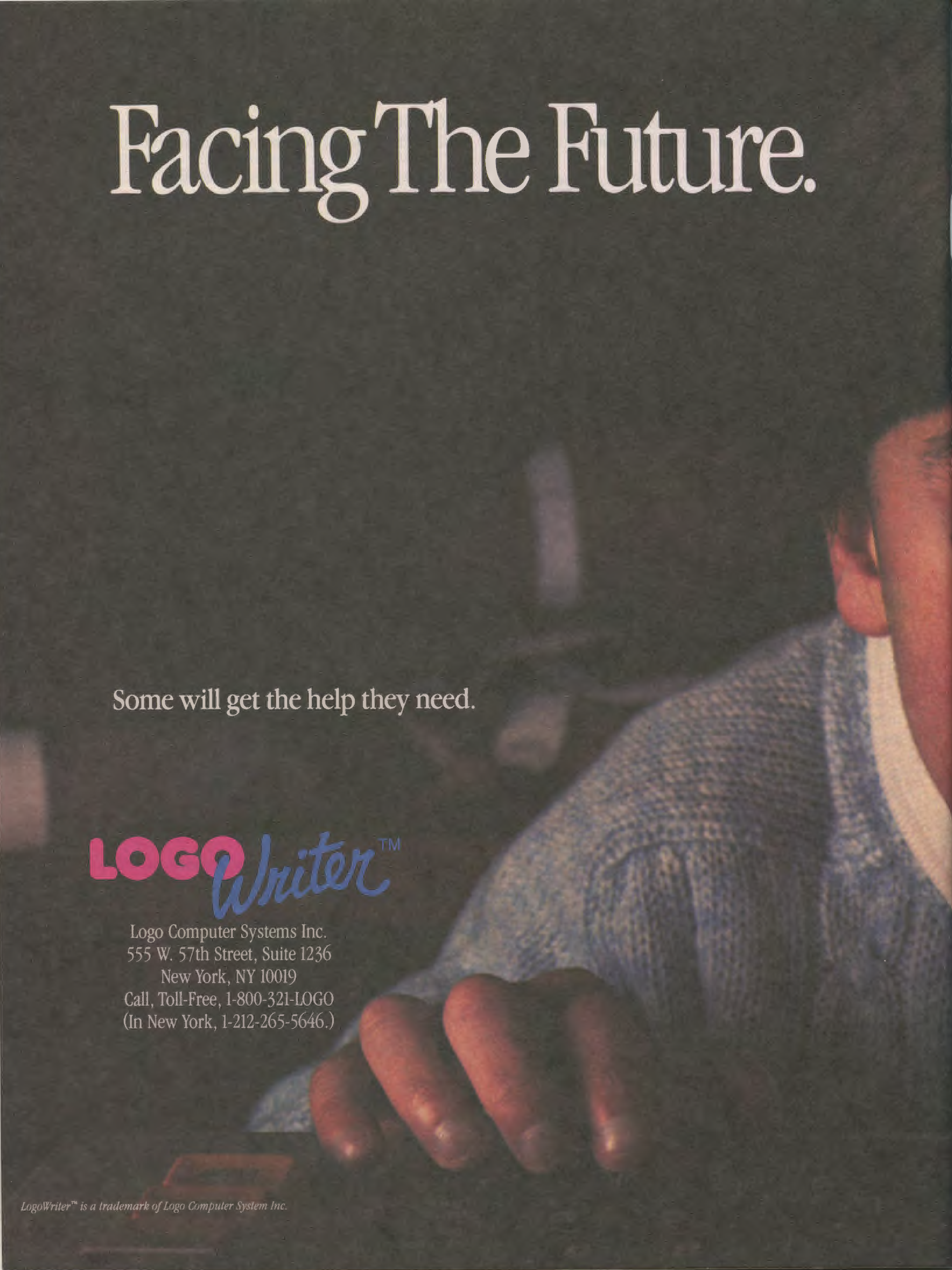

```
TO TOT.OZS :SERVINGS
OUTPUT :SERVINGS * 6
END
```

Different Continuations for Different Goals

Depending on the goals of the class, the teacher might, at this point, take any one of various alternative routes:

- She might stop and have the class figure out how this new machine TOT.OZS works. (Recall that the students know only the "shape" and purpose of the machine, but have not seen the Logo code.)
- She might immediately proceed to combine the two machines.
- Or, she might invent and play with a variety of additional machines first, such as QTS.TO.OZS.

If we were to build these machines, we could play with the system dynamically. For example,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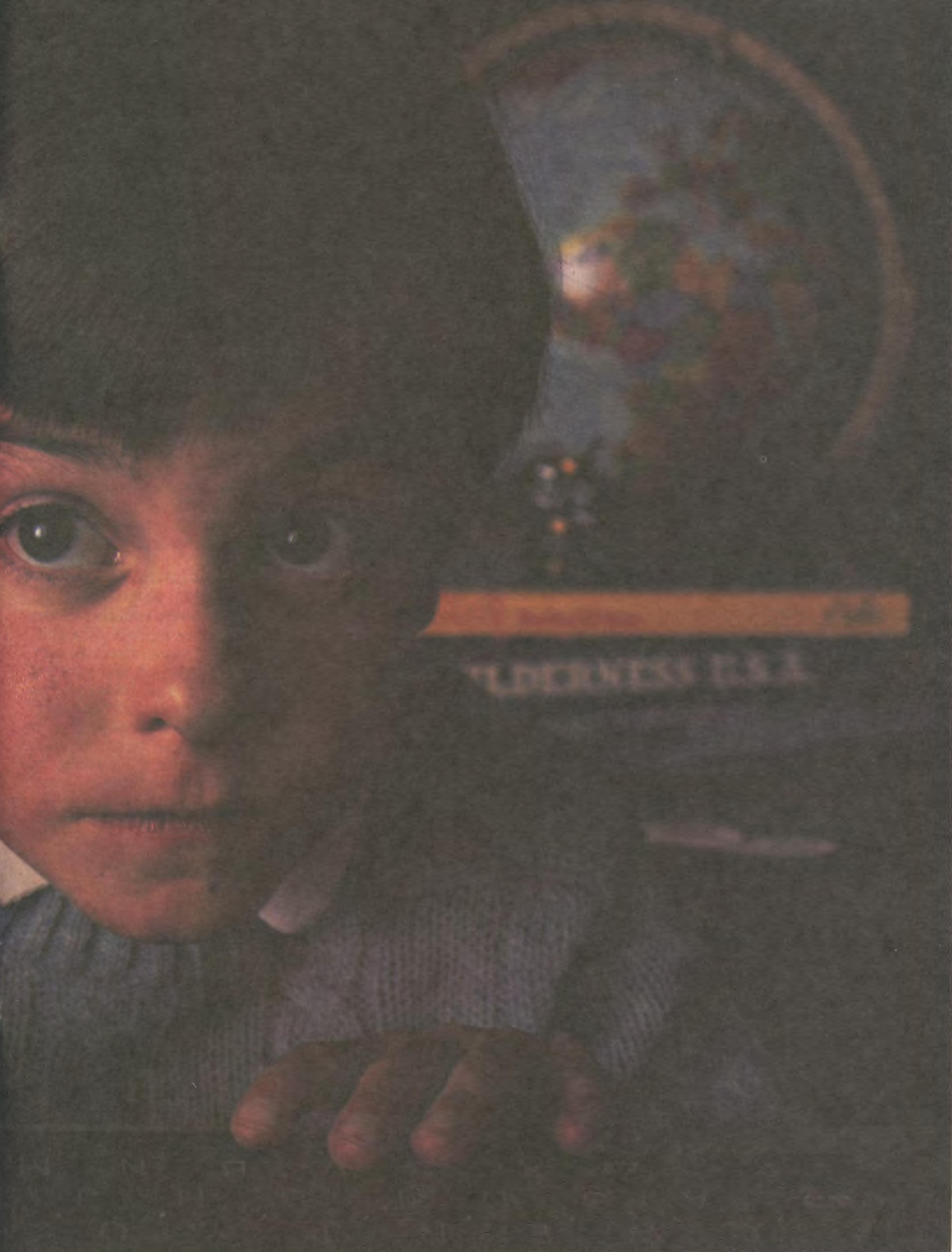

LDERNESS U.S.A.

SHOW OZS.TO.QTS TOT.OZS 48 solves the original problem, but is perhaps not as interesting as all the other things that can be done with a multi-machine system.

Because my goals are algebraic, I want, at first, to draw the students' attention away from the arithmetic manipulations inside the new machine. Also, because I am interested in developing the students' ability to pose problems and see multiple relationships within a problem domain, I want, again only at first, not to close off the problem too quickly by solving it.

Please imagine filling up a screen with drawings of different machines that are suggested, however distantly, by the original problem. After several such machines have been suggested - more than are needed for the original problem - I ask the class to hunt through the forest of machines looking for "reasonable paths." A reasonable path is one that solves a problem, whether or not it is the problem we started with.

Each of the machines just proposed can, by itself, solve a problem. The QTS.TO.OZS machine can solve a problem like "How many ounces are there in two quarts?" In combinations of two, these machines solve "useful" problems (such as how many servings can be made from a particular number of quarts), and several "useless" ones (such as how many quarts in 10 quarts).

But all of these paths are reasonable, and even the "useless" ones are mathematically interesting, in that they undo the computation that had just been performed.

Procedures vs. Calculations

Some children spontaneously embellish the original problem by drawing additional machines. For example, how many gallons does Dana need? The path travels through three of the machines: servings to ounces, ounces to quarts, and quarts to gallons. Without doing the intermediate calculations, we do not know what "the answer" is. But we can be confident that, if each machine does its job correctly, this processing plant of three machines will successfully report how many gallons are needed for a particular number of (six-ounce) servings. That is an essential step both in algebraic thinking and in creative problem solving. We have now built a procedure for calculating gallons from servings.

Now that the function machines are concrete and the problem has become dynamic rather static, we may:

• Pose and answer new problems: Dana bought enough punch for 48 people, but only 40 showed up. How many quarts were left over? This can be solved in several different ways, and it might be a valuable experience for student to compare their different strategies. Here is a way that is somewhat uncommonly thought of:

SHOW OZS.TO.QTS TOT.OZS (48 - 40)

• Explore patterns in the relationship: Prepare a chart showing number of people in one column and exactly how many quarts are needed for them in another column. Start with 5 people, and continue your chart at least until 20 people. What pattern do you see? Because the necessary procedures have been prepared, it is possible to perform quick recalculations with new numbers. Problems of this sort are tedious without that computational ease and speed.

• Use the techniques in a more complex problem domain: A hot air balloon makes a seven-day journey covering 2100 miles. Each day, the distance it travels is 50 miles greater than the distance of the previous day. How far did it travel the first day? Have your students tackle this problem algebraically, and then solve it using Logo procedures you, or they, have written.

In Goldenberg's article both the Logo procedures and the arithmetic were invisible to the fifth grade children with whom he worked. The children were busily engaged with more important matters: exploring problems, relationships, and patterns. These activities are as much a part of the foundation of mathematics as the more traditional arithmetic operations, yet are often not explored sufficiently.

Future columns will explore these and other fundamentals of the teaching and learning of mathematics, and how Logo can be used to foster their understanding by learners of all ages.

Please send your contributions to:

A. J. (Sandy) Dawson, Director
Professional Development Program
Simon Fraser University
Vancouver, BC, Canada V5A 1S6

Sandy Dawson is a member of the Faculty of Education at Simon Fraser University in Vancouver, British Columbia. His CompuServe number is 76475,1315. E. Paul Goldenberg is a teacher at Lincoln-Sudbury High School in Sudbury, MA.

SpecialTalk

by Paula Cochran and Glen Bull

SpecialTalk is a column about the use of computers with special populations. It emphasizes the use of Logo and other open-ended software, and encourages special educators and clinicians to contribute their own ideas and comments.

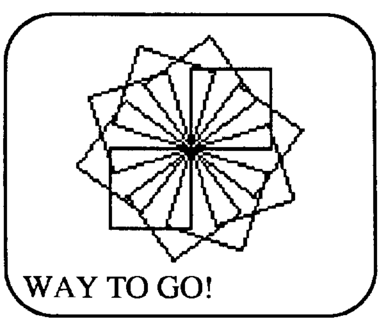
Spelling Fuzzies

A few years ago, practitioners of transactional analysis gave us the term "warm fuzzy" for the nice, pleasant little things that we say and do to reinforce each other. They make the point that there is no need to conserve warm fuzzies -- since the supply is inexhaustible, we should be generous with them.

A Logo warm fuzzy is something fun or interesting that happens on the screen. In a primary special education class at Garfield Elementary School in Heath, Ohio, Logo warm fuzzies are used to encourage students to practice typing their spelling words at the computer.

For example, let's say Eddie has the word "school" on his spelling list this week. He sits down in front of the computer, and starts to practice his words:

Eddie types : SCOL
Logo replies: I DON'T KNOW HOW TO SCOL
Eddie types : SCOOL
Logo replies: I DON'T KNOW HOW TO SCOOL
Eddie types : SCHOOL
Logo replies: WAY TO GO!



Here's how it works: First, lots of "fuzzy" procedures are defined. They are a good way to use interesting turtle drawings that you have tucked away. For example, after you define a SQUARE procedure, you could make a very simple FUZZY:

```
TO FUZZY1
CLEARSCREEN
REPEAT 10 [SQUARE RT 36]
PRINT [WAY TO GO!]
END
```

After you have several fuzzy procedures, you are ready to match them with the spelling words. Let's say this week the list for your students includes: school, think, and small. Use the spelling word for the name of a new procedure which has a fuzzy in it:

```
TO SCHOOL   TO THINK   TO SMALL
FUZZY1      FUZZY2     FUZZY3
END         END        END
```

The same fuzzy procedures can be used over and over again, as the spelling words are changed, either by the teacher or an aide. Older students in the school might take on fuzzy-making as a Logo project and agree to supply new ones for a younger class or a special education classroom.

Sheila Cochran teaches the students at Garfield who have been using Logo fuzzies for practicing spelling. She reports that one of her more determined students only missed 2 spelling words ALL YEAR! Practice makes perfect.

Spare Parts

Do you have some turtle graphics procedures that were fun when you created them, but aren't used much any more? Dave Matt, a speech-language pathologist for the Charlottesville City Schools, has simple yet flexible way to use such programs.

This past summer at the UVA/IBM Institute, we emphasized two ideas: making Logo tools that would be as flexible as possible for teachers and students, and using Logo to develop activities that give the student some control of the computer.

Dave developed a set of procedures which draw a truck -- a tractor and semi-trailer, to be exact. The TRUCK procedure consists of separate procedures for the cab, trailer, tires, hubcaps, door, and headlights. By calling TRUCK you see the whole thing. But the modular style of the program makes it possible to see one or more of the parts individually. So he can type CAB to get the cab only, HUBCAPS to add the hubcaps, and so on. Another command allows the user to fill in the parts with color.

Dave has lots of plans for using this and similar sets of procedures in language therapy with a variety of children. He plans to work on the concept of parts to a whole, what's missing, what comes next, vocabulary, and more. In this case, the success of the activity depends on the clinician guiding the conversation in the desired direction; Logo is being used to provide a shared context.

If you have procedures that can work like this to make a Logo puzzle of sorts, Dave would enjoy taking a look at them. He agrees to respond in kind. Send procedures to us and we will forward them to Dave.

Roman Holiday

The other day we had a phone call from John Heineman and Maura Cova. They said that they had been using Logo with Down's syndrome children in Rome, Italy, and would like to come to Charlottesville while they were in the USA and tell us about their work.

Their project, implemented at a special school in Italy, is titled Special Children's Alternative Language Experience, or SCALE. The goals of the project include providing Down's syndrome children with a new means of exploring and manipulating geometric forms and ideograms, and providing researchers with a new context for observing the learning style of Down's syndrome children.

According to Maura, she has observed surprising comprehension and communication, especially on the part of one 13 year old Down's child she has been working with. Although his language comprehension is good, he does not use verbal language to communicate. His Logo drawings and related off-computer drawings are becoming more symbolic and communicative than has been the case before.

Talking to Each Other

At Gallaudet College, the national college for the deaf in Washington, DC, the faculty and students have started using computers to talk to one another. Although Logo has been put to good use at Gallaudet in the past, the ENFI Project we are about to describe does not focus on Logo. Nevertheless, it incorporates a Logo-like philosophy that we think is exciting.

ENFI stands for "English Natural Form Instruction," a method of instruction developed at Gallaudet. In the ENFI project, instruction is carried on through a local area network (LAN) of microcomputers, making it possible to use written English as the language of instruction with deaf students. This is in contrast to the combination of oral and sign language traditionally used for lectures and tutoring sessions at Gallaudet.

The ENFI project publishes a monthly publication called LOG to keep interested outsiders informed about how things are going. Frequently, it includes samples of "computer-screen conversations" between deaf students and a teacher. Here is one from the beginning of the project:

Student types: I mean a person who types out messages always has to think twice before putting it in print, whereas in conversation you do not need to worry about your English.

Teacher types: Why do you worry?

S: With an English teacher, you have to prove your worth.

* * *

S: I am beginning to drop my guard and will try to write English the way I speak it.

T: That's what we're trying to do, make English a little more fun and pleasurable, so the students here will WANT to learn it.

S: OK. Then how does that help me to improve my English?

T: How do hearing kids learn English? Through speech? This is a kind of speech, right? You have a chance to pick up idiomatic English and you have more immediate motivation because this is a conversation; it is happening RIGHT NOW.

S: I think that sounds like talking to each other through the screen with words.

T: Exactly -- they are talking to each other in a way which is usually not possible.

The ENFI project began in full swing at Gallaudet in the fall of 1985. Since then, faculty have been teaching many subjects using the network, and have helped install similar classroom networks in several places across the country. The hardware consists of IBM PC's equipped with a networking system all set up in one classroom.

To find out more about it, or get yourself on the ENFI LOG mailing list, write to:

Trent Batson
ENFI Project
Gallaudet College, HMB 120
Washington, D.C. 20015.

SpecialTalk News

CLOSING THE GAP CONFERENCE
OCTOBER 23-25, 1986

The annual Closing The Gap conference on computer technology for special education and rehabilitation will be held in Minneapolis, MN, this month. Glen Bull, Paula Cochran, and Cheryl Wissick will be doing an all-day preconference workshop on Logo tools for special populations. For more information, call: 612-248-3294.

MICROCOMPUTERS AND THE HEARING IMPAIRED: SUCCESSFUL SOFTWARE

The second annual conference on the use of microcomputers in the education of the hearing impaired will be sponsored by Gallaudet on October 8-10, 1986, in Washington, DC. We think the program of speakers looks inviting, with an emphasis on software which has been tried and true (including Logo). A preconference Logo workshop is scheduled. For more information, call 202-651-5346, or 800-672- 6720 ext. 5346.

NEW IBM TOLL-FREE NUMBER

The International Business Machines Corporation has announced the establishment of the IBM National Support Center for Persons with Disabilities. The center is located in Atlanta, GA, and can provide information about IBM products, as well as make appropriate referrals for information about third party interface equipment and software. The center can be contacted through this toll-free number: 1-800-IBM-2133 (continental USA). Georgia: 404-364-2500. TDD: 404-238-3521.

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. 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.

West Coast Logo Conference

The West Coast Logo and Telecommunications Conference will be held March 6 and 7, 1987, at the Los Angeles Airport Hilton Hotel. Teachers, administrators, and others who use the Logo language or who have an interest in telecommunications are invited to plan now to attend this event. A major focus of the conference will be the integration of Logo into the curriculum. For more information, write to:

West Coast Logo and
Telecommunications Conference
Pepperdine University
3415 Sepulveda Boulevard
Los Angeles, Ca 90034

Testudinal Testimony

by Douglas H. Clements

Early Studies on Logo and Problem Solving

Many have argued that learning Logo will increase students' ability to solve problems. Children first create their own Logo problems and solutions. They then "stand back" and watch themselves, as embodied in the computer program, solve the problems. In this way, the Logo programming environment holds the promise of being an effective device for cognitive process instruction—teaching how, rather than what, to think.

Unsurprisingly, almost every researcher defines problem–solving somewhat differently. Each constructs a different rationale to explain why Logo might influence what particular aspect of problem solving. In this second column on "early studies," we will examine some of these perspectives.

Rationales and Rationality

Rationale: There are similarities between problem solving and computer programming.

Several early studies were based on the assumption that programming and problem solving use similar cognitive processes. For example, Statz (1973) postulated that programming provides a rich medium for solving problems, using heuristics, and talking about problem solving. She engaged fourth graders with programming for just under 20 weeks. No significant differences were found between this Logo group and a control group on Tower of Hanoi and "twenty-questions" tasks (although the Logo group tended to perform better). However, the Logo group significantly outperformed the control group on a permutation and a classificatory word puzzle task.

A decade later, Milojkovic (1984) provided fifth graders 10 weeks of problem solving experiences. The four groups, Logo, BASIC, CAI (e.g., programs from the Learning Company), and the non–computer Productive Thinking Program, did not differ on several measures of problem solving.

Obviously, these results are mixed. To make matters worse, several writers criticized early studies such as these for being atheoretical. While there is more than a modicum of truth in this, the criticism ignores that educational practice and "raw data" beget theory as frequently as the converse.

Rationale: Logo can make the abstract concrete, accelerating development a la Piaget.

Papert (1980) proposed that the Logo environment can create conditions in which young children master notions formerly thought too abstract for their developmental level. Thus, cognitive development, measured by Piagetian tasks, may be enhanced. An enthographic study of five kindergarteners demonstrated an increase on Piagetian conservation tasks after 10 weeks of Logo programming (Hines, 1983). Brown and Rood (1984) engaged gifted students from grades two through nine in 8 weeks of Logo or BASIC programming, using a guided discovery approach. The groups made significant and similar gains on Piagetian reasoning tasks. Rieber (1983) reported that second graders exposed to Logo for 13 weeks significantly outperformed a control group on tests of systematic and procedural thinking—combinations and permutations.

This is positive, albeit weak, evidence. On the other hand, Clements and Gullo (1984) showed no significant increases on other Piagetian tasks (seriation and classification) after 12 weeks of Logo programming. Once again, "results" are apparently not guaranteed.

Rationale: Programming involves logical reasoning.

Gorman and Bourne (1983) studied the logical reasoning of two groups of third grade children. One had worked for one hour per week on Logo programming, the other only a half hour per week. All Logo work encouraged exploration and experimentation, rather than direct instruction. At the end of the school year, the children were given a test of conditional rule learning. They were shown "attribute pieces" which varied in shape, color, size, and number. They tried to guess if each piece obeyed a secret rule (e.g., either large or blue) and were told "yes" or "no." The one–hour group performed significantly better than the half–hour group. The authors attribute their significant findings to their scoring methods (e.g., number of errors to criterion), which are more sensitive than the success / failure scoring methods. Had the students developed logical reasoning not unlike sorting by truth tables? Or was their improvement the result of work with a sprite Logo replete with exemplars of perceptual attributes? Either way, it appears that the skills they learned differed from the formal logic measured by Seidman. This may account for the disparate results.

Rationale: Logo programming makes the usefulness of planning apparent.

Pea and Kurland (1984) identified planning as one of four basic components of computer programming. They hypothesized that the feedback in programming would help students see the connection between planning and effective performance. After 20 (study 1) or 24 (study 2) weeks of programming in Logo, middle–school students did not display greater planning skills on a non–computer task than those in a matched group. This study has been widely cited as "proof" that Logo yields no cognitive benefits. There are difficulties with such a conclusion. Most importantly, it represents a misunderstanding of research. Single studies provide evidence, not proof. Furthermore, questions concerning the assignment of students, the type of Logo environment employed, and the test of planning militate against any firm conclusion. Finally, the most difficult question: Would we really expect "Logo" to develop students' planning abilities? Not for those who used Logo in a "broad-brush intuitive style" (see Papert, 1985) quite opposite to structured planning. Nevertheless, the studies cautioned Logo teachers that development and transfer of abilities would not be automatic.

Still Hazy After All These Years...

How can we encapsulate results of the studies from this and the previous column? "Inconclusive" is such an acceptably mild term. Others come to mind, however: confounded, contradictory, confusing. Nevertheless, these early works set the stage for future work. The Logo scene was ready for research which would:

• begin looking more closely at what was actually happening in the Logo environment. What were children doing with Logo? What teaching style was employed? Different research methods were needed.

• "never trust data without a theory." That is, the research should encourage the construction of implementations and investigations better grounded in a theoretical framework.

• focus on specific subject matter topics or problem–solving abilities.

• assume that Logo is not a "treatment." This needs a bit of explanation. A wide variety of factors —duration, teaching approach, personality of the teacher and students, and so on—affect the benefits that might accrue from programming. Such differences led Papert (1985) to quip, "Do not ask what Logo can do to people, but what people can do with Logo" (p. 60). If a teacher has made the decision to eschew Logo's activist side, using it to teach traditional curriculum, then students' experiences should be so structured. Specific problems might be posed, with the introduction and discussion of appropriate strategies as part of the lesson. If, on the other hand, a teacher believes that Logo presents an opportunity for educational innovation, for the development of each student's voice in his or her own learning, then the development of a single ability (e.g., one type of top–down planning) should not be expected.

Implications

As with mathematics, teachers are advised to help students reflect on their problem solving activity within the Logo environments. Gains are not guaranteed, but such guided reflection holds potential for developing students' problem solving ability. If specific aspects of problem solving, such as combinatorial thinking, logical reasoning, or planning, are desired outcomes, these should be nurtured within and without the Logo environment. Abstraction and generalization of these processes across different settings should be encouraged through dialogue. In addition, overgeneralization (e.g., logical fallacies) should be guarded against.

Postscript

As you may have noticed, the duration of the Logo experiences in these studies was often quite short—10 to 15 weeks or so. I know that I've taken longer attempting to master many a task, some Logo, some not. I've not felt that I should expect to make substantive gains in other abilities (i.e., experience "transfer"). But I believe that, over several years, working with Logo has changed the way I think. Years, not weeks. I have every respect for the students who made the significant leap from their Logo work to the non–Logo problem–solving tasks they were given. I have every respect for their teachers who, unlike too many researchers, are trying to find better ways to work with Logo. I have fewer illusions, but...I have every hope for the future.

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Douglas Clements is an associate professor in the Department of Early Childhood at Kent State University in Kent, OH.

Logo Disserts:

Dissertations Dealing with Logo

by Barbara Elias

The use of Logo as a supplement to transitional math textbook materials and manipulatives in the teaching of geometry was investigated by Judith Kay Olson. Geometry achievement, spatial visualization ability, and locus of control were assessed at the end of an eight week study. The findings may be helpful for elementary curriculum specialists and teachers as they make decisions on software to supplement instructional materials in mathematics.

This study involved 42 girls and boys in two sixth grade classes. Children were randomly assigned to one of three groups so that each class had three groups and so that an equal number of girls and boys were members of each group. Groups were then randomly assigned to Logo, CAI, or control. All children used the same textbook, materials, and learning centers for instruction in geometry with their regular teacher for about 45 minutes daily for six weeks. Their topics included angles, lines, polygons, circles, transformational geometry, three-dimensional figures, area, and volume.

To supplement this instruction, one third studied Logo and one third studied CAI topics in geometry. Children in the control group did not receive instruction in geometry while using the computer. Instead, they used tutorial, drill and practice, and educational gaming software (CAI) which dealt with computation.

Computer groups met for 30 minutes once a week for instruction and assignments. Each child received a booklet of assignments to be completed. Most worked with partners for twenty minutes each day. The Logo group spent weeks six and seven on assignments specific to the geometry topics in their textbooks and learning centers. The last week was spent on creating a project which used procedures and subprocedures. At the end of the study, each child had spent about 19 hours on the computer.

Three instruments were used as pretest and posttest measures: The Julian Elementary Test of Geometry Achievement, the Monash Spatial Visualization Test, and the Crandall Intellectual Achievement Responsibility Questionnaire. The last test measures locus of control in success and in failure situations.

All children in this study showed gains in geometry achievement. Girls and boys in the Logo and CAI groups improved in spatial visualization ability. This is an especially important finding since spatial ability has been found to be related to confidence in learning mathematics and was a good predictor of performance in geometry for boys and girls, but moreso for girls.

Logo was also effective in helping girls develop increased feelings of responsibility and personal control. Girls experienced greater feelings of success while using Logo or the geometry software.

There was a decrease in these feelings when girls used competitive games and the non-geometry software. These findings suggest that careful attention should be given to the kinds of experiences children have as they interact with the computer. They further suggest that multiple benefits may be in store for the children who use Logo in our classrooms and, from an economics perspective, for the decision makers who select and purchase software for our schools.

>>>Olson, J. K. (1985). *Using Logo to Supplement the Teaching of Geometric Concepts in the Elementary School Classroom.* (Doctoral dissertation, Oklahoma State University, 1985).

(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.)

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

LIFT's

Teacher to Teacher

by James Fry

This month, we review a book which contains excellent project ideas for language arts activities.

The Logo Project Book: Exploring Words and Lists, by Alison Birch, 1986, published by Terrapin, Inc., 222 Third Street, Cambridge, MA 02142, (617) 492-8816. $19.95 with disk.

Target Audience: All ages of Logo users with previous experience in turtle graphics, writing procedures, and using variables in simple "tail recursive" procedures.

Content: This book has grown out of many years of work with Logo and students. *The Logo Project Book* is a collection of projects that were developed during the time the author was co-director of a K-12 private school in Cambridge, MA.

The book includes an activities disk with Terrapin and Apple Logo files on one side and Commodore Logo files on the other. Although the book is written for use with Terrapin Logo on the Apple II or Commodore 64 computers, an appendix shows how to modify the procedures for users of Apple Logo and other versions.

The book contains six different sections: an introduction, projects (fourteen of them), visual glossary, glossary of primitives, appendices, and an index.

The projects are the main body of the work. They consist of activities ranging from wallpaper pattern to horoscopes to databases. Each project begins with a blue page that gives the name of the project, new primitives introduced, other primitives, tool procedures needed, procedures that will be written, and related activities disk files.

The order that the projects are introduced are related to the introduction of the primitives. It is recommended by the author that they be read in order, though the author also states that "if a particular project catches your eye, try it out."

The format of the project pages has been well planned and laid out. Along with the beginning blue page, which helps in locating the beginning of a project, the book also uses a blue header on each page that is coded to help organize the book into its different parts. The format and graphics on the individual pages are well organized and make it easy to follow the information that is being presented.

Strengths: For the experienced Logo users, the book gives many ideas or new variations for exploring. An activities disk is a welcomed addition to any Logo Book. The author's purpose for this disk is that it not contain "finished" products, but examples to be explored, worked with, and modified.

The layout of *The Logo Project Book* is very well done. The index and color coded pages make it easy to find particular items in the book.

It is exciting to see works such as this being published. It gives novices examples of the things that can be done with Logo besides turtle graphics, and provides many starting points for stimulating explorations.

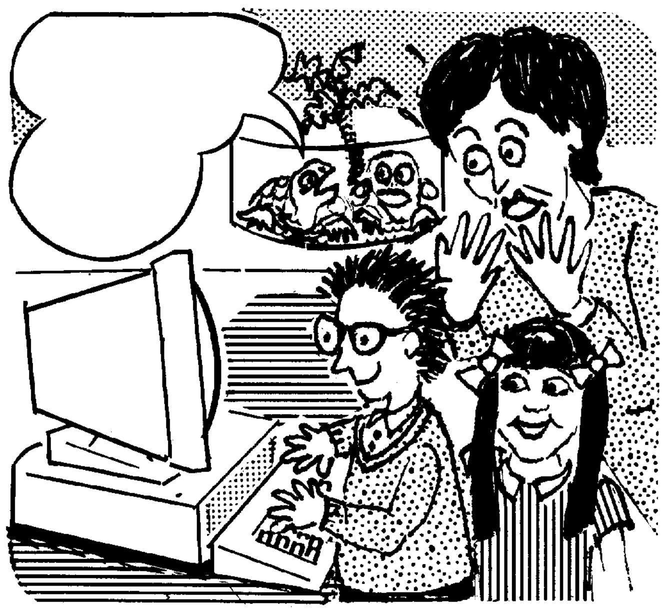
James Fry uses Logo with his Chapter 1 remedial mathematics students at Novi Community School, Novi, MI, and is a co-founder of the LIFT group. His CompuServe number is 76317,565.

The Adventures of Jacques and Elsie

drawings by
Linda Sherman

Jacques and Elsie are our two cartoon turtles who cannot resist commenting on the world they observe. Most of the things they see are related to Logo. In this month's cartoon, they are looking over the shoulders of a Logo lad and lassie who are putting the computer turtle through its paces.

What is on the screen to cause the teacher to react so? Certainly Elsie has something to say about it to Jacques. But what? Use the situation as a story starter for creative writing class, or make up a few captions of your own.



Please send your caption suggestions no later than October 20, 1986, 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.

If you submit captions in languages other than English, please provide an approximate translation, and a brief explanation of any idioms used.

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.

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. I'm afraid that your friend wins this one. This is *not* tail recursion. It is an example of what is often called "embedded recursion."

Remember that *any* procedure which calls upon itself is recursive. Usually, this results the creation of many copies of the procedure as it is being executed. Each copy is in fact a subprocedure of the copy that called it into existence. When the last copy completes its task, it returns control (and may also output some computed result) to its "parent" copy.

The HOW.MANY procedure is a good example of this. It is like COUNT, since it returns the number of objects in :LST. What makes it an *embedded* recursive procedure is the "+" in the last line. Let's do a trace on PRINT HOW.MANY [A B] to understand the details.

The first copy of HOW.MANY gets a list containing two objects, so the test for "emptiness" fails. The last line tells the procedure to get ready to output a number. This number is the sum ("+") of 1 and whatever the result is of HOW.MANY [B]. Note that the first copy of HOW.MANY can *not* finish executing until a new copy of HOW.MANY has done its job. The addition is a *suspended task* which will have to wait until the work of all subsequent copies is finished.

The second copy of HOW.MANY fails the emptiness test, too, since there is one object in [B]. It prepares to output the sum of 1 and the result of HOW.MANY [ ]. The final copy of HOW.MANY passes the emptiness test and outputs 0 to the second copy, which adds 1 + 0 and outputs 1 to the first copy, which adds 1 + 1 and outputs 2 to PRINT, which prints the number 2 on the screen. Whew!

All of those copies of HOW.MANY could take up a lot of space in the computer's memory as they wait for the copies they have created to "return" to them. Tail recursion is a programmer's trick that takes advantage of the fact that not all recursive programs need to be able to "trace back" through multiple copies. Here's a tail-recursive version of HOW.MANY:

```
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
```

In this version, HOW.MANY simply sets up an initial value of 0 for :COUNTER and passes the list to DO.HOW.MANY. It is important to note that the :COUNTER value is global and thus is accessible to DO.HOW.MANY. Every time DO.HOW.MANY runs, the :COUNTER value is incremented by 1. The incrementation takes place *before* the recursive call to DO.HOW.MANY. Since there are no suspended tasks, additional copies of DO.HOW.MANY are not necessary. As soon as :LST is empty, the DO.HOW.MANY procedure stops and the value of :COUNTER can be output immediately.

The people who create versions of Logo take advantage of this property by making it possible for Logo to recognize this kind of procedure. They arrange for Logo 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 is creating many copies, it is not. It is running as a loop.

Try running your procedure and the ones above on a Logo with TRACE capability. This will demonstrate these ideas in detail. If you use one of the MIT Logos, eliminate the brackets around the OUTPUT 0 and STOP in the IF lines.

I hope this helps you understand why your friend is correct in suggesting that the HOW.MANY procedure you sent is not tail-recursive, even though it may appear to be at first glance.

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

Windows of My Mind

To my mind, Logo presents one of the clearest examples of how technology can positively impact both individual and classroom. Logo, with its brave intentions, points towards real innovation in the process of schooling; this is particularly evident to those who have some immediate, first-hand experience with the perverse pleasures of programming. Indeed, how many Logo advocates do you know who don't program with Logo (when they have the time)? Any? It seems the terms Logo user and Logophile are synonymous.

The largest untapped pool of Logo critics can be found by searching for adults who, for one reason or another, have not directly experienced computing machinery. My teaching colleagues who "despise" computers in the classroom are, without exception, those same teachers who do not use computers. Lack of access is a severe impediment. Lack of time is another oft cited excuse. Yet there are some who *could* have access to a computer and some who *could* find the time to discover, but they, instead, choose to resist. In ignorance is born a new mythology.

My experience with introducing neophytes to Logo has exposed me to a substantial body of this mythology. In teacher inservices, in graduate school courses, in district workshops, or in week-long retreats, there is usually one participant who harbors some myth to explain their timid resistance to having a good time with a computer. Or even if they have a good time, their mythology will help explain why computers / Logo / programming is a bad idea for schools or students. (Mind you, this mythology is almost never seen when I present Logo to *my* students!)

Mythical Beasts

Here are a few of the more prevalent myths preventing teachers from using Logo.

1. **The Mathophobia Myth.** To use a computer, you've got to be good at math. I'm terrible with math, so this is terrible too!
2. **The Too-Hard Myth.** Computers are too complicated. They are only for engineers and teen-agers.
3. **The Single-Subject Myth.** As a secondary English teacher, I don't see why I should know about computers. Logo is only for geometry.
4. **The Mudpie Myth.** Primary school children need concrete manipulatives. Logo is too detached from reality; it's too abstract. Seven-year-olds should be making sand castles and using blocks, not sitting in front of a keyboard.
5. **The Corpus Callosum Myth.** As a feminist, I believe that there are fundamental differences in the way that men and women think. Logo encourages rational, left-brained thinking. I'm more intuitive and right-brained.
6. **The Don't-Rock-the-Boat Myth.** My school has a well-defined continuum. Even though I can see how Logo might have a positive impact on my students, there's no room in my schedule for computers.
7. **The No-Diversion Myth.** Programming is a arcane subject that should be taught only to computer scientists. Students need to learn the basics.

Of course there are more. As a Logo user, you've heard scores of others. These seven deadly myths are all guilty of the sin of omission; perhaps exclusion is a better word. Superficial critics usually resort to an "either / or" argument; it is either black or white, with no middle ground. The Mudpie Myth is one I've heard often invoked to wave away new technologies. Either sandboxes or CRTs; there is no in-between.

You, gentle reader, can doubtless provide your own exorcisms for each of the cited myths. As Logo enthusiasts, this is our burden. Allow me to partially answer the Mudpie Myth through an exploration of a little-discussed Logo tool and provide you will an interesting Logo challenge.

Through the Looking Glass

In ancient times, when using Logo on a microcomputer meant either a Texas Instruments 99/4A or an Apple II+ with (gasp!) 64K of RAM, the choices were either MIT Logo or LCSI Logo. I began using LCSI Logo chiefly because of one little command that was not implemented in MIT Logos -- WINDOW.

As you may know, WINDOW defeats Logo's WRAP mode and permits the turtle to walk off the screen into a "turtle world" much larger than the display screen. Using WINDOW, I could graphically demonstrate that the screen turtle really was a "transition object" -- a thing to assist in moving from the tangible to the intangible. Using WINDOW and some imagination, the turtle under glass could walk into the classroom.

If you have a Logo from LCSI, try this with your students. (If you have MIT Logo, read on...) Find a large expanse of wall space -- the larger, the better. Put the Logo computer in the center of this stretch of wall and provide a few step ladders. (Ed. note: Be sure to check your school district regulations before allowing students to use ladders. In many districts, it is prohibited for safety reasons.)

Next, paper the wall with graph paper. Creative Publications, Inc., has a packet of 100 43 cm. by 55.5 cm. sheets of graph paper with 2 cm. squares for $9.95. (To order, call 800-624-0822 and ask for product 38718.) Or, make your own from Logo drawings!

Figure out a scale for the graph paper. How many turtle steps per centimeter? After executing the WINDOW command, students can chart the position of the turtle on the wall.

Exploration #1

?WINDOW
?RT 45 FD 2600 (Where is the turtle now? Plot it.)
?PR POS
1838.48 1838.48 (Check your plotted position.)

Exploration #2

Define the following procedures.

```
TO FIGURE
REPEAT 4 [ FD 250 RT 90 FD 500 DOODAD ]
END

TO DOODAD
REPEAT 4 [ FD 1000 RT 90 ]
END
```

?WINDOW
?FIGURE (What shape does FIGURE draw?)

Exploration #3

?WINDOW
?SETPOS [10000 10000]
?PR POS
10000. 10000.
?REPEAT 360 [FD 1 RT 1]
?PR POS
9999.65 9999.65 (Why isn't the turtle back at [10000 10000]? What figures can the turtle draw and always return exactly to its starting point? Check the beginning and ending positions of circles drawn on the visible part of the screen, also.)

Exploration #4

What are the the boundaries of the turtle's world? Can you pilot the turtle upstairs into the principal's office? The basement?

Exploration #5

Using Harold Abelson's "Mystery Point Game" (*Byte* Magazine, August, 1982, pp. 98-102), a marvelous interaction can occur between a computer and a team of students. Add a WINDOW command to GAME and rewrite RANDOMCOORD to look something like this:

```
TO RANDOMCOORD
OP 5000 - (RANDOM 10000)
END
```

(Ed. note: Abelson's game is written for MIT Logos. You will need to make a few changes to play the game in LCSI Logo. Add brackets to the consequences of the IF and the IFTRUE lines. Change REQUEST to READLIST and NUMBER? to NUMBERP.)

So, in my own thinking I have placed a greater emphasis on two dimensions implicit but not elaborated in Piaget's own work: an interest in intellectual structures that could develop as opposed to those that actually at present do develop in the child, and the design of learning environments that are resonant with them. The Turtle can be used to illustrate both of these interests: first, the identification of a powerful set of mathematical ideas that we do not presume to be represented, at least not in developed form, in children; second, the creation of a transitional object, the Turtle, that can exist in the child's environment and make contact with the ideas.

-Seymour Papert in *Mindstorms*, p. 161.

WINDOW offers a concrete and exciting way to investigate distances, coordinates, and angles, by interacting with the turtle within the same space we inhabit. Through WINDOWing, the turtle can help children bridge the supposedly wide gap between reality and imagination, between the concrete and the abstract.

Finally, the Challenge

I've not yet seen a WINDOW written in MIT Logo; years ago, I would have said it couldn't be done. However, we have another chance to try again, spurred on by the primitive poverty of LogoWriter. Guess which LCSI Logo doesn't have a WINDOW? (Ed. note: Now, Robs, last month you promised that you would give us only one challenge related to the primitive poverty of LogoWriter. But this second one is extremely interesting!)

Ihor Charischak of LCSI recently suggested that WINDOW is do-able within LogoWriter. In fact, he has a nearly functional version!

So, even if the only Logo you use is LCSI Logo (IBM, Apple), or especially if you use MIT Logos (Terrapin, Krell, Commodore), this month's challenge is to write a functional equivalent of WINDOW. I suppose you need to HT if either the X or Y coordinates exceeds an absolute value beyond your screen dimensions ... yes?

As always, you are encouraged to share your experience and/or solution with other LX readers. Send your solution (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 other correspondents.

?WINDOW
?FD 1000!

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

Free Offer

Adventures in Learning, a computer-related publication devoted to simulation games (especially multi-player games) and problem solving, offers up to 100 free 3-issue subscriptions for *Logo Exchange* subscribers from US addresses. Each issue contains at least one topic related to Logo. To start your subscription, send your request to:

Adventures in Learning
Logo Exchange Offer
PO Box 7627
Menlo Park, CA 94026

This offer expires November 30, 1986, and is limited to the first 100 LX subscribers who respond.

East Coast Logo Conference Call for Papers

The University of Virginia, in association with Meckler Publishing Corporation, will host the East Coast Logo Conference (ECLC), April 2 through 4, 1987, at the Stouffer Concourse Hotel in Arlington, VA. The conference will focus on Logo classroom applications and the extensions of Logo into areas of related technology. The program will include presentations from both invited speakers and those selected based on this call for papers.

Papers and proposals for sessions dealing with Logo applications and extensions are now being accepted for the ECLC program. Logo applications include the integration of Logo into the existing curriculum, creative use of Logo with special populations, and research on educational applications of Logo.

Logo extensions include connecting Logo with additional technology (e.g., optical disks, robotics, etc.), educational methods and techniques which have a philosophy similar to that of Logo, an overview of Logolike software, and topics relating to the future of Logo.

Students of all ages are invited to submit proposals for a special student session scheduled for Saturday, April 4.

Speakers and moderators whose proposals are selected will receive free ECLC registration.

If you would like to be a presenter, send a 200-word abstract of your intended presentation to the address below no later than **October 15, 1986**. If you desire to organize and moderate a 1-hour session, send an outline of your proposed session (including confirmed speakers) no later than **October 15, 1986**.

A camera-ready 3 to 5 page paper will be required no later than January 15, 1987, from each speaker chosen for the ECLC program. Since a preproceedings will be published, this paper is mandatory for all speakers.

If you are not interested in submitting a proposal, but wish to receive more detailed information about the East Coast Logo Conference, write to the address below and request to be placed on the ECLC mailing list. A copy of the conference brochure will be mailed to you when it is available.

East Coast Logo Conference
Tom Lough
Curry School of Education
University of Virginia
Charlottesville, VA 22903

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 columns feature Latin America, Asia, and Europe. The Latin American column tells us how Logo has spread into one of the most remote areas of the planet in a very big way. The Asian column shows how two people can spark a Logo movement that includes weekly Logo articles in the country's largest newspaper and a best selling Logo text written in Bahasa Malay. The European article reports on how a very small country is using Logo with deaf students. Next month's *Logo Exchange* will find us in North America, Australia, and Africa.

World Views

I recently had the opportunity to speak at the Innotech World Conference on Educational Technology in Manila, Philippines. I visited an IBM model classroom in Manila and was disappointed to see only BASIC manuals at each of the 15 stations. One of the teachers had heard of Logo and asked me to send her something about it. In another Asian country, I asked why they were not using Logo. The response was, "Have you ever tried to copy Apple Logo II?" Just what other problems are encountered when trying to introduce computers and Logo into developing nations?

Obvious reasons come to mind quickly: lack of money, lack of a computer / Logo culture, little expertise among educators, and difficulty in obtaining materials and information from developed countries. But there are other less obvious reasons.

The problems can be broken down into six areas: **teacher training, educational hierarchy, curriculum, schools, society,** and **hardware / software.** In this column, I will discuss teacher training, and carry on with the rest in future issues of the *Logo Exchange.*

In the area of teacher training, the major problem is that there are few computer education experts. Often, there are people who have knowledge of computers, but know little about K-12 computer education and nothing about Logo. Another problem is the "one workshop wonder." A faculty member of a teacher training college goes to a weekend lecture on Lotus 1-2-3 and, before long, is appointed as director of the country's computer education effort. Don't laugh; it happens. One country's computer education "expert" has only a one-week overseas workshop on video disks as experience and is now trying to conduct pilot studies using video disks ... no word processing, no CAI, no Logo, not even BASIC.

There are few if any role models available to teacher trainers. This, coupled with the fact that many countries are trying to do everything at once, is turning many initially enthusiastic teachers against using the computer.

QWERTY Revisited

The QWERTY phenomenon runs very deep in developing countries. Old ways die hard. BASIC is the only language in town for many third world situations. Converting from BASIC thinking is more difficult in areas used to external examinations and strong state run schools.

Teacher training institutions in developing nations must upgrade candidates' basic skills to a greater extent than do institutions in developed countries. Why teach them Logo when they can barely do fourth grade arithmetic and write a decent sentence? In addition, few student teachers come with any keyboarding skills and even fewer have used a computer.

Convincing faculties of education of the potential of computer education is difficult enough in the West but even worse in the developing nations. Even faculties with open minds have to overcome societal, school, monetary, and administrative hurdles. More about these hurdles next month.

Dennis

Europe

by Richard Noss
London University Logo Group
Institute of Education
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20 Bedford Way
London, England WC1 HOAL

Logo at "LOGO

Luxembourg may be one of the smallest countries in Europe, but as guest writer Charles Krantz reports, there is plenty of Logo going on.

At the secondary school level, the grand duchy of Luxembourg (350,000 inhabitants)* has one of the best hardware infrastructures in Europe. All twenty secondary schools of our country have at least 14 computers, connected as a network with a file server, a hard disk unit, and a printer server. Although computer literacy is not yet integrated into the normal curriculum, most schools have organized special study courses for informatics. Unfortunately, the majority of the secondary school teachers will still have to be convinced that the implementation of Logo is not beneath their dignity.

As far as elementary school education is concerned, we are, like most of the European countries, still at the beginning. A study group of the Ministry of Education is preparing "the field." In a first phase, local authorities are encouraged to agree to pilot projects destined to introduce the New Technology Initiative at the infant, elementary, and complementary levels (ages 4 - 15). Most of these projects will relate to the implementation of a Logo environment in the school. Since January 1986, the first training courses for infant school teachers have been under way. We hope that the choice of the classes, the setting up of the hardware configuration, and the teacher training will be finished by autumn 1986, so that the phase of practical work in the classroom can begin not later than the beginning of 1987.

For the moment, the first and only Logo project is taking place at the Centre de Logopedie, an infant and elementary school for speech and hearing impaired children at Luxembourg City (the abbreviated name of the school is "LOGO.) I started in April 1985 with a class of 7 deaf pupils (12-13 year olds), divided into 2 groups (3 boys, 4 girls). This grouping was exclusively due to organizational problems related to the timetable of the class. We had at our disposition one computer with a disk drive and a printer. Since January 1986, our school has been the lucky owner of a network of 8 machines, each one with a disk drive and an RGB monitor. The managing unit of the network consists of a hard disk and a printer. The Institute for Pedagogical Research and Studies has been equipped with an identical configuration for teacher training.

Although it is too early to draw conclusions based on scientific criteria, there have already been a lot of interesting experiences. As this project concerns deaf children, my attention was mainly focused on the aspect of communication possibilities and problems with Logo, without neglecting the possible improvements of cognitive skills.

I think Logo can be considered as a tool, able to facilitate the acquisition and development of one's natural language:

- Logo primitives are words of a natural language and allow the pupil to learn simple grammatical structures;
- the naming of procedures and variables may foster the enlargement of a pupil's vocabulary.

The most reliable observations have been made in the development of social skills (see, for example, "Logo et la Socialisation chez des Enfants Sourds," by Francine Bonnier, *Vie Pedagogique* 37, June 1985, Montreal). The social behavior of pupils in the Logo environment differed significantly from their behavior in the traditional classroom situation. There was a need for communication, for consulting each other, for comparing hypotheses and results that I never noticed before. In short: *cooperation supplanted rivalry*. The development of autonomy in Logo activities was slower than expected, especially in the girls' group. I suppose the reason could be that the pupils were accustomed to traditional pedagogical methods over the past eight years.

Logo at "LOGO must and will continue with other classes of different grades and with different curricula. I am very interested in establishing contact with all researchers and teachers who have experience with Logo and handicapped children. I hope that the editors of the LX will reserve a column for this purpose. (Ed. note: This report was written before the new SpecialTalk column was announced.)

* For all those, who don't want to ruin their eyes: Luxembourg is the invisible country on the map situated between Belgium, France, and the Federal Republic of Germany.

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Luxembourg, Europe

Asia

by
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Tatara, Tanabe-cho, Tsuzuki-gun
Kyoto-fu, Japan 610-03

This month, our guest writer is Mr. Tan Chik Heok from Malaysia.

Logo in Malaysia

As is the case with many developing nations, Malaysia received its first introduction to Logo via the international schools. American and European teachers imported it into the international school where it is used primarily by European and American students. The public school systems here have virtually no Logo activity taking place.

Logo first entered the Malaysian public sector in August, 1983, when LX international editor Dennis Harper (then at the University of California, Santa Barbara) did a study at the National University in Bangi, Malaysia, that included 30 secondary student teachers and an inservice course for 30 primary school teachers. A Malaysian version of Logo was developed for the Atari 800 computer used in the study. Results of that study are summarized in an ICCE publication entitled "Computer Education for Developing Nations." (ICCE, University of Oregon, 1787 Agate St., Eugene OR 97403, USA).

On April 4, 1984, a workshop entitled "Guide for Teachers on Computers in Education" was presented by Tan Chik Heok and Ng Kwan Hoon of the Tunku Abdul Rahman College in Kuala Lumpur. This workshop contained a substantial amount on Logo. Two similar workshops were subsequently organized to introduce hands-on experience in the use of microcomputers in education. Logo was featured as a language for learning and cultivating problem solving skills.

Tan and Ng have written the first Logo book in the Malay language (Malay is the official language of Malaysia and very similar to Indonesian.) Their book, suitable for students of age 15 onward, is called *Pengatucarraan Komputer dengan Logo* and was published by Federal Publications in 1985.

In order to promote Logo, which is relatively new in Malaysia, Tan and Ng are writing a series of Logo tutorials in the *CompuTimes*, a weekly pullout featuring computers in education and published by the *New Straits Times*. This tutorial has received a very popular response from the readers. A more advanced Logo tutorial is planned which will continue this introductory series.

A Logo workshop called "The Role of Logo in Education" was organized by the Malaysian Council for computers in Education and the New Straits Times Computer in Education Unit on May 3, 1986. Beside Ng and Tan presenting an overview of Logo and the use of Logo in mathematics and science teaching, Liddy Nevile from Australia also talked about the projects in which she has been involved and about the Australian experience with Logo. This workshop attracted some 80 educators and officials from the Ministry of Education.

Plans are under way to organize more workshops and seminars to introduce this "new" language to Malaysian teachers and children.

For more information, please contact:

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Logo in Japan

Although many of you are reading this in the cool of the fall, right now in Japan the heat of the summer has fully arrived. The greeting has changed from, "Ohiyo gozaimasu," (Good morning) to "Atsui desu ne!" (Hot, isn't it?). Last year a number of people from Japan escaped the heat and went to "cool" Boston to give presentations at Logo '85.

This year, Logo activists and conference speakers Junichi Yamanishi, Takito Totsuka, and Hiroyoshi Goto set up a three-day teachers' workshop at Toyama University, where they worked with 44 elementary and middle school teachers. This workshop, presented under the auspices of the university, offered two units of credit, a relatively new idea to encourage members of the community to take part in university summer classes.

Almost all of the schools in Toyama Prefecture either have or will receive computers from the government this year (the Ministry of Education will be spending 5 billion yen [about $34 million] yearly on computer equipment and education!). So naturally, teachers want to learn interesting and effective ways of using the computer. The Yamanishi / Totsuka / Goto course was called "Computers in Education," and the contents were almost exclusively Logo-related, due to the efforts of these three in establishing the program.

One way to be sure that Logo and the philosophy behind it is well represented in conferences and workshops is to develop your own programs, as was done here and elsewhere by many Logo people. There is no doubt that the work of educators Tan and Ng in Malaysia and Yamanishi, Totsuka, and Goto in Japan are putting the ideas of self-empowering education into the consciousness of people who may not have been aware of its relevance before. It is important for us to remember Sylvia Weir's often repeated point, that followup from these conferences and workshops is so important, in order to nurture that newly developed awareness and help keep it GROWing.

Latin America

by
Eduardo Cavallo & Patricia Dowling
Instituto Bayard
Salguero 2969
1425 Buenos Aires, Argentina

Puerto Desado is a small harbor town with about 6000 inhabitants, situated on the 48th parallel on the Atlantic coast. It belongs to the province of Santa Cruz in the south of Argentina. It is a relatively isolated site, far from any important highway, in the enormous but sparsely inhabited extension of the Argentine Pategonia.

Connections with the rest of the country depend mainly on airlines. Here the Logo Users Group of Santa Cruz was born two years ago, largely due to the work of Pilar Labrea de Raola who is actually coordinating the Logo activities in the province school. This institution was the site of the Pro-Logo Patagonic Meeting. Delegations from remote communities such as Caleta Olivia, Bariloche, General Roca, Rio Gallegos and Comodoro Rivadavia gathered there.

One of us (Eduardo Cavallo) was invited to attend together with Horacio Reggini, Eduardo Antueno, and Hector Thompson. The latter two are well known by the people in the south since for two years they have devoted themselves to promoting Logo in the southern region.

In the fortunately well-heated rooms of the school, we got in touch with an aspect of reality which is very dissimilar to that of Buenos Aires. With scanty economical means, fighting against isolation, these communities have produced a Logo movement of great intensity and future.

Reggini's speech on the 3-d turtle was followed by Thompson's remarks on his experience in the Open Workshop at Buenos Aires, and by mine on the work at Bayard Institute. But the most interesting work was to be seen in the rooms devoted to workshops and discussions between pupils, parents, and educational authorities.

We had the opportunity of talking with authorities in the area of educational computing in Rio Gallegos who were present as observers and accepted the engagement to travel there to give teacher training courses.

We also contacted teachers who were getting ready for the forthcoming "CONGRESO NACIONAL PEDAGOGICO", and who thought about including the subject of computers at school in their propositions.

The people of Puerto Desado talked about students with learning problems, and we realized that we need all the information on this subject that we can get to alleviate the scarcity of material in our country.

We should also mention the work carried on by the Logo Workshop at the Payasin Kindergarten School, one of the pioneers of Logo in Argentina. They have created numerous programs for preschool students (4 to 5 years old) and they are about to publish their observations in this field.

The Technical School of Comodoro Rivadavia presented an excellent group of high school students who took part in an open discussion on the work actually carried on with computers at that level.

All these experiences, the natural beauty of the surroundings, and the wonderful weather we enjoyed made us all the more grateful for the opportunity of participating of this event.

Logo Notes from Brazil

The International Logo Conference will take place in the city of Novo Hamburgo, 30 kilometers from Porto Alegre, Brazil, on November 6 through 9, 1986.

We hope it will bring together many of the Logo communities of South America, as did the one in Montevideo last year.. We shall try to be there to be able to tell you about our Brazilian adventures. For further conference information, write to:

Lea da Cruz Fagundes
Rua Sofia Veloso 85
90050.00, Porto Alegre, Brazil

LogoPals

by Barbara Randolph

R-r-ring!

J: Hello?

S: Hi, John! It's me, Suzi.

J: Oh. Hi, Suzi.

S: How's your project for Logo class going?

J: Well, it's still got a few bugs in it ... but we're getting there.

S: We? Who's we? Who else is on your project?

J: Oh, my friend Papou is working on it, too.

S: Papou? Who's that?

J: Papou? He's my LogoPal from Senegal.

S: Senegal? Where's that?

J: It's in Africa, on the western side.

S: How'd you meet him?

J: Well, I've never met him personally, but I've written letters to him, and he's written to me ... and we've both been working together on the Logo project. Some days, I can't wait to come home to check my mailbox to see if there's a letter from Papou. It's fun!

S: Yeah, I get that you're enjoying it. What I want to know is ... how do I get a penpal?

J: You mean a LogoPal. Well, just write an ad like you see in the newspaper about yourself ... stuff like your age, your level in school, what you like to do in Logo. You also could say if you like a certain kind of music or canoeing or drawing or whatever. Don't make it too long.

S: Where does it go?

J: You mail it to the LogoPals column in the *Logo Exchange* magazine that your teacher has. And, you have to send an envelope addressed to yourself with a stamp on it. When Papou sent in his ad, he had to send in international postal coupons for a 1-ounce or 28-gram letter back. That's because he was writing from outside of the USA.

S: Will they print my ad in the magazine?

J: Maybe ... I guess it depends on the room they have. But they **do** match you with a LogoPal from from somewhere else ... even from another country, if you want. You can ask for a LogoPal from somewhere special or you can just let them choose one for you. Anyway, you're also supposed to keep in touch with the magazine and tell them about the projects you're working on with your LogoPal.

S: Hey!! Maybe they'll write about the project you and Papou are working on!!

J: Yeah, we'd be famous!

Teachers, hurry and tell your students about the LogoPals. As soon as we receive their "ads," we will get them matched up with other LogoPals. Have your students send their ads to:

LogoPals
Barbara Randolph
1455 East 56th Street
Chicago, IL 60637

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. We're waiting to hear from your students!

Logo Class Penpal Network

If you would like to involve your entire class in a Logo project, then join the Logo Class Penpal Network. Through the network, you and your class will establish a correspondence with another teacher and class in the United States or in another country in the world. You will be able to share Logo teaching and learning ideas, procedures, and projects. To obtain a free application kit, send a long stamped self addressed envelope to:

Logo Class Penpal Network
University of Virginia
Curry School of Education
Ruffner Hall
Charlottesville, VA 22903

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

Interactive Technology in Education

The second annual Interactive Technology in Education Conference will be held November 14-15, 1986, in Norfolk, VA. For details, write to WHRO CII, 5200 Hampton Blvd., Norfolk, VA 23508

** 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 its 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.