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The Hazards of Hacking

by
Sharon Burrowes

Logo "slipped" into our school system last year via our Talented and Gifted (TAG) program. As our resource teacher introduced it to groups of 5th and 6th grade children at each school, the interest in the computer (and especially in Logo) spread like wild-fire. Before we knew it, instead of having one computer for the TAG program that rotated from school to school, we found ourselves with one computer in each school!

Of course, this created questions such as, "What is the curriculum?" and "How do teachers get training?" which the school system set about dealing with. Meanwhile, the eager Logo loving students were pounding away at their keyboards, creating fascinating works of "turtle art."

This fall, as part of our newly developed system-wide curriculum, we decided to sponsor a series of "training sessions" for selected 6th graders who were last year's most enthusiastic Logo-ers. The sessions were to focus on the non-graphics aspects of Logo so that these students could grow in a different direction. By the second of the four sessions, it became apparent that two bad habits had developed in most of these students during their months of "hacking" last year.

HACKER HABITS

The first of these was the tendency to take a model procedure, key it in, run it, and dash onward to the next model. Little attempt was made to understand why the procedure functioned as it did. They seemed driven to try something new, ooooh and ahhh at the results, and then plunge on the next example - thus merrily skimming the surface.

While I constantly encourage teachers to let students "mess about" and explore, it is apparent that students need guidance to explore in more depth. Without depth, they seem to get forever stuck on FORWARD, BACK, RIGHT, LEFT, and a few other turtle control commands.

For example, in the first session, I had used the statement MAKE "NAME READLIST at one point in a procedure. Later in the same procedure, I used PRINT :NAME. In the next session, I introduced an example which contained the statement MAKE "STUFF WORD "HI "THERE. Most of the students said that this MAKE statement would cause the computer to print out HITHERE. This seemed to indicate that they had never really experimented with the statements from the previous week, in spite of having computer time during which they were supposed to do exactly that!

In another instance, I had suggested to a group that they simulate the roll of a die using RANDOM. The next week, they presented me with a procedure which I knew was beyond their capabilities. They admitted they had copied it and did not understand how it worked. They had not experimented with the idea sufficiently.

BREAK IT UP

My second concern will be no surprise to anyone who has watched students write their first turtle graphics procedures. The procedures get longer and lonnnnger and lonnnnnnger! I found that students had not been shown and did not spontaneously invent the concept of modularity.

A pair of students had written an exploratory procedure using such things as REPEAT 1000 [ARCRIGHT 50]. The procedure produced fascinating designs on the screen, ending with what looked like stars winking out. The students wanted to have the turtle write END when this was all done, but their E had an extra line in it. (These students has not yet been shown the NLX ABC's.)

Hazards continued

The procedure took a minute or so to run up to that point; thus, they were not getting very far with isolating the bug. I showed them how to break their existing procedure up into modules and write a super-procedure procedure to call the other parts. They were delighted. One student popped out with, "Is that why our procedures won't work right?" This question, it turned out, really meant, "Is that why we can't GET our procedures to work right?"

In another group were two boys who had written a long procedure which our TAG coordinator sent to the NLX. Editor Tom Lough broke the procedure into subprocedures, and sent it back for them to study.

When I began talking about keeping procedures small, one of these boys blurted out that their procedure had been sent to "some man" and he sent it back broken up into smaller parts! They seemed very impressed that "some man" and I came up with the same idea! In fact, it seemed to be enough to convince them that there really was something of value to the idea.

The concept of subprocedures needs to be introduced fairly early. Long procedures are frustrating to debug. But, by taking "masterpieces" which have bugs in them and cleaning them up with the students, the ease of debugging is clearly demonstrated.

In hindsight, we realize that we should have emphasized exploration of commands and their multiple uses more and modularity more than we did both in working with students and in training teachers. However, if you find yourself in a situation such as we have where Logo lovers have rushed ahead of the teacher training and curriculum, do not despair. It does seem possible to go BACK 50 and LEFT 45 to get students and teachers pointed in the appropriate directions. Better programming habits will spread among the children when they help us be more effective.

Sharon Burrowes is a consultant and a computer science teacher in the Wooster (Ohio) City School System, and a frequent contributor to the NLX.

From The Editor

In November, 1982, the staff of The Computing Teacher devoted an entire issue of their magazine to Logo. It was an outstanding effort, and made a significant contribution to helping Logo teachers everywhere.

They have replicated their effort a year later with the recent December / January issue. It contains many useful Logo articles, including 4 separate treatments of recursion!

David Moursund's editorial, "Logo Frightens Me," deserves special mention. Moursund is a respected and experienced computer educator. He is a strong supporter of Logo, but harbors some fears which are worth thinking about.

Is Logo being oversold? Are overzealous educators reading Mindstorms, buying Logo, and developing unreasonable and unattainable expectations of what Logo can do in their classrooms? To view Logo as the "ultimate answer" in computing education is folly.

Will Logo reach its full potential in our classrooms? How will we know if it makes a difference? Research reports now available do not provide sufficient information on Logo's effectiveness with "ordinary" teachers - those with a modest level of training, experience, and interest in the computer field.

This brings Moursund to the heart of his fear - that the importance of full teacher support will not be recognized. Providing training, experience, resources, and research opportunities for the teachers as well as continuing computer access for students must be high on priority lists if the full potential of the Logo language is to be realized.

Moursund's cautions deserve discussion and thought. We agree with his suggestions and recommend that his editorial be carefully considered.

Another key article, "Problem Spaces in a Project Oriented Logo Environment," by the NLX's Steve Tipps and Glen Bull, has been copublished by the NLX, with Part II appearing in this issue.

Editor continued

Jim McCauley's outstanding article, "Kepler," should be required reading for all Logo teachers. McCauley describes his interactions with a group of children as they struggle to use Logo to help them study planetary motion. His sensitive description of the ups and downs of their discovery process will help all readers to identify more effective ways to facilitate Logo learning. His candid admissions of his own self doubts serve as mirrors for us all, and offer encouragement through his personal example.

For information on obtaining a copy of The Computing Teacher's Logo issue, write to Sharon Franklin, TCT, University of Oregon, 1787 Agate Street, Eugene OR 97403.

For Logo, the last twelve months have seen a groundswell of interest and development. The depth and breadth of ideas in TCT's Logo issue demonstrates how far thinking about Logo has come in 1983. And we're just getting started! We at the NLX wish for you and your students much growth and excitement with Logo in 1984! Happy New Year!

MAKE "84 100
FD :84



Logo Down Under

Australia has quite a large active Logo population. We recommend that NLX readers consider subscribing to COM 3, an Australian magazine published 5 times per year by the Computer Education Group of Victoria (CEGV). Here is a partial listing of titles from a recent issue. "Using Multiple Turtles to Create Games," "Turtling On: Excerpts from some Turtle Tales," "Turtle Talk," a regular column by Sandra Willis, and a review of Prentice Hall's Let's Talk Apple Turtle. For more information, write COM 3, 32 Chrystobel Crescent, Hawthorn, Victoria, Australia, 3122.

MECC Announces New Logo Products

Two Logo products have been released by the Minnesota Educational Computing Consortium (MECC) to help teachers with Logo in their classrooms.

"Introduction to Logo for Teachers" contains training materials developed from the combined efforts of Logo teacher trainers throughout Minnesota. Its 116 pages contain instructor notes, transparency masters, activity pages, and reference materials. The book and accompanying diskette were designed to be used with Apple (LCSI) Logo. The instructor notes consist of nine learning module segments, with objectives. Teachers using the material are cautioned to avoid over-structuring the use of Logo. The price is \$49.00.

"EZ Logo" is a set of Apple (LCSI) Logo learning materials designed to help children of primary age (4-8 years old) learn to use the computer in self directed ways. Based on a version of INSTANT, EZ Logo was developed by Judith Anderson, and was an award winner in MECC's 1982 Teacher Programming Contest. Two levels are presented. Included in Level 1 are 24 turtle activities in module form, with supporting materials, command cards, activity guides, and a set of stickers for the computer keyboard.

Level 2 includes activities to teach how to begin combining Logo skills for more complex accomplishments, and to make copies of pictures. The materials are not intended as a substitute or replacement for Logo. Rather, they provide very young children with "EZ" ways to explore many aspects of turtle graphics. The 79-page manual and accompanying diskette sell for \$48.00.

To order, send your check or purchase order to MECC, 3490 Lexington Avenue North, St. Paul MN 55112. For more information, call (612) 481-3500. Add 10% for orders from addresses outside the continental United States.

Problem Spaces in a Project-Oriented Logo Environment

by Glen Bull and Steve Tippis

Ed. note: This article is also appears in the December / January issue (Logo issue) of The Computing Teacher, and is published here in two parts. In part I, appearing in last month's NLX, a two dimensional matrix was set up to define four possible problem spaces in a Logo environment.

Implementation (Solution)	Source of the Project	
	LEARNER	FACILITATOR
LEARNER	I	III
FACILITATOR	II	IV

Learner Generated / Learner Implemented (Type I) and Learner Generated / Teacher Facilitated (Type II) Problem Spaces were explored. In this continuation, the remaining problem spaces will be explored.

Part II

III. Teacher Generated / Learned Implemented Problem Spaces

Some children invent their own projects, while others languish for lack of direction. One reason for tiring of Logo is a low skill level. Another is lack of interesting examples. Potential solutions for ennui in Logoland are ideas which build skills or provide models for exploration. The teacher generates a project for student solution in a Type II problem space.

A Type III project can become a static model. Asking students to type in a POLYSPI procedure which they don't understand is not a valid Type III project. The problem is not with POLYSPI, but with the short circuiting of the learning in POLYSPI through imposition of a solution. Teachers grounded in the purpose of Logo do not require a rigid scope and sequence chart with fixed activities; besides, most students already receive enough practice in doing things they don't understand.

Teachers do need many open ended ideas and projects. Characteristic of a good Type III project is a clear objective which can be reached in a variety of ways. A didactic approach can involve a specific suggestion:

"Place a square inside a circle."

A less structured approach could include the suggestion for a range of projects appropriate for the learner, using one procedure as an example:

"This procedure places a diamond in a circle. Can you create other shapes which fit inside? What other shapes could fit inside each other?"

Long range cooperative projects may be even less structured. The term "problem schemes" has been invented to describe long range classroom projects which emphasize applications of Logo in content areas. A class project to create a variety of increasingly sophisticated programs to generate random sentences according to linguistic rules is an example of a problem scheme.

In this instance, the teacher has deliberately chosen a context which requires deliberation on the nature of English syntax. The incongruities generated will inevitably create questions about the ways in which words work together. Such projects have an ideal Logo flavor, because the ideas sparked can lead in a variety of directions. This situation may be as threatening as a non-authoritative role for some teachers. The teacher directing the project must have a firm grasp of the potential subject matter embedded in the project.

Teachers need explanations of how content embedded in a project can be developed in a classroom setting. Discussions of subject matter are missing; the emphasis is on programming concepts required to conduct a project. For example, ANIMAL is a well known program in which the computer attempts to guess an animal by asking questions such as:

- *Does the animal have four legs?
- *Does it bark?

The program makes a final guess about the animal, asking: "Is it a frog? Or, is it an elephant?"

Problem Spaces continued

This is a potential problem scheme for the classroom. When developing this project, a class will discover why some nouns have the article "a" before them, while others have the article "an." Members of the class can become linguists, attempting to discover patterns which govern sentence structure. Questions arise: "Why do vowels exist?" "What is a vowel?" In this type of project, the class confronts natural rules found in the English language, rather than disassociated rules memorized by rote from a workbook.

The greatest potential of Logo in a classroom is its possible use for elimination of disassociated learning. This potential will be neglected as long as extensive illustrations of how Logo can be used to learn specific content are not available.

IV. Teacher Generated / Teacher Implemented Problem Spaces

The teacher supplies both the idea and the implementation of the project in a Type IV situation. At first glance, Type IV problems seem to be at odds with Logo philosophy, but problems of this sort may be worthwhile to illustrate a new capability of the language or to seed new student generated problems.

If a student has seen only the turtle graphics, a program which uses list processing to manipulate English or to graph a linear equation may be a revelation. Music generators can provide "hooks" for students to create procedures for their own projects. Tom Lough's NLX alphabet procedures use the turtle to draw letters which can be used in student projects.

Templates provided by teachers also may be a Type IV project. A poetry formatter which asks for words to complete a haiku or cinquain form might entice students to explore those forms. The questions, asked in a fill-in-the-blanks way, make apparent the form of the poetry.

When teachers first learn Logo, they often gravitate toward another kind of Type IV project - the drill-and-practice or tutorial programs, which are easy to write in Logo. Teachers develop their own skills in programming Logo with such projects, but using them in class to teach content is inherently anti-Logo and has nothing to do with Logo for student use.

A Call for Type III Projects

Valid projects from all four problem spaces should be used in a complete Logo environment. Logo's potential is reduced if it is restricted to one type of problem. Type I problems permit free exploration and play. Type II problems invite teacher-learner collaboration. Type IV projects expand the use of Logo in areas which exceed the learner's programming skills. Type III projects are valuable because they are particularly suited to the use of Logo in learning subject matter.

Logo with Content

Where are the projects in Logo which focus on learning experiences in algebra, social science, industrial arts and other content areas? The Logo community has avoided describing Logo projects of this kind for fear that descriptions might become recipes - explanations that shift into rigid lockstep programs deemed to be "the right way to do Logo" or "the right thing to do with Logo." A written description of a project tends to capture product rather than the process. It is a still picture rather than a movie.

Some teachers do not recognize that using Logo to teach a subject is even a possibility. A high school math teacher asked, "Can Logo help me teach algebra?" Other teachers realize the potential but find it difficult to develop methods of using Logo to teach specific concepts. How can Logo be used to understand multiplication of polynomials? Traditional methods have focused on mechanical techniques which can be used to obtain the answer without understanding the process.

For example, the solution to the following operation can be determined with the mnemonic FOIL (First, Outer, Inner, Last) which specifies all possible paired combinations of the elements:

$$(5X + 3)(2X+1) \text{ becomes } 10X^2 + 11X + 3$$

The teacher who attempts to present this concept through Logo is first tempted to create a tutorial with Logo. After recognizing the discrepancy between the intent of Logo and this tutorial approach, the second effort may involve the use of Logo to create a graphing tool. This then becomes a Type I project for the teacher, but is a Type IV

Problem Spaces continued

tool for students. From the student's perspective, it doesn't really matter whether the graphing tool is written in assembly language, BASIC or Logo. Calling the graphing tool a microworld doesn't alter the situation.

A Proposed Model

What is needed is a project which will allow students to use Logo directly to explore the meaning of polynomial multiplication. One approach involves a geometric method utilizing turtle graphics. A second technique might be based on exploration of the distributive law using list operators. Several Stages are likely before a Logo project actually reaches the classroom. Implementing content - laden projects may include:

- * Recognition of the potential of using Logo for learning specific concepts
- * Identification of a concept
- * Determination of avenues of attack with Logo
- * Development of the problem scheme
- * Use in the classroom

The fourth stage involves the design of an experience in teaching without telling. A true Logo problem demands both inquiry and discovery.

A model problem scheme in the Type III category (teacher generated / student implemented) should contain a complete English description of the problem with a variety of possible directions in which the project might go. Exploration of area is one possible direction for binomial multiplication, but others might be suggested. The teacher needs an understanding of the concepts potentially embedded in the project. Given the nature of Logo, this frequently includes more than one subject area. With the distributive approach to binomial multiplication, compound words and sentences as well as combinatorial theory are outcomes.

The project would not include a full programming implementation to reduce the temptation to use the project in a static, cookbook - like fashion. At most, key programming ideas or program stubs might be suggested. The challenge to the Logo community is to provide projects which involve learning about content or subject matter without resorting to direct instruction with the computer as a teaching machine. Logo should make the computer a learning machine.

Problem schemes in many subject areas are essential if Logo is to go beyond computer literacy. This is a complex task - we still do not have fully realized Logo projects for binomial multiplication and have only arrived at our present understanding after several weeks of thought and sharing with high school mathematics and science teachers with strong Logo backgrounds. No single teacher will have the resources to create a series of projects spanning a school year. The challenge to the Logo community is to jointly develop and share ideas for projects of this kind.

Steve Tipps and Glen Bull are professors in the School of Education at the University of Virginia, and are regular columnists for The National Logo Exchange.

Be a Pal

Many Logo classes throughout the United States and Canada are participating in the NLX's Logo Class Penpal Network. Classes are matched by grade level, Logo version, and experience.

The following Logo classes still need to be matched with counterparts.

- * Cyberlogo class of 30 4th and 5th grade students.
- * Apple Logo and Commodore Logo class of 20 kindergarden children.
- * Radio Shack TRS-80 Color Logo class of 33 4th graders.

If your situation corresponds closely to one of these, won't you consider participating? Send a stamped self addressed envelope today to NLX, Attn: Logo Penpals, Box 5341, Charlottesville, Va 22905.

Can You Help?

Help wanted! Peggy Goold uses Terrapin Logo on her Apple II+. She cannot get her Star Gemini-10 printer and APIC/G interface to function with it. Any NLX readers who have experience with these peripherals or other related ones please write to Peggy with suggestions. Peggy Goold, PO Box 264, Averill Park, NY 12018.

TIPPS for TEACHERS

by
Steve Tipps

Triangle thinking: Side 1

Anyone who has worked with Logo for more than three weeks has probably discovered that turns of 120 rather than 60 are needed to make an equilateral triangle. Experience with other triangles provides many new insights about geometry and many new skills in Logo.

My columns for January through March will be about "triangular thinking," and will suggest many different projects using triangles. Activities can be approached at levels from turtling with procedures through axioms and postulates in geometry and trigonometry. The learning intent and outcome of these activities will vary from class to class.

PYRAMIDING

Equilateral triangles in pyramid grids and patterns are a good exercise in variable procedures and positioning logic.

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

Triangles can be organized with moves and turns coordinated for different arrangements. A simple pyramid might be two triangles at the base with another on top. The network could grow with three on the first level, two on the next level, and one on top; then four, three, two, and one on top. The repeated structure of the pyramid may incite the old question, "Isn't there a better, easier, simpler way to do this?"

AN EASIER WAY

Building a module called TRIANGLE.ROW is one easier way to do this. Two variables would be needed: the :SIZE of the triangle and the :NUMBER of them. A repeat statement could be used to draw the triangle, move over, draw another, etc. Positioning is crucial. The turns and moves have to be coordinated with TRIANGLE to produce a row.

To get the triangle base horizontal, a RIGHT 30 is put in to TRIANGLE. The turn works well for one triangle, but leads to complications with multiple triangles. "State transparency" helps simplify the case. This means that the turtle returns to its beginning position and heading after completing each drawing. That way, you know exactly where it is and which direction it is facing at the completion of each triangle. This makes moves much easier to plan. Here, state transparency is maintained by putting in a compensating LEFT 30.

```
TO TRIANGLE :SIZE
  RT 30
  REPEAT 3 [ FORWARD :SIZE RT 120 ]
  LT 30
END
```

Positioning can be handled outside the procedure in the immediate mode or separate positioning moves in a master procedure.

MODULARITY AND POSITIONING

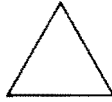
How positioning moves are handled seems to indicate the level of understanding of modularity. The less sophisticated problem solver will put all positioning moves into the procedure itself. This limits the usefulness and flexibility of procedure. The second stage is to keep the positioning separate from the procedure so that a shape can be moved or oriented according to the specific need of the design. The last step in the process is to make positioning procedures which can be used flexibly to move the turtle almost automatically.

```
TO MOVE.OVER :SIZE
  PU RT 90
  FD :SIZE
  LT 90 PD
END
```

MOVE.OVER can be used to move right or left. Positive numbers scoot the turtle right while negative numbers scoot left. Another procedure gives flexibility of angle as well.

```
TO MOVE :SIZE :ANGLE
  PU RT :ANGLE
  FD :SIZE
  LT :ANGLE PD
END
```

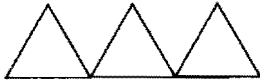
Tipps continued



With this arsenal of procedures, a pyramid is easily constructed. One possible English description would be:

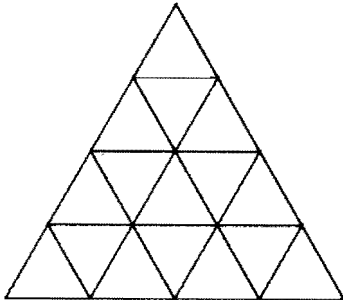
To make a row of triangles

- Draw a triangle
- Move over the length of the base
- Draw another triangle
- Move over, draw another
- Continue until the row is finished
- Move back to the first position of the turtle



To make a pyramid

- Draw a row of triangles
- Move up for the next row
- Draw a row with one less triangle
- Move up for the next row
- Draw a row with one less
- Continue until a row with only one triangle is drawn



In these descriptions, positioning moves are used as much as actual drawing moves. The eventual pyramid procedure can be written calling only simple procedures and REPEAT; it can also be written with recursion and testing. The level of implementation depends on the skill of the programmer, but the thinking, planning, and describing is challenging for all.

PYRAMIDING ACTIVITIES

The teacher's role is to create an environment which invites the creation of pyramids of many different kinds. Pyramids can be made with different size or color triangles on each row. The pyramid can be drawn from the top or the bottom. The pyramid can be rotated around the screen in a SPIN.PYRAMID procedure. Pyramids can be stacked together to make a pyramid of more pyramids.

Fortuitous mistakes may create other uses for TRIANGLE and PYRAMID. The screen may fill with equilateral triangles of different sizes and shapes. Rows of triangles of decreasing, increasing, or random sizes will be invented. Various combinations of colors, shapes and sizes may become pattern challenges. Designing wall paper or wrapping paper with triangles is a good activity.

Another patterning activity has a child creating a sequence (for example, purple square, blue circle, orange triangle, blue square, orange circle) for others to finish. Sizes can be added for a pattern with three elements. One activity with pyramids is to find how many different ways the pyramid lines can be traced without going over any line twice. The solutions can be worked off computer, then programmed quickly to check. The challenge from the teacher could be to discover how many possible paths there were.

AUTOMATIC TRIANGLE

Extend triangular understanding with an exploratory activity on right triangles called Automatic Triangle. Automatic Triangle takes advantage of the line drawn when the Turtle goes HOME. Type a distance move, a RT 90 or LT 90, another distance move, and HOME.

```
FORWARD 100  
RIGHT 90  
FORWARD 40  
HOME
```

```
FORWARD 67  
LEFT 90  
FORWARD 42  
HOME
```


more Tips

The sequence of four commands will always result in a triangle. Students can speed the process with an AUTO.TRIANGLE procedure and two variables for :SIDE1 and :SIDE2. The exploration can be extended by using RANDOM to generate the lengths of the two sides.

MEASURING SIDE THREE

The length of the third side can be measured on the screen with a flexible clear ruler and recorded on a chart.

	Side One	Side Two	Side Three
#1	100	40	8.3 cm.
#2	60	60	6.5 cm.

The issue of scale will come up. Should you change turtle steps to centimeters or centimeters to turtle steps? Different monitors may have slightly different conversions factors to consider. We use the ratio of 13 turtle steps to 1 centimeter on our own monitors.

Students will notice that side three is longer than side one or side two. The teacher can challenge them to find an arithmetic rule for the length of side three. Simple addition gives a result which is too large. Students may also try adding a fraction of one side to a fraction of the other side. This will work for some combinations, but not for others. Although this discovery method is sometimes slow and frustrating, the students are on the right trail, the trail of Pythagoras.

While following the trail, a number of very interesting side trips are possible using AUTO.TRIANGLE. This procedure can be used to explore the ideas of vector composition in physics and slope (gradient) in mathematics. What happens if you add 10 to one side and subtract 10 from the other side, for example?

```
AUTO.TRIANGLE 90 10
AUTO.TRIANGLE 80 20
AUTO.TRIANGLE 70 30
AUTO.TRIANGLE 60 40
```

The same process can be done with the lengths of the sides incremented recursively. A triangle depth projection effect is the result. A question for further exploration might be how to make a circular design with AUTO.TRIANGLE.

PYTHAGORAS' TRIANGLE TRAIL

Pythagoras and his theorem about the length of the third side can be introduced easily with Logo. Working out a teaching activity with the Pythagorean theorem and Logo was a project which NLX subscriber Maro Medovic-Zandee of Santiago, Chile, did in our Logo class last summer at UVA. Maro's procedures were especially beautiful because they were in Spanish!

As students work on the chart of sizes, some may try multiplying :SIDE1 by :SIDE2. A hint about multiplying a side by itself may be needed. Logo might be used directly for constructing a square on each side of several triangles. AUTO.TRIANGLE lets you make triangles of any size, but easy triangles such as those with sides of 60, 80, and 100 are useful for simplifying calculations. The general formula for square area is side times side. The chart can be expanded to hold this information as well, after the centimeters are converted to turtle steps, for example.

	Side One	Side Two	Side Three
#1	100	40	108
Squared	10000	1600	11664
#2	60	80	100
Squared	3600	6400	10000

When students start looking for a relationship, they usually will find one. In this case, "the square (area) on the long side is equal to the sum of the squares (areas) on the other sides." Short hand for this is

$$a^2 + b^2 = c^2$$

The terminology "squared" has a real meaning for the process of multiplying a number by itself. The geometric property of area is related to arithmetic squaring. The Logo primitive for square root is demonstrated as being the answer to the question, "What number multiplied by itself is 100? (or 245, or 1600394)" Proof can be shown by turning the process around and multiplying.

```
SQRT 100
RESULT: 10
PRINT 10 * 10
100
```

```
SQRT 1600394
RESULT: 1265.06
PRINT 1265.06 * 1265.06
1.60037E6
```

Tipps . . .

The latter example may raise questions about significant digits, rounding off, error, and scientific notation. These topics are often bypassed; Logo creates a surprising result which can serve as a real situation for exploring these ideas. Why doesn't the exact answer come back? What is close enough? Students usually think that mathematics deals only with exact answers. The calculator and Logo can be used to build understandings of arithmetic accuracy.

THE ROOT OF THE SQUARE

The square root function can be used to discover the length of unknown sides of right triangles. The length of the side opposite the right angle is equal to the square root of the sum of the square of side one and the square of side two. This length can be figured with a short procedure using OUTPUT.

```
TO SIDE3 :SIDE1 :SIDE2
  OUTPUT SQRT ( :SIDE1 * :SIDE1 +
:SIDE2 * :SIDE2 )
END
```

An understanding of arithmetic operations with variables may be needed. (For an exploration into the order of arithmetic operations, see "Tipps for Teachers," NLX October 1983, "The Truth about Numbers.") The operation OUTPUT needs to be introduced as a way of passing numbers or results around. Because OUTPUT is the action of SIDE3, it (with its inputs) becomes an operation and could be used as an input to the command FORWARD. Using a procedure as input may be a difficult idea which needs exploration.

```
SIDE3 60 80
RESULT: 100
PRINT SIDE3 60 80
100
FORWARD SIDE3 60 80
```

ONE MORE TRIANGLE

A triangle with two equal sides also has two equal angles. A triangle with two 45 degree angles is the easiest to draw using SIDE3. A description of a procedure for a 45 degree triangle might be:

To draw a right triangle with two 45 degree angles

```
Move forward the length of the side
Turn 90 degrees to the right (left)
Move forward the same length
Turn right (left) 90 plus 45 degrees
Move forward the length of SIDE3
Turn right (left) 90 plus 45 degrees
```

The sides are of equal length, so only one variable is needed.

```
TO 45.TRIANGLE :SIDE
  FD :SIDE
  RT 90
  FD :SIDE
  RT 135
  FD SIDE3 :SIDE :SIDE
  RT 135
END
```

45.TRIANGLE is an independent module which can be used anywhere on the screen. Calculating SIDE3 with Pythagoras' formula makes this possible. New PYRAMIDS can be designed with 45.TRIANGLE. Houses can have other kinds of roofs. New SPIN.TRIANGLES can combine 45.TRIANGLE and procedures for equilateral triangles.

As handy as 45.TRIANGLE is, it is still not an all-round, anywhere, anytime, any size, any angle triangle procedure. Next month, activities for a generalized triangle procedure will be developed as a Type III Problem (See "Problem Spaces in a Project Oriented Logo Environment" elsewhere in this issue) for Logo students in middle and high school.

Steve Tipps is a professor in the University of Virginia's School of Education, and presents Logo workshops for school systems throughout the United States.

Logo on Sale

Here are some low Logo prices. Krell Logo (\$72.95) and DR Logo (\$79.95), available from Nonagon Software, 11185 San Pablo Avenue, El Cerrito, CA 94530, (800) 942-2058. Terrapin Logo (\$109.95), available from Ark Computing, PO Box 2025, Corona, CA 91720, (714) 735-2250. Also, Terrapin Logo (\$112.46), available from Strictly Software, Inc., 28 Barrett Road, Katonah, NY 10536. (914) 232-4844.

MICROWORLDS

by
Glen Bull

Adventure Stories and English Skills

Involving a class in an interactive adventure story is an exciting way to work on written language skills. Members of the class write different segments of the story. At the end of each segment of the story, the reader gets to choose the direction the story takes. This idea has been used with success by Nancy Sopp and others to develop English skills in the classroom.

JONATHAN'S ADVENTURE

JONATHAN PULLED BACK THE COVERS AND LISTENED CAREFULLY. THE CRACKLING NOISE APPEARED AGAIN. HE HOPPED OUT OF BED AND RACED OVER TO THE WINDOW. A LUMINOUS GLOW WAS VISIBLE THROUGH THE LEAVES OF THE OAK TREE IN THE FRONT YARD.

WHAT SHOULD JONATHAN DO?

TURN ON THE LIGHT? (TYPE A)
WAKE HIS PARENTS? (TYPE B)

The most straightforward way to create a procedure which will print on the screen the text shown above is through a series of PRINT statements. This method is easily comprehended by students, and will work satisfactorily.

```
TO PART1
PRINT [ JONATHAN'S ADVENTURE ]
PRINT [ ]
PRINT [JONATHAN PULLED BACK THE COVERS AND]
PRINT [LISTENED CAREFULLY. HE HOPPED OUT OF]
etc.
```

Note: The procedures which follow are written in Terrapin Logo. A complete listing of the LCS1 (Apple) version is provided at the end of the column.

This method requires some experimentation to determine the length of each line. I found that I was not patient enough to finish my story. As an alternative, the story could be written with the Logo editor, and could be printed out as a procedure.

TO PART1

```
JONATHAN'S ADVENTURE
JONATHAN PULLED BACK THE COVERS AND
LISTENED CAREFULLY. THE CRACKLING
NOISE APPEARED AGAIN. HE HOPPED OUT OF
etc.
```

TO PRINT.STORY

```
PRINTOUT PART1
MAKE "CHOICE READCHARACTER
IF :CHOICE = "A PRINTOUT PART2A
IF :CHOICE = "B PRINTOUT PART2B
END
```

I found that this solution was unsatisfactory because the procedure name TO PART1 appears at the beginning of the procedure printed out. The word END also appears at the end of the procedure. By this time, the prospect of using the Logo editor to write the story was tantalizing. I simply couldn't face the prospect of all those PRINT statements with a perfectly good Logo editor available.

Logo has a TEXT command available, which enables one to print the text of the procedure without printing the procedure name. However, it does not appear in the form I desire. Instead, each line of the procedure is enclosed in brackets.

PRINT TEXT "PART1

```
[ ] [ JONATHAN'S ADVENTURE ] [ JONATHAN
PULLED BACK THE COVERS AND ] [ LISTENED
CAREFULLY. THE CRACKLING ] [ NOISE APPEARED
AGAIN. HE HOPPED OUT OF ] etc.
```

Those who followed last month's column may recognize that each line is a list. A list in Logo is defined as a series of items enclosed in brackets. Logo procedures seem to be stored in the form of a series of lists.

It is possible to avoid printing the blank brackets (empty list) at the beginning of the procedure by using the Logo command BUTFIRST. The empty brackets are associated with the title line of the procedure, and usually contain variable input names, if any are present.

PRINT BUTFIRST TEXT "PART1

```
[ JONATHAN'S ADVENTURE ] [ JONATHAN PULLE
D BACK THE COVERS AND ] [ LISTENED CAREFUL
LY. THE CRACKLING ] [ NOISE APPEARED AGAIN
. HE HOPPED OUT OF ] etc.
```

Microworlds continued

The results were a little better, but still nothing that I would write home to Mom about. The strategy needed to print the series of lists is similar to that used for the report generator in last month's Logo grade book.

An English description of this process might be:

```
To write a story
  Print the first line in the story
  Remove the first line from the story
  Continue this process until all
    lines have been printed
```

The same idea could be expressed in Logo fairly easily. The procedure WRITE simply bypasses the empty set of brackets in the TEXT of whatever procedure we are concerned with. WRITE.LINE performs the remaining operations described above.

```
TO WRITE :STORY
  WRITE.LINE BUTFIRST TEXT :STORY
END
```

```
TO WRITE.LINE :STORY
  IF :STORY = [ ] STOP
  PRINT FIRST :STORY
  WRITE.LINE BUTFIRST :STORY
END
```

These two procedures now allow me to write the text of a procedure just as it appears, without the procedure name.

```
WRITE "PART1
```

```
JONATHAN'S ADVENTURE
JONATHAN PULLED BACK THE COVERS AND
LISTENED CAREFULLY. THE CRACKLING
NOISE APPEARED AGAIN. HE HOPPED OUT OF
etc.
```

My wants are simple. I would be perfectly content if the title of the story were only centered. Typing spaces before the title doesn't work, since the Logo editor removes extra spaces to conserve the amount of memory used.

Last month, during the development of the report generator, we found that printing character number 32 produces a space. This enables us to write a procedure which will print spaces.

```
TO SPACE :TIMES
  REPEAT :TIMES [ PRINT1 CHAR 32 ]
END
```

If this procedure could be placed in the middle of the story, it could be used to move the title line of the story over to the center. The key question is, "How will the program recognize that this is a command, and not text to be printed?"

There are several ways in which this problem might be solved. One way is described in an article by Tom Lough and Steve Tipps in the special Logo issue of Classroom Computer News (April 1983, p. 53). The way in which I chose to solve the problem was by placing commands in brackets in the Logo editor. If text is enclosed in brackets, I assume that it is a command, and execute the command. If text is not enclosed in brackets, it is printed.

For example, the command, BLANK.LINE, could be added to the story to place a blank line between the title and the body of the story.

```
TO BLANK.LINE
  PRINT [ ]
END
```

The story would then look like this.

```
TO PART1
  [ SPACE 9 ]
  JONATHAN'S ADVENTURE
  [ BLANK.LINE ]
  JONATHAN PULLED BACK THE COVERS AND
  LISTENED CAREFULLY. THE CRACKLING
  NOISE APPEARED AGAIN. HE HOPPED OUT OF
  etc.
```

But we're not finished yet. First, we need to tell Logo how to decide whether to print or execute a line. The Logo instruction called LIST? (LISTP in Apple Logo) can be used to check whether text is enclosed in brackets.

```
LIST? [ DOG ]
RESULT: TRUE
LIST? "DOG
RESULT: FALSE
```

Thus, LIST? indicates that a line is a command because I have enclosed my commands in brackets. This method of discriminating between commands and text can be easily incorporated into WRITE.LINE.

more Microworlds

```
TO WRITE.LINE :STORY
  IF :STORY = [ ] STOP
  TEST LIST? FIRST FIRST :STORY
  IFTRUE RUN FIRST FIRST :STORY
  IFFALSE PRINT FIRST :STORY
  WRITE.LINE BUTFIRST :STORY
END
```

The result of the WRITE procedure is shown below.

```
WRITE "PART1
```

JONATHAN'S ADVENTURE

JONATHAN PULLED BACK THE COVERS AND LISTENED CAREFULLY. THE CRACKLING NOISE APPEARED AGAIN. HE HOPPED OUT OF etc.

This line by line method works best if <return> is pressed after each line in the story is entered in the editor. The revised method of piecing together the adventure could have the following appearance.

```
TO TALE
  CLEARTEXT CURSOR 0 0
  WRITE "PART1
  MAKE "CHOICE READCHARACTER
  IF :CHOICE = "A WRITE "PART2A
  IF :CHOICE = "B WRITE "PART2B
END
```

This is the WRITE stuff for printing adventures. An extension of this method could also be used to generate letters to parents and end of school year reports.

LCSI (Apple) version

```
TO TALE
  CLEARTEXT SETCURSOR [ 0 0 ]
  WRITE "PART1
  MAKE "CHOICE READCHAR
  IF :CHOICE = "A [ WRITE "PART2A ]
  IF :CHOICE = "B [ WRITE "PART2B ]
END
```

```
TO WRITE :STORY
  WRITE.LINE BUTFIRST TEXT :STORY
END
```

```
TO WRITE.LINE :STORY
  IF EMPTY? :STORY [STOP]
  TEST LISTP FIRST FIRST :STORY
  IFTRUE [RUN FIRST FIRST :STORY]
  IFFALSE [PRINT FIRST :STORY]
  WRITE.LINE BUTFIRST :STORY
END
```

```
TO SPACE :TIMES
  REPEAT :TIMES [ TYPE CHAR 32 ]
END
```

BLANK.LINE and PART1 are the same as in the Terrapin version.

Glen Bull is a professor in the University of Virginia's School of Education, and teaches Logo courses at both the graduate and undergraduate level.

Computer Game Contest

Scholastic Inc. and Verbatim Corporation announce the Verbatim Computer EdGame Challenge, a contest for classes, individual students, teachers, and professionals to design and write educational computer games. Hardware prizes totalling over \$12,000 will be awarded to the winners. Only non-violent games will be judged. The contest closes on April 30, 1984. Here is a chance to show what Logo can do! Write for your entry blank and rules today. Send your request to Corona B. Gray-Moore, Scholastic Inc., 730 Broadway, New York, NY 10003, or call her collect at (212) 505-3485.

Children Love Turtle Puppets

Have you been looking for a turtle puppet? Cynthia Solomon of Atari Research told us about the Folktales Turtle from Folkmanis. It has the highest quality of any turtle hand puppet we have seen. Handcrafted by conscientious workers and measuring about 12 inches long and 5 inches high, the puppet comes with care and handling instructions and a short story on how the turtle got his shell. You can make the turtle pull feet and head into its shell and pop them out again. This puppet will find many uses in Logo classrooms. Check in your local high quality toy store. In case you cannot find the puppet, a store in Charlottesville which stocks the puppet has agreed to make them available by mail to NLX subscribers. Send a check for \$16 to Persimmon Corner, Folktales Turtle, 421 East Main Street, Charlottesville, VA 22901. VA residents enclose 64 cents for state sales tax.

Of Sushi and Mushi

by
Duane Yee

In an October 9, 1983, article in Parade magazine entitled, "Can We Rise to the Japanese Challenge?", David Halberstam tells about the "sobering experience" of a trip to Japan in which he observes so much that is superior to America, both in industry and in industriousness.

One of the photos accompanying the article depicts primary-age Japanese children seated before computer keyboards and monitors, with the caption, "Computer learning starts early: A kindergarten class in basic mathematics." Yet, about the only reference in the article to Japanese elementary education in any form is a single sentence stating that the "Japanese have emphasized science and engineering in their schools ..."

Mr. Halberstam or the editors of Parade have fallen victim to America's paranoia about Japanese competition. They have incorrectly assumed that a country so abounding in high tech expertise must also be a leader in computer education in the classroom. In a July meeting in Tokyo, I found that, at present, computer education is virtually non-existent in the traditional Japanese schooling.

GETTING TO KNOW EACH OTHER

My hosts were called the Society for Studying Logo in Education - a small consortium of educators, hardware manufacturers and software people. The corresponding secretary of this fascinating group of computer enthusiasts had the most appropriate surname of Goto. Mr. Hiroyoshi Goto is a member of the Electronics Division of the Uny Company, a huge supermarket chain based in Nagoya, and developer of a Logo version for the Hitachi Model 5 computer.

I had been put in touch with the society by Tom Lough, editor of the NLX, who, upon hearing that I was to vacation in Japan, felt that I might need some time off from sampling sushi to engage in more rigorous mental activity. The result was my

three-hour meeting at Tokyo University with people from Kyoto, Nagoya, and Tokyo. (Not coincidentally, Tom had written an article in the April 1983 issue of Electronic Learning magazine about our work with Logo at Punahou School.)

One of the society's major objectives is to promote computer education in Japan, be it through traditional schools, primary schools (preschools and kindergartens), or through the large network of "juku" - tutoring schools of various sorts that meet with students after school and on non-school days.

The takeoff point for our discussion was a slide show I presented on Punahou's Logo program. There was such interest expressed in the Punahou slides that they were used later in two national Japanese conferences, one involving primary teachers, and the other educators in general.

LOGO FOR JAPAN

The Punahou Logo student activity cards we had developed caused great excitement, to the extent that the Uny Company sent two representatives to Scott, Foresman & Co. in Chicago - the publishers of the cards - the first week in September to negotiate for translating the learning materials into Japanese.

When the Uny Company's representatives stopped by to visit Punahou on their return to Japan, they indicated that the society's Japanese translation of Logo was expected to be completed by the end of September.

I also learned of the Fujitsu company's plan to market its own machine specific translation of Logo.

Several members of the society were engaged in translating several different works on Logo, including Abelson and diSessa's Turtle Geometry (Ed. Note: see NLX Vol 1 # 2, October 1982 for review), and some writings on Logo in special education. Time did not permit me to find out about the special "mushi" (Japanese bugs) encountered by those brave souls who were doing the translation!

I also had the opportunity to learn about the new Yokohama Children's Science Museum which is being planned for completion by the end of 1984. It is patterned on the exploratorium model with lots of hands on

Sushi continued

experiences, and, of course, will include microcomputers and Logo. I learned also of one of the first children's computer camps in Japan - on Shikoku Island in August, sponsored by the Primary Schools Association. Mr. Goto was one of its principal architects, and it featured students from primary school age through high school.

READY TO GO

So I found a Japanese educational system that was far from being replete with computer education. But I also found a group of people - educators as well as non-educators - who were intensely interested in promoting computers in education, both traditional and non-traditional.

As for the "Japanese Challenge" suggested by Mr. Halberstam and Parade magazine, I can only respond by citing my own experiences. It is somewhat dubious that even the most optimistic of my Japanese friends would envision an intrusion of computers into the traditional school system in the immediate future.

But how long is immediate? And, if success with computers and children is indeed coming to the fore, will not even the most conservative traditionalists look towards computer education in all schools? One might consequently expect an incredible burgeoning of computers in Japanese education - but they're not there yet.

Duane Yee is the principal of the Punahou Junior School (K-8) in Honolulu, HI.

SPRITES!

Synetix Inc. announces a series of sprite boards for the Apple computer. They have 32 sprites, all of which can move simultaneously. Background scenes can be created with devices (paddles, joysticks, etc.) connected to the game port. Sprite drivers will be available for MIT Logo (Terrapin, Krell) and Apple Logo by February, according to spokesperson Dave Boyd. Other features include a sound generator and speech synthesizer. These may not operate with Logo, however. Prices range from \$149 to \$395. For more information, write Synetix Inc., 10635 NE 38th Place, Kirkland WA 98033, or call (800) 426-7412.

NLXual Challenges

with Robs Muir

Perhaps the pleasure of problem inquiry in Logo is its resemblance to play. The goal is sometimes ill defined and, often, non-utilitarian.

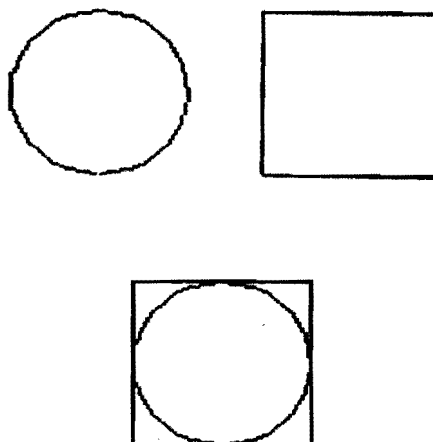
The beauty of Logo problem solving is that the limits are those of our imaginations. We have fun if we can meet our self-imposed tasks. We find joy along the way if we discover some fundamental truths about mathematics, computers, or the cognitive processes.

We define the goals, and we set the point at which our play is concluded: our own rules, our own game. One such game involves the turtle geometry of circles.

Have you ever struggled with drawing different sized circles using the REPEAT command? The idea of a circle being composed of straight lines is odd; the idea of repetition complicates the problem even more.

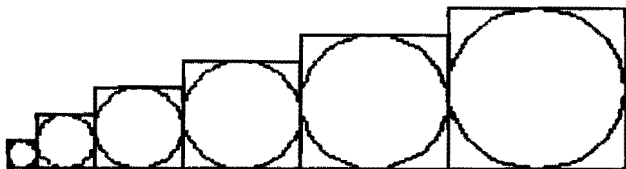
Since we adults have all mastered the circle (haven't we??), perhaps we can move on to a problem which uses some "circular logic." This month's NLXual Challenge is a problem with two simple elements, the square and the circle. Perhaps a square can help us discover something new about Logo's circular polygons.

Take a simple shape, like a square, and construct a circle within its boundaries. The trick is to make the circle tangential to each of the four sides, something like this:



Challenges continued

Doesn't this sound easy? (Oh, no, you Apple Logo people! No fair using the pseudo primitives CIRCLER, CIRCLEL, ARCR, or ARCL from your STARTUP file!) Once you have a solution, let's take it one step further. Write a procedure which will make this shape any size you'd like, i.e., a square of 37.65 turtle steps per side. How succinctly can you write your procedure(s)?



Another step? OK. Let's draw circles in the center of other polygons: triangles, pentagons, hexagons, etc. In fact, what is the limit at which our polygon is apparently indistinguishable from the circle inside it? (Use a standard diameter of, say, 100 for your circle.)

Your move ...

Note: As with all NLXual Challenges, if you want to receive a possible solution, send a copy of your solution (or your attempt) with a stamped self addressed envelope to NLXual Challenges, Attn: Robs Muir, 1688 Denver Avenue, Claremont CA 91711. We will compile contributions and send you the most elegant solution.

If you would like to submit a challenge or puzzle for this column, send your ideas to the above address.

Robs Muir is a teacher in the Claremont CA Unified School District and Claremont Graduate School. He presents Logo workshops in the southern California area.

News

The Quadlink board for the IBM PC will run Apple Logo (LCSI), according to a preliminary list published by the Quadram Corporation. No other Logo versions for the Apple computer were listed. For more information, write Quadram Corporation, 4355 International Boulevard, Norcross, GA 30093, or call (404) 923-6666.

American Indian Systems Co., Inc. is holding a three day workshop for Indian educators entitled, "Microcomputers within Indian Education," February 28 through March 1 at the El Dorado Hotel in Reno, NV. The workshop will include presentations on Logo and its use at summer camps for American Indian children. For more conference information, write AISC, PO Box 214844, Sacramento, CA 95821. If you are aware of Logo use within the American Indian population, please contact Evelyn Dale, 820 Christie Court, Davis CA 95616.

Micro, a new magazine from Japan, features Logo in many places in its premier issue. Although written mostly in Japanese, there are several English words (such as Papert, Logo, and PENUP) in the articles. On page 58 is a news article about Duane Yee and the Logo Activity Cards developed by his teachers at Punahou School in Honolulu. (Ed. Note: also see Electronic Learning, April 1983, and Duane Yee's article in this NLX issue.) A Japanese magazine for Logo users, entitled, Logo Some Z's, is introduced. Several Logo versions (MIT, LCSI, Commodore 64 Logo, and Japan's H/Logo) are discussed. A photo of Terrapin's Mark Eckerwiler also appears. For more information on Micro, write to Akihiro Kato, Micro Magazine, Publishing Division, Shinkigensha Inc., Shinjuku-Youth Building 1-9, Shinjuku 4 Chome, Shinjuku-Ku, Tokyo 160, Japan, or (if you can afford it) call 03-350-0848.

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Editor.....Tom Lough

NLXTRA

Logo Notes

Do you have an idea of what the perfect Logo version should look like? What features would you wish for, if you had your wildest dreams? We receive inquiries from Logo developers for just that information! If you would like to add your ideas to the NLX Logo Wish List, let us hear from you. Who knows? Maybe in a few months (years), one of the most popular versions of Logo will have features which you first suggested!

Do you have experience using the Gibson Light Pen to fill Logo drawings? If so, would you consider sharing your experiences with other NLX readers? Please write to Editor, NLX, PO Box 5341, Charlottesville, VA 22905.

Recently, we have received mail with some really cute turtle stickers on them. We discovered they are produced by Hallmark, 4 sheets of 16 stickers each per package. Check your nearest Hallmark store, or write Hallmark Cards, Inc., Kansas City, MO 64141.

Reston Publishing Company announces The Big Trak Book, by Tom Rowley and Ron Leckrone. It contains many interesting and challenging learning activities for children using Milton Bradley's programmable toy, Big Trak. Many teachers find these activities useful for young children as an introduction to Logo concepts. The book costs \$12.95, and may be ordered directly from Reston by calling (800) 336-0338.

On page 51 of the December 19, 1983, issue of Infoworld, is a small item about programs which were announced when IBM unveiled the PCjr. Included among them is one called "Turtle Power," reported to be a children's introduction to Logo, designed to help the PCjr sell in schools.

The first issue (November 1983) of Teaching, Learning, Computing magazine contains many references to Logo. A two page article featuring Seymour Papert begins on page 81, in which he reflects on Logo's past, and postulates on its future in our education systems.

Paul Karoff's stimulating article, "Computerized Head Start," explores attempts to determine the appropriate age for children to begin using computers, and contains several references to Papert's work.

In an article on the use of computers in Great Britain, Papert's name comes up once again. "We are Papert disciples over here..." says one dedicated teacher.

Finally, an article on public domain software invites readers to take advantage of the large holdings of the Software Exchange of the Young Peoples' Logo Association. (Ed. Note: For more information, write YPLA, PO Box 855067, Richardson, TX 75085.)

For magazine subscription information, write TLC, Data Learning Tower, PO Box 9159, Brea, CA 92621.

"Turtle Tracks," a modified turtle graphics program from Scholastic, has won a Learning Software Award from the Learning Periodicals Group. For more information, write Scholastic, Inc., 730 Broadway, New York, NY 10003.

Do your students like putting on plays? Why not have them write a play about the Logo turtle? There are hundreds of themes to explore. Maybe your children would like to build a turtle puppet theater. One related technique is to build a stage resembling a computer monitor. A sheet of bristol board or other thin cardboard serves as the screen. Turtles are moved around the screen by students behind the scenes using magnets!

Dear Editor,

In the November 1983 issue of the NLX, Dan Novak asked a question which Joshua Rosenfeld, a fifth grader at South Oceanside School may have answered with this procedure, shown just as he wrote it.

```
TO EVERY
LOAD "SQ
LOAD "TRI
LOAD "RP
LOAD "SR
LOAD "RQ
LOAD "AW
LOAD "RE
LOAD "RT
LOAD "MT
LOAD "GR
LOAD "HOUSE1
LOAD "RADAR
END
```

Each subprocedure had been previously defined and saved by Joshua. He thought his procedure might do something he hadn't been taught yet. After the procedure EVERY is called, the user types the name of the subprocedure desired, and it is immediately drawn on the screen by the turtle.

Joe Trotter
Oceanside, CA

>Thank you for sharing your student's work, Joe. For our new subscribers, Dan Novak's question was, "Is it possible to design a program which will ask the user (with REQUEST) what function to draw and make the turtle draw it?" -- Ed.

Dear Editor,

I have the Apple (LCSI) Logo Tool Kit, and would love to plot some Logo color graphics with the new Apple Plotter and a super serial interface. The question is, does anyone know how to change the plotting procedures in the Tool Kit so they will drive the Apple Plotter?

Also, does anyone know if the Alf synthesizer board (featured in Byte, August 1982) can be accessed through Logo? There are probably others like me who would like to know.

Deb Milek
632 Lion Drive
Rapid City, SD 57701

>Readers, can any of you help Deb with her Logo questions? Ed.

Dear Editor,

I am a new convert to Logo and have been too busy with local municipal politics to dig my teeth in properly, but I am about to do so now. We should soon have a Logo school in Ramat Hasharon. In the meanwhile, may I point out that we work in Hebrew with English software, and that makes our work more difficult. We have to use Logo in the same way as the Chinese use their written characters to express over a thousand dialects - without changing the characters in any way.

Ann Swersky
Ramat Hasharon, Israel

>Thank you for sharing your views and experiences. We take many things about Logo for granted. Thanks to your letter, we have gained a new appreciation of it! --Ed.

Dear Editor,

We have tested DR Logo on our Eagle PC, and it appears to work well. If you or your readers have any questions, feel free to write or call.

Noelle Tardieu
Eagle Computer
983 University Avenue
Los Gatos, CA 95030
(408) 395-5005

The Fall 1983 issue of Atari Connection contains several pieces relating to Logo. The first is a four page article by Carlos Vidal Greth, entitled "Learning to Learn with the Father of Logo." The format is an interview with Seymour Papert, in which many facets of Logo and its applications are explored. Papert predicts that Logo will replace BASIC as the language of choice in a majority of homes in the future. Greth follows this article with one called "In Defense of BASIC."

The very next page is the beginning of "Logo vs. BASIC: Which Language is BEST?" Authors Dave Menconi and Ted Richards explore this volatile topic with the help of excerpts from a language comparison article by Dr. Wayne Harvey.

Atari Connection is sold at selected newsstands.