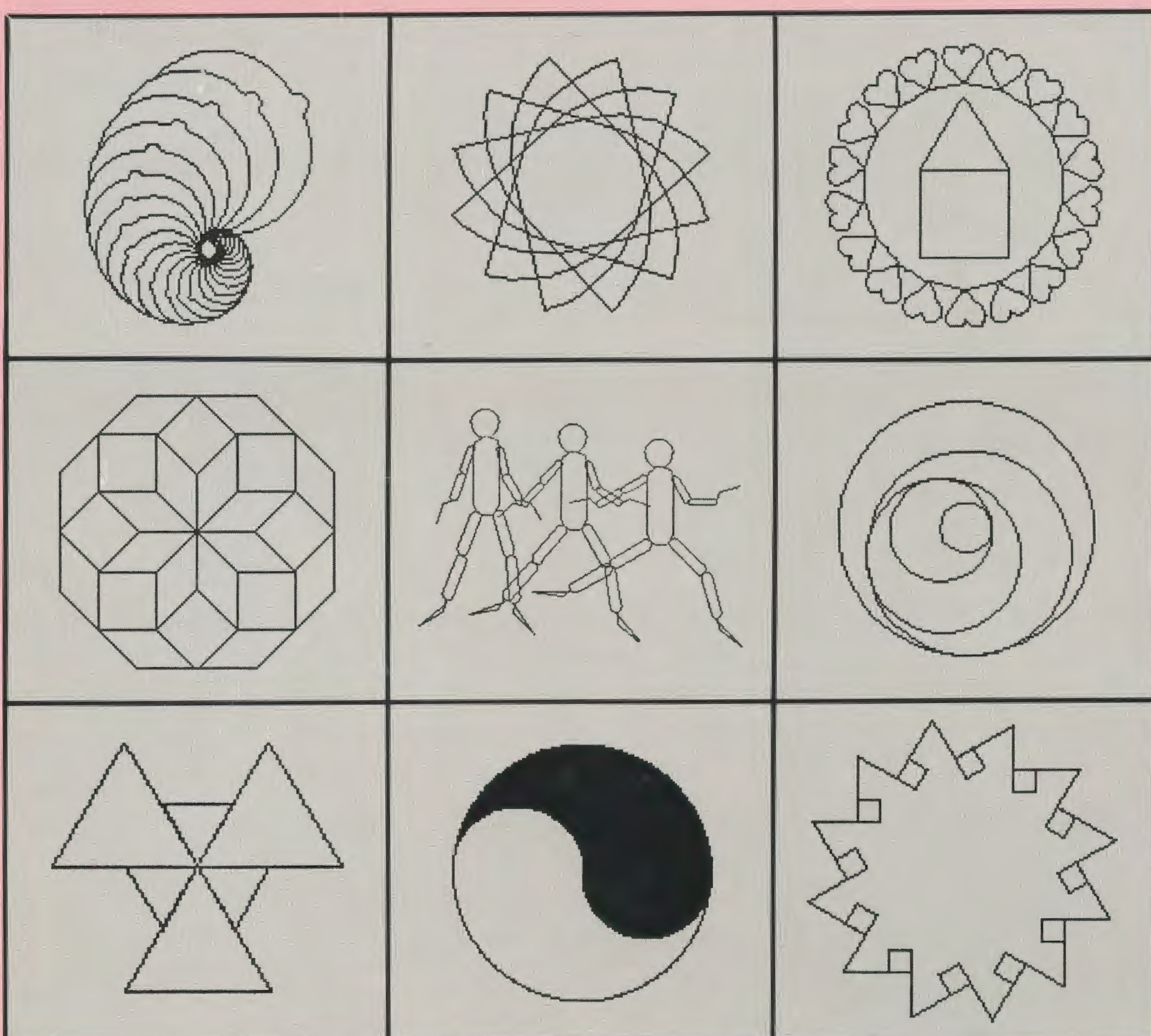
LOGO EXCHANGE

The Magazine for LOGO Activities Worldwide

ISSN 0888-6970 VOLUME 5 NUMBER 9 MAY 1987



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Logo Data Toolkit

Logoware™ from Terrapin

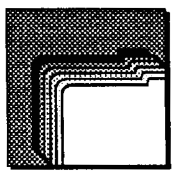
Be among the first to explore data handling through Logo with the all new *Logo Data Toolkit* from Terrapin. In developing Logoware products, Terrapin continues to extend applications of the Logo language into a wide range of subject areas. The *Logo Data Toolkit* , developed in conjunction with educator and Logo enthusiast Dorothy Fitch, is the first Logoware product to be released by Terrapin.

The *Logo Data Toolkit* contains comprehensive programs for gathering and manipulating data designed for a variety of classroom settings. The package contains a manual with descriptions of each tool program as well as helpful classroom activity ideas. The individual tools can be used "as is" or can be modified in the Logo environment to suit your own classroom and curriculum needs.

Survey Tool

- Study popular preferences, trends and attitudes
- Create surveys and poll your classmates and friends
- Print out surveys and generate reports on the results

Database Tool



- Organize information about people, places or things
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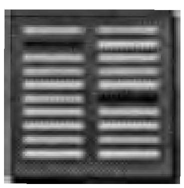
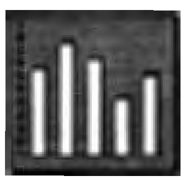
- Format and print mailing labels

Associations Tool



- Set up associated word pairs
- Play matching games or quizzes on the related data
- Make up trivia games for different subject areas

Charts Tool



- Display information in chart or graph forms
- Generate pie, line and bar charts from collected data
- Print out charts on parallel or serial printers

Integrated Projects and ***Appendix***

Four exciting projects incorporate each of the *Logo Data Toolkit* tools to collect and study data. These projects include A Look at Advertising, Studying Weather Patterns, Exploring Another Country and Learning More About Books. The projects can involve student groups or an entire class and can be carried out over a week or several months. An appendix contains useful information on Logo data structures, frequently used tool procedures and Data Conversion programs. Reproducible worksheet planning pages for each data tool are also provided.

There are versions of the *Logo Data Toolkit* for use with Terrapin Logo (both 64K and 128K files provided) and for Commodore Logo. Please indicate Apple or Commodore version when ordering.

Note: The Apple version of the Logo Data Toolkit requires Terrapin Logo version 2.0 or 3.0.

Price: **$49.95**

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

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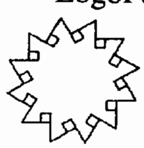


Cover: The design added to this month's cover was contributed by Mark Lindsey, a 5th grader at St. Anne's - Belfield School, in Charlottesville, VA. He constructed the design as part of a project with squares.

Subscription: $29.95 per year. Subscribers outside the USA please add $15.00 for surface mail or $50.00 for air-mail. Orders from North and South America should be sent to *Logo Exchange*, Dept. VV, P.O. Box 3000, Denville, NJ 07834; elsewhere to Meckler Ltd., 3 Henrietta Street, London WC2E 8LU, UK, (tel.) 01-240-0856.

From the Editor

by Tom Lough

Does Logo Really Make a Difference?

"There were no significant differences between the Logo group and the control group..."

"It is not clear that Logo made a significant contribution to the performance of the subjects..."

These and similar statements appeared throughout the early Logo research literature. They tended to dim somewhat the bright promises Logo offered to the education community by *Mindstorms*. In fact, some educators even suggested a moratorium on Logo use until the "benefits" were discovered and documented.

As with most complex issues, there are many dimensions to it. One of the advantages of an editorial column is that I am not restricted to the strictly professional aspects of what I write about. I take advantage of that now.

I would like to relate some personal perspectives on Logo. These perspectives are not based on research, scholarship, or in-depth analyses. Rather, they are simply personal observations and reports on my experiences and how Logo has affected me. Even though n=1, I hope that you will find something in common with your own experiences.

My earliest Logo experience took place in the University of Virginia classroom of Steve Tipps and Glen Bull back in early 1982. It was my first encounter with the language. When they showed me that I could put the SQUARE and TRIANGLE procedure names as commands into another procedure called HOUSE, I was changed forever. Suddenly, modular thinking was never the same. I understood in a completely new way the power of breaking problems down into smaller, more manageable pieces.

And it was shortly afterwards that the idea for a Logo newsletter for teachers suggested itself. Of all the ideas I have ever had, this one has had the most impact on my life (with the exception of the idea to marry Posy!). Through the newsletter and now this magazine, I have met some of the most warm, caring, and competent professional educators in the world. I am convinced that the nature of Logo is mainly responsible for these wonderful interpersonal experiences.

Later the next year, I found myself in an airport lobby under renovation while on the way to a conference. You can imagine the confusion, the detours, the impatient crowds. I had a plane to catch, 43 gates away, and no idea how to get there. Time was running out. I saw a "you are here" map, which was utterly confusing. And then the idea entered my head to pretend I was the Logo turtle, and ask how to tell myself to go from "you are here" to the distant gate shown on the map. After deciphering the lefts and rights and forwards, suddenly it made sense to me. I made the plane, but barely. If I had not helped both students and teachers to "walk it out" while planning Logo procedures, I do not believe the idea to navigate the detour correctly would have entered my head.

A couple of years later, I attended a talk by a speaker billed as a pure mathematician. Although the talk was interesting, I especially enjoyed the example problems he presented. I remember one in particular, in which he wrote a long and complex mathematical expression on the board. The speaker was commenting on how tedious and involved the algebra would be from that point on. However, as I was examining the problem, it occurred to me that it could be expressed and solved in a recursive manner. The mathematical expression became greatly simplified, and I was able to do the calculation in my head. I'm confident that I would not have thought of this idea unless I had been working hard to understand Logo's recursion.

While developing Logo tool procedures for my college physics classes, I stumbled upon a model for accelerated motion. The Logo procedure was so simple and elegant that it still enthralls me to this day. Moreover, I was able to extend the thinking which this procedure stimulated to a point where I can view the input of the FORWARD command as the value of (what is called in calculus) the first derivative of position with respect to time. From this, I was able to set up models of electric circuits with direct currents which grow and decay exponentially, and to draw these exponential curves with turtle graphics using only the ordinary arithmetic operations. This personal experience has been fascinating to me, and I value highly the special learning Logo has made possible.

More recently, I enrolled in an artificial intelligence course this past semester at the University of Virginia. The course was a combination of artificial intelligence background, theory, philosophy, and programming projects with the Prolog computer language. Prolog is an interesting language which operates according to rules of logic given by the programmer. It requires a different way of thinking about programming and solving problems. Like Logo, it is a recursive language. In that regard, I was able to make quite a bit of progress in understanding how to do what I want in Prolog because of my previous understanding of recursion from Logo.

"None of the above" would probably show up on standardized tests as making a significant difference in my performance in various tasks. Yet, I *know* that my Logo experiences have affected me in a deep and profound way. I have grown cognitively, affectively, socially, emotionally. I have great difficulty in describing this growth, much less in measuring it. If I cannot understand how to measure that in myself, how can I ever hope to measure that in my students?

You don't suppose Logo is something we have to accept on faith, do you?

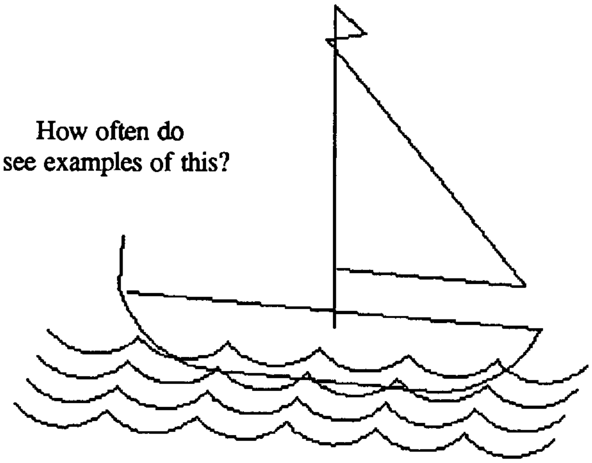
FD 100!

Tom

Polishing Programs for Publication: A Neglected Step in the Logo Programming Process

by Molly Watt and Daniel H. Watt

How often do
you see examples of this?



Bill and Tanya's Logo sailboat presents a lively, pleasing picture. It shares their experiences and expresses their personal interests. It communicates in ways that remind us of our own experiences in small boats. Constructing and debugging the drawing took a lot of work, and completing it gives Bill and Tanya a great deal of satisfaction. For many Logo students and teachers, the project would be over.

But not for us. Behind the graphics is a Logo procedure which has the same possibility for expressing and communicating ideas as the drawing which appears on the screen:

```
TO BOAT
PC 2 BK 30 FD 150 PC 4 RT 130 FD 20 RT 130 FD
20 PC 1 LT 120 FD 150 RT 135 FD 90 LT 90 PU FD 19 RT
90 FD 100 RT 180 PD PC 3 FD 200 PC 2 RT 120 REPEAT
6 [FD 10 RT 10] FD 100 REPEAT 6 [FD 10 RT 10] FD 10
RT 30 PC 4 FD 25 PU RT 90 FD 227 RT 90 FD 40 RT 45
PD PC 5 REPEAT 6 [RARC 30 LT 90] PU LT 135 FD 255
RT 90 FD 5 RT 45 PD REPEAT 6 [RARC 30 LT 90] PU LT
135 FD 255 RT 90 FD 5 RT 45 PD REPEAT 6 [RARC 30
LT 90] PU LT 135 FD 255 RT 90 FD 5 RT 45 PD REPEAT
6 [RARC 30 LT 90] PU LT 135 FD 255 RT 90 FD 5 RT 45
PD
END
```

Without its name to give us a clue, we'd have no way of knowing what the procedure is supposed to do. And without playing turtle -- with painstaking attention to every detail -- a reader has no way to understand how Bill and Tanya constructed their boat, or to understand their problem solving process.

Before this procedure is shared with others, either in printed form or on a disk, we would suggest that Bill and Tanya rewrite it as a set of subprocedures, so that each subprocedure has a name, reflecting its part of the overall design. For example,

```
TO BOAT
MAST
FLAG
SAIL
HULL
WAVES
END
```

In our book, *Teaching with Logo*, we show how this can be done easily, using the Logo editor.

Logo was developed with the idea that students of all ages could learn to express themselves in well-defined clearly named procedures and subprocedures. Each subprocedure's name would reflect its purpose in the overall design, thus giving each learner a clear expression of her own thinking and problem solving strategies. In practice, however, we have observed that this objective is rarely achieved the first time a program is written, even when a teacher stresses this style and provides clear examples of structured Logo programs for students to use as models. Some additional teacher intervention is required.

We are beginning to see the process approach to teaching writing as a useful model for teachers of Logo. Writing as a form of expression is at least as complex as Logo. We can take two ideas from research about the writing process in classrooms. First, we observe that students write more effectively, using better form, when they are writing for an audience. When students know that their writing will be read by many people in addition to their teacher, they work to make sure that their ideas are communicated as clearly as possible.

Second, we notice that the process approach to teaching writing is based on the ways that real writers approach their craft. It allows a writer to focus on getting the shape of the ideas first, before concentrating on correct spelling and syntax. In classrooms, this is often described as a five step process.

1. Prewriting
2. Generating ideas
3. Revising for meaning and organization
4. Polishing for grammar and spelling
5. Publishing

This seems to be similar to the approach of many adults we know who work in Logo. We rarely begin by writing clearly articulated programs in an elegant top-down structured programming style. Our first programs are preliminary drafts, explorations to see if we can get something to work the way we want it to. If we decide to share our work, on disk or via printed media, we clean up our programs to make them easier to read, and to present accurately to readers our ideas about how our programs work.

Although revision is a separate step, carried out after our programs are fundamentally working, we often make other changes to our procedures to make them work more efficiently or to elaborate and enhance what they do.

In our *Collaborative Logo Research Project*, supported by the National Science foundation (Grant number MDR - 8561600), we have begun to identify a Logo Programming Process which parallels the writing process.

1. Brainstorming
2. Choosing a project
3. Simplifying the project and making a plan
4. Identifying specific tasks
5. Creating first drafts of different parts
6. Putting the parts together
7. Embellishing and extending
8. Polishing and refining the programming
9. Publishing and sharing

Or, as Brian Silverman said to us recently, "It's just beautiful to see a well-structured program."

References

1. Daiute, C. *Writing and Computers*. Addison-Wesley, 1985.

2. Graves, Donald. *Writing: Teachers and Children at Work*. Heinemann, 1983.

3. Watt, Molly, and Daniel H. Watt. *Teaching with Logo: Building Blocks for Learning*. Addison-Wesley, 1986.

Molly Watt and Daniel H. Watt are teachers, lecturers, authors, and consultants in the field of educational computing. Write to them in care of Logo Collaboration Research Project, Center for Learning Technology, Education development Center, 55 Chapel Street, Newton, MA 02160.

West Coast Logo and Telecommunications Conference Held

Los Angeles was the site of the second West Coast Logo Conference in early March, joined this year by an enthusiastic group of educators interested in telecommunications. A crowd of over 700 people attended a wide variety of sessions. Keynote addresses by June and Bernie Dodge, David Thornburg, and Seymour Papert provided memorable accents to the occasion. Hosted by Pepperdine University, in association with a number of educational computing organizations, the conference provided an opportunity for professional growth in many directions.

East Coast Logo Conference Held April 2 - 4

The East Coast Logo Conference '87 was attended by more than 500 people over a three day period. The conference was hosted by the University of Virginia, in association with Meckler Publishing and *Logo Exchange* magazine. A half-day set of "warm-up" activities organized by Judi Harris (including juggling, recursion plays, singing, math manipulatives, LEGO Logo, and Logo video tapes) set the tone for the conference. Over 80 presentations and 7 special interest group meetings provided opportunities for information interchange. A special evening of entertainment included Logo songs led by Peter Rawitsch, and Logo plays and contra dancing led by Dan and Molly Watt. The program culminated in an exciting address by Seymour Papert.

East Coast Logo Conference Reflections

by Sharon Burrowes

The conference was over. I'd said farewell to new friends and old...and begun the drive through rain and then snow from Arlington Virginia to Ohio. Before I had even left Virginia, the post conference "let down" hit. I'm sure you all know the feeling -- wondering where those few days went and why you never managed to do quite all of the things you planned.

However, by the time I reached the mountains of Pennsylvania, I began to reflect how I could best share the "feeling" of this this conference. Of course there were many familiar faces, some superb sessions, and delightful new ideas. But what made the ECLC unique?

Those of us who attended will all laugh about the construction equipment at every corner and the mud puddles at every turn. We'll all remember our many jaunts up the stairs to sessions and then back down to the exhibit area. But, every conference has its unique setting.

For me, there was a different flavor at this conference. For example, at what other Logo conference could you learn to juggle? Or listen to songs about how to get the "bat out of your bath" (using BUTLAST, of course). How about the dancing that included children and adults, both familiar faces and new ones. Or watching as a group of people "played Logo" to sing Old MacDonald? How often can you attend sessions filled with Logo thinking, only to realize as you leave that you saw not one line of Logo code?

Different, you say? But similar, too. We shared ideas. We shared our Logo success stories. We discussed our similar frustrations. And, of course, Seymour's speech, enhanced by a large screen display filled with ever changing and evolving patterns of colored squares, was a high point for us all.

We sang, and danced, and laughed, and learned. What more could you ask?

How long until ECLC '88?

Tipps for Teachers

by Steve Tipps

Random Revisited

Flipping coins, spinning spinners, and rolling dice are three methods of generating random events. Random events provides the basis for the study of probability which later provides the basis for inferential statistics. In elementary and junior high, students need to explore and to expand ideas about randomness. Last month, several random experiences were presented for random movement of the turtle using a Logo die simulation. This month, the topic of random continues.

Spinning Wheel

Children enjoy spinners in playing many games. Working with real spinners is important because students need to recognize the important that variables such as the free movement of the spinner, the flatness of the spinner, the strength of the spin, and the number and relative size of the areas play in determining whether the spinner is fair.

However, using a real spinner to work out theoretical probabilities can be a pain in the finger. A Logo spinner is a good substitute. It involves making a spinner board and then causing the spinner to spin.

```
TO SPINNER.BOARD
CS SETPC 1 PIECE   SETPC 2 PIECE
SETPC 3 PIECE   SETPC 4 PIECE
SETPC 5 PIECE   SETPC 6 PIECE
END

TO PIECE
REPEAT 30 [ FORWARD 40 BACK 40 RIGHT 2]
END

TO SPIN
HOME   SETPC 0
RIGHT RANDOM 360   FD 30
END
```

With these procedures, a 6 segment board is created with each segment a different color. The arrangement of colors might be better or the size / number of segments can be arranged.

SPIN is used to generate values. At first this can be done manually by typing SPIN 60 times and recording the results for each spin. The expected values for the spinner would be 10 times for each color. This is also known as the "theoretical" probability. You might determine how fair the Logo spinner was by comparing the "theoretical" probability to the observed probability of the actual spins. A chart is useful in organizing the results.

	WHITE	BLUE	ORANGE	GREEN	PURPLE	REVERSE
Expected	10	10	10	10	10	10
Observed	_____	_____	_____	_____	_____	_____

The observed probability should become closer and closer to the expected if the spinner is fair. However, typing SPIN 120 or 2000 times to find out is just as tiring as flicking the spinner 2000 times. Wouldn't it be nice to have Logo spin and count the spins while you were busy with another task? Then you could eat lunch or do a science experiment while it was doing the repetitions. You could even let Logo work all night and report the results to you the next morning.

The spinner has six possible answers, just as a die does. Rather than work with the spinner, keep track of the numbers from 120 rolls of a die. This activity is developed in "Rolling Dice" in *Nudges* by Bull, Tipps, and Riordon (Holt, Rinehart and Winston, 1985). How would you adapt this activity for a spinner of four equal sections or a die with four sides instead of six?

Heads Plus One

Students should recognize that this repetitive task is a perfect one to assign the computer. Another way to keep track of the actual flips involves making a counter for coin flips. Begin with one coin flip.

```
TO FLIP
OUTPUT 1 + RANDOM 2
END

TO FLIP.COIN
TEST FLIP = 1
IFTRUE [ OP "H]
OP "T
END
```

The coin flip now can become the basis of another random exploration with binary outcomes. The coin will be either heads or tails.

```
?REPEAT 20 [ PRINT FLIP.COIN]
H
H
T
...
```

The expected outcome would be 10 heads and 10 tails. If the experiment is repeated 10 times, most of the observations should be close to 10/10 but some may actually be as far off as 5/15 or 16/4. Such extreme outcomes are unlikely, but they are possible.

If the coins are fair, flipping one coin 10 times should have the same possible outcomes as flipping 10 coins 1 time. Try actually flipping 10 coins at once and counting the heads and tails. You may find that you spend as much time picking up the coins off the floor or hunting for them as you do counting. The computer does not lose the coins however. You can make it flip two or three or ten coins at once. However, you need to think carefully about the possible outcomes.

Two at a Time

Begin with only two coins. If you flip two coins at the same time, the possible outcomes for each coins is still H or T. However, together the possible outcomes look a little different because the result is not simply H or T. It is a combination of the H and T of two coins. Flip two coins several times. You should see that the observed outcomes can be TT, TH, HT, or HH.

If order is not important in the result, HT and TH are the same result. Although four outcomes are possible, only three are unique. The expected probability is not 33% however. The theoretical probability is 25% for TT or HH and 50% for one head and one tail. Try the Logo simulation for flipping two coins.

```
TO TWO.COINS
PRINT SENTENCE  FLIP.COIN  FLIP.COIN
END
```

```
?REPEAT 100 [ TWO.COINS WAIT 20]
H T
H H
T H
...
```

This displays the result of 100 double flips. Counting the results is not too difficult, although a counter would be better. Tally the actual frequency of two coins to see whether the result conforms to the expected values.

Three Coins

When three coins are used, the counter becomes almost a necessity. Try out a few of the three coin experiments to make sure you know what all of the results are. Have students list all of the possible results and group them into ones which are unique. The list will include eight possible outcomes but only four unique ones: TTT, THT, HTT, TTH, HTH, HHT, THH, and HHH.

Although you could extend the TWO.COINS method to include three coins, the demands of a counter suggest a different plan. Create counting variables and initialize them to 0.

```
TO SETUP
MAKE "NO.HEADS 0
MAKE "ONE.HEAD 0
MAKE "TWO.HEADS 0
MAKE "THREE.HEADS 0
END
```

```
TO THREE.COINS
MAKE "TAILS 0
MAKE "HEADS 0
FLIP.THREE
PRINT (SE :ONE :TWO :THREE)
END

TO FLIP.THREE
MAKE "ONE FLIP.COIN
MAKE "TWO FLIP.COIN
MAKE "THREE FLIP.COIN
END

TO COUNT.SIDES
TEST :ONE = "H   TALLY
TEST :TWO = "H   TALLY
TEST :THREE = "H   TALLY
REPORT
KEEP.COUNT
END

TO TALLY
IFTRUE [ MAKE "HEADS :HEADS + 1]
IFFALSE [ MAKE "TAILS :TAILS + 1]
END

TO REPORT
PRINT SE "HEADS :HEADS
PRINT SE "TAILS :TAILS
END

TO KEEP.COUNT
 TEST :HEADS = 0
IFTRUE [ MAKE "NO.HEADS :NO.HEADS + 1
STOP]
TEST :HEADS = 1
IFTRUE [ MAKE "ONE.HEAD  :ONE.HEAD + 1
STOP]
TEST :HEADS = 2
IFTRUE [ MAKE "TWO.HEADS  :TWO.HEADS + 1
STOP]
TEST :HEADS = 3
IFTRUE [ MAKE "THREE.HEADS :THREE.HEADS
+ 1 STOP]
END
```

```
?SETUP
?REPEAT 100 [ THREE.COINS COUNT.SIDES]
```

After the heads and tails are counted, you need a handy way to display the results.

```
TO DISPLAY
PRINT (SE "HHH :THREE.HEADS)
PRINT ( SE [ HHT HTH THH] :TWO.HEADS)
PRINT (SE  [ TTH THT HTT] :ONE.HEAD)
PRINT ( SE "TTT :NO.HEADS)
END
```

?DISPLAY
HHH 7
HHT HTH THH 30
TTH THT HTT 34
TTT 9

The experiment can be repeated 10 or 20 more times. Collect the individual experiments and note the largest and smallest value for each set of answers. Also accumulate all the results. You should begin to get close to values of .125, .375, .375, and .125.

More Change

Extend the experiment to includes 4 or 5 coins. After the model is established, students should be able to add more cases to it. As they look over the possible combinations, they may find a pattern, especially if they organize the results in a chart.

1 1	One Coin	1H and 1T
1 2 1	Two Coins	1HH, 2HT, 1 TT
1 3 3 1	Three Coins	1HHH, 3HTT, 3THH, 1TTT
1 4 6 4 1	Four Coins	1HHHH, 4HHHT, 6TTHH, 4THHH, 1TTTT

A pattern such as Pascal's triangle helps students organize their ideas and predict other possibilities. More coins means more change and many experiences with probability. Logo makes change easy and fun. RANDOM makes it exciting!

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.

Logo Fellowship Winners Announced

Keith Lawrence Abbott and Mary Upton have been named recipients of Logo Fellowships to study at the University of Virginia this summer. Funded by a grant from Logo Computer Systems, Inc., the fellowships are awarded on a competitive basis to selected applicants to provide an opportunity to come to the University of Virginia for a period of residence and work on a self-designed Logo project.

Keith Abbott is an assistant principal at Wellington Junior Secondary School in Nanaimo, British Columbia, Canada. Mary Upton is a computer programmer and teacher trainer in the Lubbock (Texas) Independent School District.

Information about the next cycle of Logo Fellowships will be mailed out in mid-October. To receive this information, send a self-addressed mailing label to: UVA Summer Logo Fellowships, Attn: Tom Lough, Dept of Educational Studies, Curry School of Education, 405 Emmet Street, Charlottesville, VA 22903-2495

Teacher Feature

by Rebecca Poplin

Featuring: Penny Rendall

Tourist Attraction in St. Paul

Planning a summer trip? Recently, students in Penny Rendall's class created an ideal vacation spot for Logo lovers, the town of Logoville. In Logoville you could see a movie at Appleup Theater, get copies printed at Stamp Copying Company, and plan your remodeling at Setbackground Wallpaper Store. Later, you could take a break at the Spacebar Cocktail Lounge then go to your room in the Embassy Turtles Hotel. On the weekend, you might take the family to Turtleson Monument, gaze at Mount Rushturtle or visit the FD 100 Racetrack. Logoville was a monumental effort and just one of many exciting learning experiences in Penny's class.

Penny Rendall is a fifth grade teacher and Logo resource teacher at Groveland Park Elementary School in St. Paul, Minnesota. Under the direction of Gerri Kozberg, St. Paul schools have made a major commitment to Logo and LogoWriter. As one of the first teachers trained, Penny has participated actively in teacher training, has conducted seminars for parents, and has been a facilitator for the St. Paul Summer Logo Institute.

Timetables and Schedules

Penny feels that computer time should be deeply integrated with classroom work. She has two computers which students use throughout the day in 15 minute intervals. Although a schedule is kept, time and computer use are flexible. Students can choose whether they want to use the computer. Most often, there is a specific project or a real purpose for computer use. For example, students might be asked to create a book report using STAMP to illustrate the report. Each week, computer sharing time enables students to show what they have been working on or for Penny to introduce a skill or primitive.

Excursions

Recently, students have been using LogoWriter to help them travel back to the time of the early settlers. As part of a social studies project, each child or group organized a class presentation which included a computer program. For example, one group working on early medicine developed a true false test using the word processor function of LogoWriter.

One of Penny's students discovered that several countries have exactly the same flag with different colors, so he created a graphics program about the flags. Program users are to guess which country the flag represents.

A project directed by one of Penny's colleagues was called "Peace and Peacekeepers." Students did research on famous people who worked for peace. Using the computer, they wrote essays and created symbols to represent peace and the person they learned about.

Science World

Three weeks are set aside at Groveland Park to have all the computers together in a lab situation. Cathy Overby, the science teacher, introduces many new computer skills and interfaces measuring instruments with LogoWriter. One recent project involved using the paddle port hooked into a thermometer and having the data read onto a chart. Since Cathy is the science teacher for grades K-6, she found that she needed extra help during computer lab time, especially with the kindergarten children. Penny helped work out an interesting solution to this problem. She began a project called Turtle Tutors.

Tour Guides

Turtle tutors are third and fourth grade students who work with the kindergarten class. Becoming a tutor wasn't easy. An application process resulted in selection of 25-30 students. Tutors received special training and learned special Turtle Tutor Tips: Never press the key for the student; point or give clues instead. Always sit next to the student; be at their level. Penny adapted an idea from *Instructor* magazine for the tutors. It is the 3P method: Pause, Prompt, Praise. Penny is planning to do some role-playing with the tutors and will also go over lesson plans with them so they will have a purpose for going into the kindergarten class.

A Wider World

Penny Rendall feels that teacher training is vital to Logo's success. If teachers aren't trained and don't feel ownership, Logo could become another game or word processor rather than a philosophy. The effectiveness of teacher training depends on how it is presented. The watchword in St. Paul is "Logolike thinking."

As a part of a week-long seminar on LogoWriter, teachers toured businesses where Logolike thinking was going on. Some went to an artificial intelligence lab while others went to a publishing company or to 3M. Penny's group visited a neonatal center. Teachers studied the kinds of activities taking place in these business and analyzed skills they are now teaching for their relevance and effectiveness. Logolike thinking is a part of the planning for teacher training, too.

Penny believes that Logo has changed her in the past five years. Since learning Logo, she has become excited about discovery learning and has developed a deeper appreciation of how students learn from each other. In addition, her perspective about Logo's place has changed. She believes even more strongly that it is important to integrate computer use into the curriculum. Unless the computer is part of social studies or language or writing, it can become just another add-on. In nearly any job students take, they will be using a computer. It will be an integral part of their lives. Computers in education must be integrated with everything we do and be a natural part of the learning environment.

If you would like to know more about Penny Rendall or the Logo program in St. Paul, contact:

Penny Rendall
Groveland Park Elementary School
2045 St. Clair
St. Paul, MN 55105

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

Logo Notices

Learn Logo with the *Logo Exchange* columnists at the University of Virginia this summer. Two courses are being offered, both for graduate credit. Introduction to Logo (EDES 547, 1 graduate credit) will be taught by Judi Harris, author of "Logo LinX" column in *Logo Exchange* magazine, July 6-10, 1987. Logo in the Classroom (EDES 548, 3 graduate credits) will be taught by Glen Bull, author of "Teaching Tools" column in *Logo Exchange* magazine, July 13-31, 1987.

The latter class will have the opportunity to meet and work with the 1987 Logo Fellowship recipients. For additional information write:

Peggy Marshall
Curry School of Education
University of Virginia
405 Emmet Street
Charlottesville, VA 22903-2495

Dan and Molly Watt will host their summer Logo Instutite in association with Union College in Schenectady, NY, August 3 - 16. Institute participants will receive 4 graduate credits upon completion. The institute closes with a two-day conference, August 15 - 16. Separate registration is available for the conference, which features many well-known Logo leaders. For more information and registration materials, write to: Logo Institute, Union College, Graduate and Continuing Studies, 1 Union Avenue, Schenectady, NY 12308.

Two one-week long advanced Logo institutes for teachers will be held at the University of South Alabama, July 6 - 10, and July 13 - 17, 1987. Registration costs $595 with lodging, and $470 without lodging, and includes all meals and materials. Each institute is limited to 20 participants. IBM Logo will be used. Instructors are John Strange and Mary Ann Robinson. For more information, write to: Dr. George E. Uhlig, Dean, College of Education, University of South Alabama, Mobile, AL 36688, or call (205) 431-6535.

Teaching Tools

by Glen Bull and Paula Cochran

Poetic Justice

SUMMER IS HOT
SUMMER IS A BUTTERFLY
ON MY SWING

SUMMER IS CLEAR
SUMMER IS A BIRD
UNDER THE TREES

SUMMER IS ENDLESS
SUMMER IS A SUNBEAM
IN THE GRASS

The success of a Logo activity depends more on the teacher than on the Logo code she uses. Two teachers can use identical Logo procedures with a class, but get very different results. This is true not only of Logo but of all teaching activities, and comes as no surprise. In this column, we would like to identify some of the procedures (teaching procedures, not Logo procedures) that enhance a Logo activity. As an example, we've chosen a short Logo poetry program. In this column, we plan to present some ideas for how to do justice to a Logo poetry activity.

The (Logo) Procedures

The procedures which generated the verses at the beginning of this column will be familiar to many of our readers. (See the "Listful Thinking" columns in the October 1984 and April 1986 issues of the *National Logo Exchange*.) Only three or four procedures consisting of a line or two each are required to generate poems like these.

```
TO POEM
PRINT SENTENCE [SUMMER IS] ADJECTIVE
PRINT SENTENCE [SUMMER IS A] NOUN
PRINT PLACE
PRINT [ ]
END

TO ADJECTIVE
OP PICK [HOT SUNNY BRIGHT FUNNY WARM
ENDLESS CLEAR COLORFUL FULL]
END

TO NOUN
OP PICK [FROG KITE BIRD BUTTERFLY
SUNBEAM CLOUD DAISY]
END

TO PLACE
OP PICK [[IN THE GRASS] [UNDER THE TREES]
[IN THE PARK] [AT A PICNIC] [BEHIND OUR HOUSE]
[ON THE PLAYGROUND] [IN THE WOODS] [ON MY
SWING]]
END

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

After the procedures have been typed into the computer, type POEM to see a computer-generated poem.

```
?POEM
...
```

You can add your own words to the ADJECTIVE, NOUN, and PLACE procedures to for more satisfying results.

The (Teaching) Procedures

I. Lesson Preparation

The first step in preparing any sort of instructional activity is to choose appropriate objectives. If the teacher is planning an activity for English class, then her objectives should focus on English. This is true for Logo activities that are being used to explore any aspect of a regular content area, such as science, math, or language arts.

What are some appropriate language arts objectives that could be addressed through a Logo poetry activity? How will these objectives be addressed? There are many possibilities, ranging from goals directly related to poetry forms, such as rhythm and rhyme patterns, to goals related to grammatical forms such as nouns and verbs:

- Synonyms and Antonyms
- Article and Noun Agreement
- Mass Nouns vs Count Nouns ("some" popcorn vs "a" potato chip)
- Grammar and Parts of Speech (adjective, adverb, prepositional phrase)
- Poetry Elements (metaphor, simile, alliteration)
- Poetry Forms (haiku, sonnet, limerick)
- Practice with Dictionary and Thesaurus Skills

The same basic poetry activity can be used with the class, but the focus of the activity will depend on the teacher. For example, a goal could be to practice using a thesaurus.

How many words can you think of that mean "hot"? Summer is hot; how many other words could we use to describe summer and make our poems more interesting? The activity of trying to think of synonyms for "hot" for our Logo poems provides an incentive for consulting a thesaurus. This even happened spontaneously in one middle school class.

In a quick foray into *Roget's Thesaurus* we found the following HOT words which describe summer:

torrid, muggy, sunny, sultry, stuffy, humid, sticky, broiling, warm, toasty, tropical, burning, scorching, scalding, blistering, roasting, simmering, broiling, sizzling, smoking, blazing

SUMMER IS SULTRY
SUMMER IS A LEMONADE
ON THE PORSCHE

It is also desirable to involve objectives from other content areas. If the class is studying Italy in social studies, students can generate poems which incorporate vocabulary associated with Italy (Mediterranean, classic, Rome, Venice, olives, forum, coliseum, Pantheon, pizza).

Besides choosing objectives for the activity, the teacher should prepare the Logo procedures and have them ready on a disk. The teacher can seed the activity with a set of starter-words in each poetry procedure (POEM, NOUN, ADJECTIVE, PLACE).

II. Logistics

The instructional objectives we mentioned are especially appropriate when Logo poetry is used in a group activity. It is certainly possible to have very successful lab experiences with Logo poetry, where one or two children at each computer work on their own poems, starting with the core procedures (tools) on disk. However, Logo poetry makes a wonderful, interactive group activity as well.

If you have one computer in your classroom, you can do Logo poetry with 3 or 4 students at a time clustered around the monitor. It is possible to expand this for a larger group by making use of a 25 inch TV. The TV can be attached to the computer, permitting up to 20 or 25 students to see the poems. Most schools already have televisions for viewing instructional video tapes.

Another possibility for use with large groups of students is a projection pad. This is a new device which can be used to project the computer image with the aid of an ordinary overhead projector. The image appears on a screen just as an overhead transparency does. The Kodak DATASHOW is one example of such a projection pad. At the time of this writing its retail price is about $1200. In other words, for the cost of one more computer, a school can purchase the ability to use a single computer with a large number of students.

III. Class Activities: Pre-Computer

The first part of a Logo poetry activity should occur away from the computer. The group should discuss the topic of the poems. This is a chance for the teacher to assess whether the class really knows enough about the chosen topic to think of good words and ideas for the poems. Vocabulary items that arise during this brainstorming session can be listed on the board for use later in the Logo activity.

IV. The Computer Activity (Finally)

The class may do the Logo activity in a laboratory setting, or students can take turns adding to the poem at a single computer station in the back of the room. If so, it will be necessary to have some written instructions which nudge the student in the desired direction.

The Logo exercise may also be conducted as a group activity, with several children or an entire class watching the screen. The teacher can type students' suggestions as they volunteer them, or choose a student helper to do the editing. This activity works well when an assistant types the words into the appropriate procedures as the teacher coordinates the class discussion.

First the class should look at several poems generated with a starter-kit prepared by the teacher:

```
?REPEAT 4 [POEM]
...
```

Soon it becomes clear that the computer is choosing the same words over and over again. The students are invited to add their own words to the poem. For example, the teacher could edit the NOUN procedure, and add words suggested by the students which are associated with summer.

The teacher must serve as a facilitator, and focus the activity on the objectives she has chosen. For example, the goal of the activity could be to work on number agreement between nouns and articles. Sooner or later a student will suggest a word (e.g., GAMES) which will not agree with the article (e.g., A) in the poem. Rather than pointing out that some words do not fit the teacher types them in along with all the rest.

As more poems are generated with the new words, eventually a poem will appear which contains the word that does not fit. Usually it is obvious that something is wrong:

```
SUMMER IS SIZZLING
SUMMER IS A GAMES
IN THE PARK
```

Often the class will recognize the problem, if not the solution. Then the teacher can help them determine how the problem might be resolved. The class could remove the article from the second line:

```
SUMMER IS SIZZLING
SUMMER IS GAMES
IN THE PARK
```

Another possibility is to completely remove the offending noun from the NOUN procedure. Or, the class could change GAMES from plural to singular, and agree to use singular nouns throughout the poem. After the discussion, the class can vote on which approach they would like to take. The point of the discussion is to allow the students to think about how language works. Students in the class remain very interested in the language generated, because each one is waiting for HIS own word to appear on the screen.

V. Class Activities: Post-Computer

After the lesson, poems can be used as the inspiration for other classroom activities. The class may want to vote for favorite verses and put them on the bulletin board. In the lower grades, students can illustrate their favorite poems and turn them into greeting cards, posters, or booklets. In the upper grades, poems may find their way into the school newspaper. In all cases, copies can be provided so that students can share their work at home.

After the group activity, older students may continue to develop other poems on their own. As an advanced exercise, students could be asked to modify the form of the poem itself. For example, they could create poetry about a different topic, such as their favorite sport or rock star. The structure of the poem could be modified; haiku is a favorite choice because the structure is short and easy to explain. In high school, students can be challenged to create a poem with a specified meter. Writing a poem that only generates iambic pentameter is a challenge, and leads to examination of English prosody even if the poem generator is not perfected.

Students can participate enthusiastically in a group Logo poetry activity without knowing anything at all about Logo. Students do not even need to know a great deal of Logo in order to participate in Logo poetry activities on their own. It is necessary to show students how to turn on the computer and load Logo, and how to use the Logo editor. If Logo poetry tools are provided on a disk by the teacher, students can begin creating their own poems in the first class session.

Summary

A teacher could start with many other Logo poetry procedures. Rather than having procedures named NOUN, ADJECTIVE, and PLACE, a teacher could just as easily create procedures such as COLOR, SCENT, and TEXTURE:

> PURPLE SMELLS LIKE VIOLETS IN A VASE
> PURPLE FEELS LIKE VELVET AND OLD LACE

Logo poetry tools can also be integrated into language arts activities in many other ways. We have provided a few concrete examples to illustrate the important role of the teacher. If a teacher waited for a class to spontaneously invent the poetry procedures, she would wait a long time, and she would have to spend many weeks teaching Logo programming skills. If a teacher simply hands the Logo poetry procedures to the class without direction or guidance, the learning which may take place is unpredictable. Some students may learn about articles, some may learn about metaphors, and some may not learn anything at all. The teacher is the one who must provide the structure in which discovery takes place.

This is as true of Logo in math class as it is of Logo in language arts. This column has been about Logo teaching tools. No matter how elegant or ingenious Logo tools might be, they depend on the classroom teacher for effective results.

Hope your summer is bright, sunny, and (seemingly) endless.

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

TO BEGIN :MORE.PROJECTS

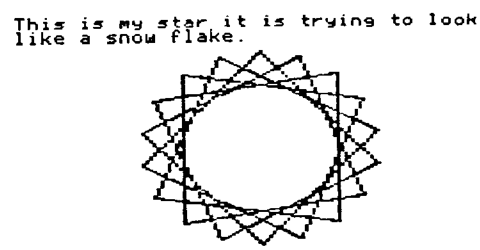
by Elaine Blitman
and Barbara Jamile

Our collection of Logo activities grows daily. Some bring chuckles, others admiration for the creativity and diligence of elementary students. This month we have several projects to share illustrating the variety of Logo applications in the classroom.

A Shared Experience

The first graders in Donna Hayes' classroom have been working with LogoWriter since September. Initial experiences were with word processing; now they're exploring with the turtle and combining the two modes. For this project, Donna took the class to the middle school's computer lab so that she could see how they understood the effects of the REPEAT command which they had been exploring during independent work periods on their classroom computers. Working with partners, they provided the number inputs for REPEAT ___ [FD ___ RT ___]. The children then were asked to write about the figure their inputs produced.

The teacher was pleased with this project because she could check on each partner's perception of the REPEAT command, and each student left the lab with a finished project combining problem solving and creative writing. Following are a few samples of the first grader's results:

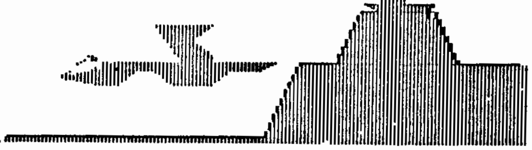


Integration with the Art Curriculum

Art teachers Dee Van Dyke and Betty Jenkins used a "castles and dragons" theme this year for a number of kindergarten through fourth grade art activities, culminating in an art show with a fantasy theme. Interest ran high and carried over into many subject areas. Third and fourth graders, working in teams of two with LogoWriter, produced the following stories and graphics during their free time as a follow-up to their art work.

THE DRAGONLINGS

THERE ONCE WAS A TIME WHEN PEOPLE BELIEVED IN MAGIC, DRAGONS, SORCERY, WIZARDRY, AND DEMONS. THE IDEA OF DRAGONS AND MAGIC BEGAN DYING AND BECAME WEAKER AND WEAKER. SOON THERE WERE FEW DRAGONS LEFT.



ONE DRAGON LAID A CLUTCH OF EGGS. VALIANT KNIGHTS BEGAN ATTACKING THE DRAGON FOR THE EGGS. ONE KNIGHT WOUNDED THE DRAGON AND TOOK IT HOME. HE CARED FOR ITS CLUTCH AND THE DRAGON ITSELF.

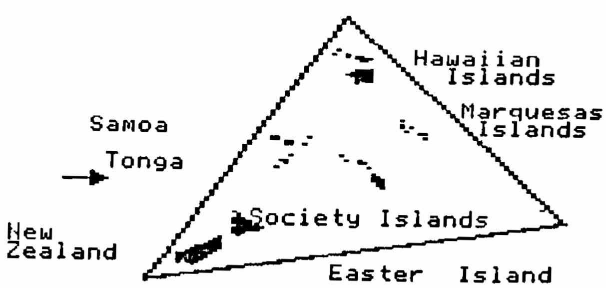
THE EGGS HATCHED, BUT THE MOTHER DIED. THE KNIGHT BURIED THE MOTHER AND CARED FOR THE YOUNG DRAGONLINGS. HE TAUGHT THEM HOW TO FLY AND HOW TO CATCH PREY TO EAT.

HE SET FIVE FREE AND KEPT ONE FOR A PET AND GUARDIAN. HE FED IT AND CARED FOR IT. HE NAMED IT SILVER WINGS. SILVER WINGS WAS LOYAL TO HIS MASTER AND MISTRESS. HE LOVED BOTH DEARLY. SILVER WINGS OFTEN TOOK HIS MASTER AND MISTRESS FOR RIDES ON HIS BACK. WHEN HIS MASTER, SIR BRADFORD, RODE INTO TOWN SILVER WINGS WAS MUCH ADMIRED BY THE TOWNSPEOPLE. SIR BRADFORD, DRESSED IN HIS SHINING ARMOR, RODE ON SILVER WINGS' BACK. THEY MADE A MARVELOUS PAIR.

IN THE END SIR BRADFORD DIED. SOON AFTER LOSING HIS LOVING MASTER SILVER WINGS DIED OF GRIEF.

Integration with Social Studies

Computer resource teacher Paola Williams works with classroom teachers to develop computer activities that relate directly to the curriculum covered in the classroom. The following project was part of the study of the Polynesian migration of the first people to Hawaii. With LogoWriter, fifth graders Diane Kim and Sachie Sullivan made the islands from sprite shapes which were stamped in place, and used LABEL to identify the islands. The arrow is animated and shows the migratory routes believed to have been used within the Polynesian triangle.



A sixth grade class studying the American colonial period wanted to make a database of the information they had found about the colonies. Since most of the students had quite a bit of experience with both Logo and databases, Paola asked them to write their own database system using Logo II. She provided some tools and examples of how lists and their properties work. The results were outstanding.

Sharing ideas about the applications of Logo among teachers, students, and other schools has been important to the growth of our Logo program. Ideas are sometimes adopted without change, but more often they're built upon or revised to meet special needs. The more experiences teachers and students have, the better they are at finding new uses for Logo and computers. Creativity flourishes in the Logo environment where the computer truly becomes a tool for the mind.

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

Logo LinX

by Judi Harris

Educational Objective: Fun!

Did I hear you "harrumph"ing as you read this month's subtitle? For shame! Isn't *fun* in your district's standardized curriculum? It should be. "Go tell my principal," you say? OK. Tell him/her that it's really divergent thinking development, or creative design. But you, your students, and I will know what the *real* objective is.

Yes, fun *can* be worked into the traditional curriculum, from kindergarten through graduate school. You already know that. You try your best to make learning fun for your students; isn't that, after all, part of the reason that you use Logo with them? Making an activity fun is an excellent way to motivate learning in all traditional subject areas. But I'd like to look at fun from a different perspective.

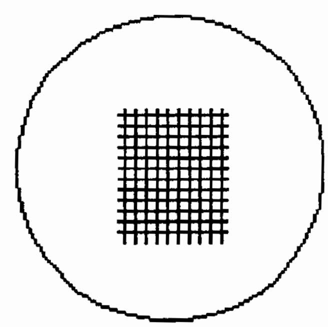
If an activity is fun, then it probably fulfills an intellectual, psychological, physical, or spiritual need. This kind of fun isn't manufactured to encourage better spelling or help children to memorize the multiplication tables; it is inherent in the activity itself. If something is fun to do, then I believe that it has a rightful place in a student's schedule.

Is this heretical talk? Not really. Underlying this argument is a very basic assumption: human beings, when provided with a rich environment of possibilities from which to choose, naturally seek out learning experiences that they need. Such Piagetian reasoning must not seem unfamiliar if you have perused the pages of *Mindstorms*. Learning is an inherently pleasurable, self-fulfilling activity.

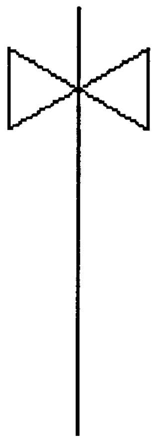
Out-of-Line Drawings

Time for some fun with Logo.

What's this?



Or this?

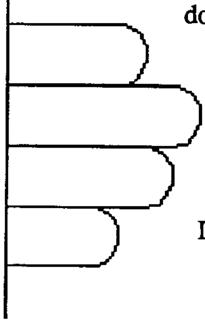


This *fun* Logo project was inspired by a wonderful little book by the title of *Droodles*. (Price, R., Los Angeles: Price/Stern/Sloan, 1953.) The original designs for the droodles displayed in this article were taken from the line drawings in that delightful little volume. The author defines a droodle as "a borkey little drawing that doesn't make any sense until you know the correct title." (Price, p. 2.)

By the way: the first design is a "Mended Doughnut." The second one is a "Man in a Tuxedo who Stood Too Close to the Front of an Elevator." As you can see, the droodle is no fun without the label.

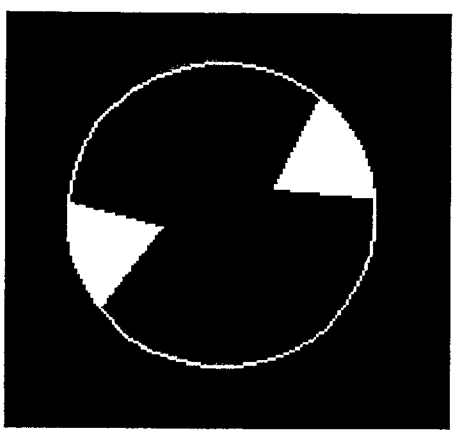
Droodle LinX

If the Curriculum Enforcement Committee is breathing down your neck, try a droodle that is integrated into the social studies curriculum:



(Inside view of Napoleon's coat)

Droodles can even get quite philosophical:



(The world outside as seen by a little person living inside a beer can)

But, most of all, Droodles are mind-stretchers, and therefore appropriate for both enrichment and remedial groups.

Droodle Logo

Droodles can be drawn in the immediate or delayed (procedure) mode, and labeled with a simple PRINT statement. Droodle captioning can be a group or individual activity, and droodle displays draw many admirers. Droodle printouts also make unusual Mother's or Father's Day presents. I hope that by now you are convinced that droodles have a rightful place in The Curriculum during these happy spring months. If that insistent administrator still raises an eyebrow when he/she sees "Logo Droodles" in your plan book, remind him/her what educational objective Roger Price quotes for droodling:

"You will find that droodling will help you to withstand the pressures of a troubled and complex world, develop your character and your motor ability, and make you more self-reliant..." (Price, p. 48)

Now, I ask you, who needs any more reason for "having fun" than that?

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

MathWorlds

edited by
A. J. (Sandy) Dawson

Uri Leron's article, "Logo Today," which appeared in *The Computing Teacher* in 1985, propelled Uri into the limelight within the Logo community. His presence on the West Coast at Berkeley last fall provided an opportunity for an invitation to come to Vancouver and share his current views on Logo with members of the BC Logo User Group. While here, Uri and a number of my mathematics education colleagues had a chance to discuss the topic of the relationship between Logo and mathematics. Those discussions led to my invitation to Uri to write a column about that topic. I also had an ulterior motive in making the request: I am to teach a Logo / mathematics course to graduate students during the summer of 1987 (it begins just about the time this column will appear), and I wanted the benefit of Uri's ideas and thoughts on the 'intersection' of Logo and mathematics. I was not disappointed when I received Uri's article, as he has begun to capture some the mathematical essences inherent in Logo.

On the Mathematical Nature of Turtle Programming

by Uri Leron
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The invitation from Sandy to write this column gave me an opportunity to reflect once more on what I think is the fundamentally mathematical nature of programming with the turtle. My emphasis will thus be on fundamental processes of mathematical thinking, rather than specific subject matter.

What's in a Rectangle?

Let me start by considering a procedure that 11-year olds can typically write on their own after a few weeks (or months) of learning Logo: