LogoUpdate The Logo Foundation Newsletter ▲ Volume 4, Number 1 – Fall 1995

In This Issue

In this Issue of *Logo Update* we reflect upon what has changed and what has remained constant during Logo's 28-year history. David McClees and Dorothy Fitch define and defend "classic Logo" in their article on page 8. I offer a somewhat different point of view beginning on page 6. In his front page article, José Valente looks at how Logo helps us understand what is going on in a learner's mind, a fundamental aspect of Logo that transcends versions and applies to Logo activities in all domains. "Continua..." on page 10 provides recent news about events reported on in previous issues.

Logosium '96 will be hosted by the St. Paul Logo Project next June 14th, the day after NECC '96 in Minneapolis, and just prior to the first of two St. Paul Logo Summer Institutes. Our expanded schedule of Summer Institutes for 1996 also includes an August session in St. Paul and a June Institute at The Spence School in New York City. Look at pages 12 and 16 for more information about these happenings.

This issue of *Logo Update* also includes advertisements for software, books, and materials, all of which may be obtained from the Logo Foundation. Please patronize our advertisers by buying their products and, at the same time, support the Logo Foundation by using the order form on page 15.

Advertising revenue defrays part of the cost of *Logo Update*, helping us to continue our policy of free subscriptions.

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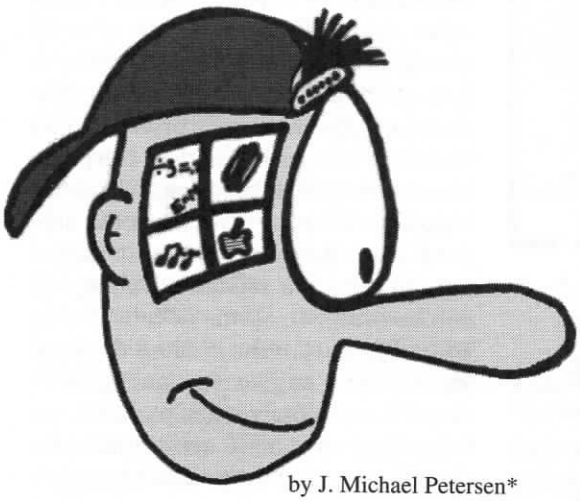
Logo as a Window into the Mind

José Armando Valente

If we could "penetrate" into the student's mind to find misconceptions and bugs, we would be able to intervene more effectively to help the student to learn better. Even though this was desired by many teachers, the reason it wasn't done is that we did not have good ways of getting into the mind. We didn't until we had computers!

Computers have provided us with the possibility of penetrating into the learner's mind in ways that we never had before. Artificial Intelligence and Cognitive Science have benefited from this enormously. And in the Logo community, especially within the group working with handicapped children, it was common to hear that Logo provided us with a "window into the child's mind" (Weir, 1987). The argument was that a Logo program had imbedded in it the student's concepts, strategies, and styles, which could only be the product of his mind. Looking at students' programs we could have ways of understanding how their minds worked in the process of developing the programs, and the level of knowledge, strategies, and style used.



by J. Michael Petersen*

However, the current uses of computers in education and the educational software available have minimized programming activities. The emphasis of computer activities has been on the creation of finished products with minimal effort. It seems that this line of thinking undermines one of Logo's original objectives and dismisses important characteristics of the computer as a tool for enhancing learning.

Why Programming?

Any intellectual activity can be seen as a window into the mind. However, there are important features of programming that allow us to penetrate into one's mind that we did not have before.

The discussion about "why programming" is a current topic in the Logo literature. Seymour Papert presented several examples in which programming allows the computer user to have better control over the computer (Papert, 1993). The reason Papert prefers programming over ready-made educational software is that "discovery cannot be a setup; invention cannot be scheduled" (Papert, 1980, pp. 115). "Is Programming Obsolete?" (Clements and Meredith, 1993) gives a summary of an American Educational Research Association meeting in which several speakers presented different views of programming. Programming is "the best ever representational support for cognitive activities" according to Andrea diSessa. Mitchel Resnick is cited as describing programming "as an expressive medium." I certainly agree with these views but I think that programming should be placed into a theoretical framework along the lines of that proposed by Solomon (1982).

The window into the mind emerges when one considers the process of programming as a cycle consisting of description-execution-reflection-debugging-description (Valente, 1994). When a student is using Logo (I will

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In This Issue

continued from page 1

But it isn't enough. I'd like to thank those of you who responded to our request for contributions in the last issue. If you have not given, please consider making a tax-deductible contribution of $25 to the Logo Foundation.

In some countries you are receiving *Logo Update* from one of the Foundation's international partners: Jeff Richardson of Monash University in Melbourne, Australia; José Valente of NIED-UNICAMP in Sao Paulo, Brazil; and Rosa Kaufman of Laboratorio de Computación in Buenos Aires, Argentina. Their efforts make it possible to better serve the international Logo community.

Finally, *Logo Update* welcomes letters, commentary, and articles from readers in response to items in these pages, and on Logo-related topics in general. Get in touch with me if you'd like more specific guidelines, or if you have an idea you'd like to discuss.

Michael Tempel

Logo As A Window Into The Mind

continued from page 1

concentrate, for the moment, on the graphics aspect of Logo) his initial ideas about how to solve the problem are passed to the computer (or the Turtle) in terms of Logo commands. Thus, the student is acting upon the object "computer." However, this action is also a description of the problem solution through the Logo procedures. The computer then executes these procedures. The Turtle "walks through" each instruction in each of the procedures and presents a result in terms of a picture on the screen. The student observes this process and the final product, and can reflect upon them. This reflective activity can lead to one of two alternative actions: doing nothing, when the student accepts the result presented by the computer and considers the problem solved; or debugging, when the result is different from what the student intended or the result is not accepted by the student. Debugging can be either in terms of concepts in the subject area (the student does not know about angles, for example) or about some convention in the Logo language, or about strategies (the student does not know how to apply a particular concept.)

The cycle "description-execution-reflection-debugging-description" allows us to understand the learning process a little better, and why programming can be an effective activity for learning. In this cycle, debugging constitutes a unique opportunity for the student to construct his knowledge; to learn about particular concepts involved in the problem solution, and/or about problem-solving strategies. However, the debugging activity is facilitated by the existence of the computer program: the student's description of his ideas in terms of a formal, precise, and simple language. Also, there is a direct correspondence between each command and the computer's action, as reflected by the Turtle's behavior.

It is important to say that the cycle, description-execution-reflection-debugging-description, is part of a programming activity in any computer language. However, Logo graphics has added some aesthetics to this process in terms of simplicity, structure, and feedback. Interaction between the student and the computer is simplified with the use of terms used in everyday conversation, making the description of spatial problems in synchrony with intuitive spatial knowledge. The ease in naming and defining procedures facilitates the problem-solving process. Turtle graphics enhances the feedback from the computer, which feeds the reflective process. All these features were introduced without compromising the computational power of Logo.

Thus, it was the Logo aesthetics that made Logo such an important tool to think about, and to foster, learning. It allowed us to understand about constructionism: the how, when, and what that makes the construction of knowledge possible. It has catalyzed investigations into "learning about learning" since the student in the process of looking for information is exercising his learning skills. And it has raised questions about "thinking about thinking" since the students can analyze their programs in terms of effectiveness of their ideas, strategies, and problem-solving styles.

However, we have learned that none of these phenomena will happen by just placing a student in front of a computer. The student-computer interaction needs to be mediated by a professional who knows about Logo ideas. Students are part of a social environment, comprised of their peers, their parents, the school, and even the community. These social elements provide ideas, information, and problems to be solved through the use of the computer.

Logo Aesthetics Can Transcend Logo Graphics

The activities that take place in the Logo graphics environment are ideal for talking about the Logo aesthetics. However, the Logo aesthetics can transcend the graphics activities, although the aesthetics are much harder to implement in other educational software or even in other domains of Logo.

In other Logo domains, such as list processing, music, LEGO®Logo, and animation, the cycle of description-execution-reflection-debugging-description is certainly present, although each action in the cycle may not be as simple as in the graphics domain. The music domain, for example, has all the qualities of the graphics domain, although the description of sound ideas in terms of frequency is not that intuitive; and the reflection requires the ability to discriminate sound which can be a little harder than the discrimination of forms. List processing, on the other hand, is the domain in which the cycle is much harder to establish. First, the description of recursive processes is not very intuitive and it is not an everyday type of activity. Second, the execution of a recursive list-processing procedure is very opaque, making it impossible to see what the computer is doing. Third, the feedback provided by the computer is often insufficient to facilitate reflection. All of these factors make debugging a list-processing procedure very difficult. However, with a proper debugging facility, list processing can be less opaque, as was shown by Rocha (1993). Thus, it is not by chance that Logo is well known for its graphics!

Other computer software with menu-driven capabilities, such as Kid Pix™ or Paintbrush™, makes the construction of beautiful objects very easy by just controlling the mouse. However, the fact that these software applications are not programmable or that they do not leave a trace when the activities are done, means that there is no description of the activity. Without the description, the description-execution-reflection-debugging-description cycle is truncated, and certainly debugging is undermined.

Software such as HyperCard® and Control Lab™ have programming capabilities in addition to powerful menu-driven facilities. However, the programming capabilities of these applications present problems. Either the type of programming they allow is simplistic to the point where it cannot be considered a window into the mind, or too intricate, providing a feedback that is hard to interpret, making the reflective and the debugging processes almost impossible. The problem with the programming capabilities in these applications stems from the fact that they were not implemented with the objective of facilitating the process of describing ideas. They are more concerned with achieving a product. In this sense the emphasis of the product design is on the computer, and the user has to mold his ideas to the computer. The design of a good learning tool needs to put the emphasis on the learner.

Even in the latest version of Logo, MicroWorlds®, we can get a lot done by just controlling the mouse. However, if we do not have a trace of these actions we have the same problems as we have with Kid Pix or Paintbrush. Also, if MicroWorlds adds much more, to a point that we have to ask "where's the program now?" (Adamson, 1993), certainly we are not moving in the right direction in terms of developing software to facilitate learning. In order to debug a program, we should be able to have the procedures, the values of the inputs that change the procedures' behaviors, and the results provided by these procedures all in one place so we can facilitate reflection and therefore debugging. If we have to look for the procedures attached to turtles, to buttons, to colors, and then look for sliders, we are distracting the user's attention from the debugging activity.

In order to be able to facilitate the construction of knowledge computer software needs to have certain aspects of the Logo aesthetics to easily engage the student in the description-execution-reflection-debugging-description cycle. The software should have a programming facility, or the computer should be able to collect information and construct a procedure as we select items from a menu, or do things on the screen. Some software developed within the visual programming paradigm has this feature. The trace becomes the description, as in "Mondrian," a program

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continued from page 3

developed by Lieberman (1992).

Another reason that educational software should have these facilities is to be able to help teachers to be effective in the classroom computer environment. A teacher who interacts with many students at the same time is not able to dive into a learner's program and understand what is going on if the software does not contain a description of the student's work. If it is necessary to search for the program and/or if there is no trace of what has been done, it will take forever to understand the student's computer activity. Certainly this distances the teacher from the student's intellectual process and undermines the effectiveness of learning in the Logo environment.

Conclusion

In the early days of computers in education, Logo made a big impact because it provided powerful computational facilities for children and a completely different way of talking about education. Some of these facilities, such as graphics, were revolutionary considering the computer power available at that moment, and for many years Logo was the only educational software that allowed students to develop educational computer activities. The developers of Logo did everything possible and impossible to implement these facilities because they stressed important pedagogical issues. Even today the pedagogical innovations introduced by Logo, the Logo aesthetics, are an important landmark in education. People who still use and value Logo today do it because of its aesthetics and because of its potential as a revolutionary educational tool.

As the computer becomes more widely available in education it is clear that today we have many more software applications to choose from, each one requiring more or less effort to develop a final product. We no longer need to "program" the computer to draw a little house or to draw a sophisticated landscape scene. And that is fine if the objective is to get the product done. However, if we want to emphasize the use of the computer to enhance learning, we should not lose the Logo perspective. The criteria should be whether the software allows the student to engage in the description-execution-reflection-debugging-description cycle, and how effective each of the activities in the cycle is for the learning process.

In terms of the development of new versions of Logo, a special effort should be made to keep the Logo aesthetics clear and crisp. However, we should think about new ways of describing ideas to the computer. It does not need to be through a sequence of typed commands. The new features added should be analyzed in terms of the gains acquired in the process of facilitating learning and penetrating into the user's mind. This means that the development of Logo should be more an exercise about learning than the implementation of a diversity of new computational features.▲

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Park
a Turtle Graphics project in MicroWorlds by Charles Lee
(It looks really cool in color! Turn to page 14 to find out how to get a copy on disk.)

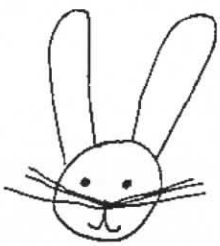
The Turtle Is Dead

Rethinking Logo in the Age of Kid Pix™

by Michael Tempel

At a recent Logo workshop a teacher asked me, "Why do we need Logo if we have Kid Pix?". I replied that Kid Pix can be used to produce a drawing, but with Logo you also learn geometry and planning and debugging skills while creating your picture. She seemed satisfied with my response, but I really wasn't. Maybe I had given her a good teacher answer, but is wasn't a good kid answer.

Here's an example of a turtle graphics project done 18 years ago in the Brookline Logo Project, a research project conducted by the MIT Logo group and the Brookline, Massachusetts Public Schools (Watt, 1979). Deborah drew a rabbit with pencil and paper and wanted to duplicate the drawing using Logo.



Her teacher suggested a modification of the drawing that would make it easier to reproduce on the computer.

After two weeks of work, Deborah succeeded in creating her rabbit using the Logo turtle.

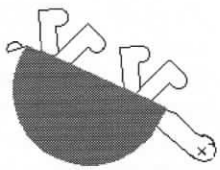
In 1975, Logo was the best software tool available to draw that rabbit. But today, you could do it in a minute using Kid Pix, or use a scanner (which is what I did to get the images into this article). But Kid Pix and scanners don't teach geometry! Hold on. Let's get back to basics for a moment.

In *Mindstorms*, written in 1980, Seymour Papert tells us about the criteria that were used to design a "new mathematics" for children. What he said is worth quoting at length:

> Turtle geometry started with the goal of fitting children. Its primary design criterion was to be *appropriable*. Of course it had to have serious mathematical content, but we shall see that appropriability and serious mathematical content are not at all incompatible. On the contrary: We shall end up understanding that some of the most personal knowledge is also the most profoundly mathematical. In many ways mathematics – for example the mathematics of space and movement and repetitive patterns of action – is what comes naturally to most children. It is into this mathematics that we sink the tap-root of Turtle geometry. As my colleagues and I have worked through these ideas, a number of principles have given more structure to the concept of an appropriable mathematics. First, there was the *continuity principle*: The mathematics must be continuous with well established personal knowledge from which it can inherit a sense of warmth and value as well as "cognitive" competence. Then there was the *power principle*: It must empower the learner to perform personally meaningful projects that could not be done without it. Finally there was the *principle of cultural resonance*: The topic must make sense in terms of a larger social context. I have spoken of Turtle geometry making sense to children. But it will not truly make sense to children unless it is accepted by adults too. A dignified mathematics for children cannot be something we permit ourselves to inflict on children, like unpleasant medicine, although we see no reason to take it ourselves.

Let's look at the rabbit project in light of Papert's three principles of an appropriable mathematics for children. Children move around in pretty much the same way as they did 18 years ago. The mathematics of the Turtle is still firmly rooted in the personal and natural "...mathematics of space and movement..." But using Logo in this way certainly does not empower today's child to do something "...that could not be done without it," nor does the activity resonate with the way in which the adult world does computer graphics. The rabbit wins on continuity but loses on power and cultural resonance. One out of three ain't good.

Is this the end? Is the Turtle dead?



Not exactly. The turtle is a very adaptable creature and can do more than draw. In 1980 when Logo emerged from the Logo Lab at MIT and went into the real world of schools it came in two varieties. One ran on the Apple II. With a single triangular Turtle, its graphics capability was similar to that of the large research machine that Deborah used for her rabbit project. The other ran on a Texas Instruments TI99/4. This one was a flamboyant Logo with 32 brightly colored "sprites" that could fly around the screen and change shape to be birds, flowers, or space ships. In the early 1980s different branches of the Logo culture emerged, one around Turtle graphics and another involved with animation and video games. These two traditions have endured to this day.

The domain of animation and game programming measures up quite well against Papert's criteria for an appropriable mathematics. Getting a bird to take off, drop an egg on someone's head, and then return to the nest, or causing two spaceships to

dock, or designing and building a pinball game are as much connected with the "...mathematics of space and movement..." as are drawing a house or a rabbit. They involve the same learnings about distance and direction, and also about time and motion.

Logo empowers the learner to create these action projects. Action-oriented programming resonates well with the modern culture in which computer games are commonplace, and computer-generated animation is part of movies, TV commercials, and the nightly weather report.

So where does that leave Deborah's rabbit? Now that we have Kid Pix, or for that matter MicroWorlds with its built in drawing tools, why do we need to draw with Logo? Is this the end for Turtle graphics?

Maybe not. Can you do this with Kid Pix?

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if :step > 100 [stop]
forward :step
right :turn
spiral :step + 1 :turn
end
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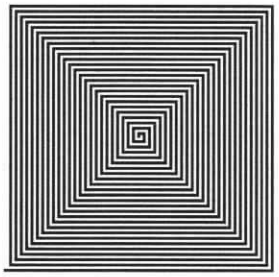

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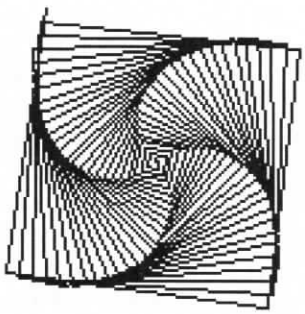

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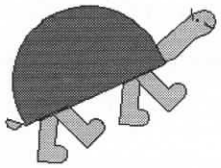

Long live the Turtle! ▲

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Turn to page 14.

The Case for Classic Logo

by David L. McClees and Dorothy M. Fitch

Logo is a classic – timeless and enduring. Just as *Treasure Island* should be on every student's reading list, so should Logo be a part of every computer room's curriculum. Why? Because Logo's learning environment is the best one for teaching the lessons students need to learn.

Logo is a learning tool, an environment that helps you, the teacher, guide students to lessons that are important for their growth and education. As a teacher, you choose the best tool or tools to help you teach students what they need to learn. But how do you match the educational tool to what you want to teach?

To teach mathematics and programming, Logo is the best tool available. To teach problem-solving, it is one of the best available. Specifically, Logo was designed to be a world for exploring fundamental math concepts, for teaching programming, and for teaching powerful analytical concepts, such as sequencing, iteration, and structure (breaking large problems into smaller ones). If you can think in these terms, you can also analyze the world around you.

In particular, with computers becoming a part of *all* jobs in all workplaces, students will need to know how to use simple programming concepts, regardless of the language. Spreadsheet macro users are programmers. VCR owners (at least those who can set their machine to record future broadcasts) are programmers.

We believe that classic Logo is the best tool for learning these valuable concepts. What do we mean by "classic" Logo? We mean a traditional Logo:

- that matches the environment described in Seymour Papert's *Mindstorms*, which woke countless educators to the power of Logo learning;
- that has no threshold and no ceiling;
- in which the user moves and turns a turtle using **forward, back, right,** and **left** commands;
- in which the user can add new words to Logo's vocabulary by defining new procedures using the **to** command;
- in which the user can look at all the procedures that make up his or her program;
- that is compatible with the Logo examples and activities found in many math texts and resources;
- that is suited to all levels and all abilities;
- in which everything that can be done with "point and click" can also be done using a command;
- that is a complete programming language, useful to even the most accomplished programmer.

What difference does it make which Logo you choose? Again, it depends on your learning or teaching goals. If you are graphing results of probability trials, it does not matter if the turtle looks like a triangle or a tyrannosaurus. If you are using Logo as a geometry construction tool, you probably won't need sliders and other gizmos. If you are simulating ant behavior, you might like to have multiple turtles with ant shapes over an "active" background. And if you are simulating a traffic scene, vehicle-shaped turtles that can move independently and perpetually may be useful.

By analogy, while an accomplished woodworker may wield a power router with ease, an apprentice woodworker can learn about wood's grain and textures by cutting, planing, and hand-sanding. Different environments and different tools encourage different thoughts and learning.

We have found that people like classic Logo because it continues to provide an environment in which (1) the focus remains on mathematics, programming, and analytical thinking, and (2) these concepts are *easily* taught.

Certainly some teachers always want the newest and latest. We do agree that modern interfaces offering more convenient "housekeeping," such as saving and printing, add to Logo without detracting from its core. However, many teachers believe that "bells and whistles" distract from the lessons they are trying to teach. They are concerned that as more and more conveniences are provided, students learn less and less about the underlying process. Some teachers prefer not to have an arc or circle primitive so that they can guide their students to a deeper understanding of a circle. Many teachers do not want students to be able to position the turtle with a function key. Rather, they believe students need to learn the math concepts involved, to experiment in order to fully internalize the lesson. To them, this is important learning – what makes Logo, Logo.

This is not to say that one can't learn math and programming using the newest versions of Logo. But how long will it take students to grasp the same concepts that are more readily attainable in classic Logo? In the limited time available, will students absorb the important learning Logo has to offer?

Recently, a high school teacher noted that she "gave the kids a 'real' Logo assignment (no paintbrushes and melodies and so on)." She reported that three out of fourteen kids asked if it were all right for them to use their 'old' Logo disks instead, "even though they could have done the same program in MicroWorlds® and just ignored the fancy stuff."

Even with "classic" Logo for the Macintosh, some teachers long for the simplicity of the unadorned Apple II Logo language. They prefer to focus on the lessons they wish to teach with Logo, rather than the "fancy stuff" that is possible.

Is there a place for classic Logo today? You bet. It offers the clearest and most powerful representation of what drew us all to Logo in the first place. ▲

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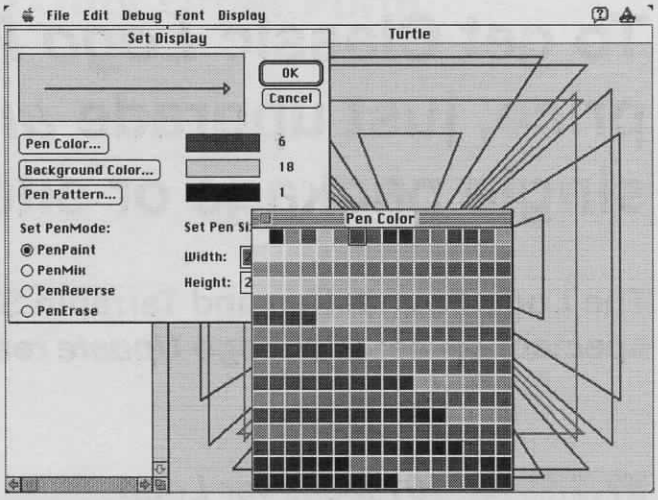
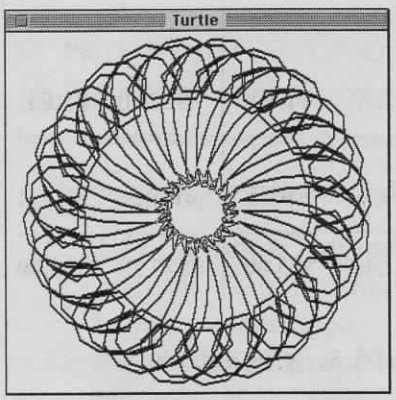
"Classic" *Logo PLUS for the Macintosh* in an up-to-date version!



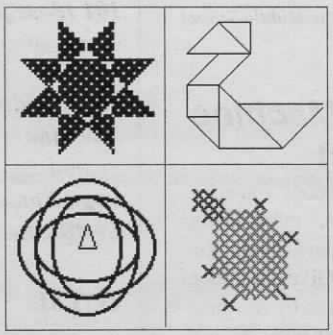
It's easy to preview your color environment in Logo PLUS.

Logo PLUS for the Macintosh version 2.0 is a "classic" Logo language with an exciting set of modern features. Many of these special features load automatically—they don't take up room when you don't want them, and they are available in an instant when you do!

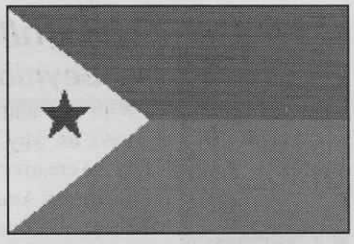
Use as many turtles as you want (here are 24!)



or stick with tradition.



Logo PLUS is ready for you when you want to explore the world!



Djibouti

Logo PLUS *requires a Macintosh® computer with a minimum of 4 MB of RAM, hard drive, and System 6.0.7 or higher (compatible with System 7.5). Printer and color monitor recommended. Site License is network aware.*

A New Version of Award-Winning Software!

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Check out these features!

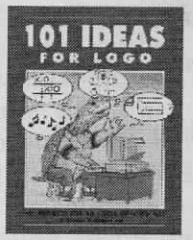
- ✔ command an unlimited number of turtles
- ✔ play with 124 rotating turtle shapes; lock a shape's heading
- ✔ create, flip and rotate shapes in the shape editor
- ✔ edit any of the 256 colors
- ✔ choose colors and patterns in the graphics preview window
- ✔ use the "slow turtle" mode to help young learners follow it more easily
- ✔ resize windows with the mouse or commands; use KEEPWINDOWS to start up your custom arrangement automatically
- ✔ create multiple windows: move turtles in different windows, paste from one edit window to another, create your own "help" window!
- ✔ type text in the Turtle window in any size, font, or style
- ✔ learn from the sample games and demo programs included
- ✔ load your graphics and programs into other applications

PLUS procedure burying, arrays, property lists, robotics drivers, and more…

The popular ***documentation*** includes a step-by-step **Guide** (9 Lessons, 2 Projects, and 5 Exploring chapters), a detailed **Reference Manual**, handy **Quick Reference Guide** and **Quick Reference Card**, and a **QuickStart!** booklet that helps you get going right away!

To get Classic *Logo PLUS* at a bargain price, just upgrade *any* version of Logo – single package or site license!

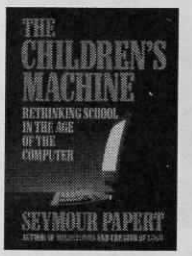
The Logo Foundation and Terrapin Software have put together a spectacular deal for *Logo Update* readers – one no Mac user can refuse!



101 Ideas for Logo

101 Ideas for Logo is packed with Logo project ideas. It does not teach you Logo, but will send you on months of Logo adventures! Compatible with almost every version of Logo, *101 Ideas* offers easy projects for beginners and plenty to challenge expert programmers. Perfect for kids at home or at school. (128 pages)

"This book is an excellent resource for anyone who uses Logo with students."
— *Mathematics Teaching in the Middle School*



The Children's Machine by Seymour Papert

"With wit and insight, Seymour Papert... shows us why 'little schools,' cybernetics, and the creative use of computers can revolutionize how Americans learn. Give schooling, he says, back to the grass roots by devising ways for parents and kids to take ownership of their own learning." (hardcover, 256 pages)
— Jerry Brown, former governor of California

Save 10%

10% Logo Foundation Discount Certificate

Save 10% on any single order of books, software, and video tapes from the Logo Foundation prior to April 30, 1996.

Upgrade:	Single		Site License†	
and get:	Regular Price	***Special Price***	Regular Price	***Special Price***
Logo PLUS	$99.95	**$75.00**	$500.00	**$350.00**
and				
101 Ideas for Logo (single book)	$19.95	**FREE**		
or				
101 Ideas for Logo (site license)			$50.00	**FREE**
and				
The Children's Machine	$22.50	**FREE**	$22.50	**FREE**
and				
Logo Foundation Certificate	priceless	**FREE**	priceless	**FREE**
TOTAL	$142.40	**$75.00**	$572.50	**$350.00**

† First 30 workstations.
Extra workstations $10.00. Sorry, no discount.

SPECIAL for Terrapin Users:

We always treat Terrapin customers the best, so we are offering you the deal above for an even more amazing price!

Upgrade to *Logo PLUS* for: **$60.00** or **$275.00**

Proof of purchase required: sales receipt, warranty card, or photocopy of disk, binder, or documentation page.

This is a ***limited time offer***. You must place your order by **December 31, 1995**!

Use the attached order form or call Terrapin at 800-972-8200.
(Be sure to mention this Logo Foundation flyer
or you won't get any of the free stuff!)

Special *Logo PLUS* Offer Order Form

Ship to: Is this your ____ home or ____ school address?

Name _____

Address *(no PO Boxes, please)* _____

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Daytime telephone *(in case we have questions about your order)* (_____) _____

Site License Information:

School Name _____ Grades _____

Address *(no PO Boxes, please)* _____

City/State/Zip _____

Telephone (_____) _____ Contact _____ Position _____

Billing Information:

❑ **Check** enclosed (payable to Terrapin Software, Inc.)
❑ **Purchase Order** enclosed ($20 minimum, from U.S. schools)
❑ Please **charge** to this credit card: ❑ Visa ❑ MasterCard Card number _____ Expires ___/___

Fill in the price next to each item you wish to order:

***Logo PLUS* Single Upgrade (with free books and discount certificate)**		
from any Terrapin Logo *(proof of purchase required; see previous page)*	$60.00	_____
from any other Logo	75.00	_____
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from any other Terrapin Logo: My current Site License # _____	275.00	_____
from any other Logo	350.00	_____
101 Ideas for Logo *(in case you didn't take us up on the entire offer)*		
Single book	19.95	_____
Site License (book plus blackline masters)	50.00	_____
	Subtotal	_____
	Shipping (5%, minimum $5.00)	_____
	Tax (Maine only, 6% of subtotal)	_____
	GRAND TOTAL	_____

Return your order ***by December 31, 1995*** *to:*

Terrapin Software, Inc.
400 Riverside Street
Portland, ME 04103
Phone: 800-972-8200 or 207-878-8200
Fax: 207-878-0956
E-mail: 71760.366@compuserve.com

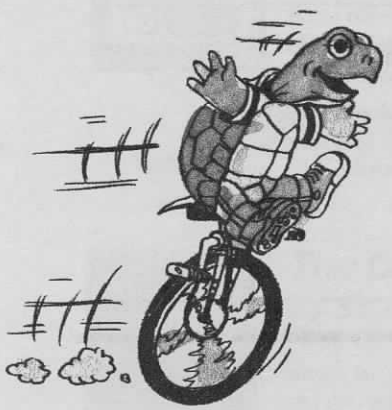
Be sure to mention the Logo Foundation offer!

How can you get over 100 Logo ideas for *FREE*?

Ordinarily, you would pay $19.95 for a single copy of *101 Ideas for Logo* and $50.00 for a site license. With this special offer, you can get yours for free!

Hurry and see the amazing deal inside!

101 Ideas for Logo is packed with classic Logo project ideas. There are simple ideas for beginners and complex ideas to challenge even the most experienced Logo programmer.



Compatible with almost every version of Logo, these ideas use turtle graphics, words and lists, music, shapes, animation, and multiple turtles. There are enough projects here for months of Logo adventures!

Each project tells you what Logo skills you will need: drawing with the turtle, writing and editing procedures, using variables, IF instructions, or recursion. Then you're off!

What fun you will have making quilts, creating wacky proverbs, playing musical duets, drawing pyramids, or animating a space scene.

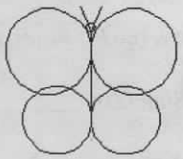
This book will not teach you Logo—you can learn Logo in a class or from your documentation. This book *will* give you lots of ideas to explore. And the Things to Try sections will give you even more ideas for expanding the projects. You're limited only by your imagination!

Use these ideas in a computer lab when you teach Logo or in the classroom as you teach other subjects. Many of the ideas tie directly into your math, science, language arts, social studies, and music curriculum.

Whether you are learning Logo at home or using it in school, ***101 Ideas for Logo*** will entertain, challenge, and delight you!

A Sampling of Beginning Projects:

Aim for the Moon
Telephone Music
Butterflies
Jigsaw Puzzle
Bicycle Wheel
Pentominoes

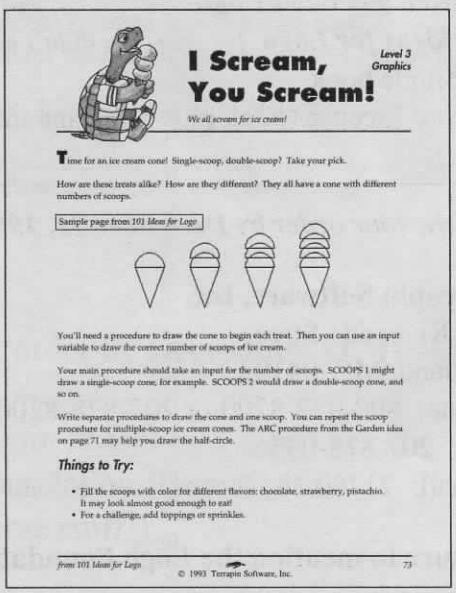


A Sampling of Intermediate Projects:

Quilting Bee
Adventure Game
Snowflakes
Tangrams
Flags of the World
Inca Tapestry

A Sampling of Advanced Projects:

String Art
Roman Numerals
The Four Bugs
Morse Code
Rat in the Maze



I Scream, You Scream!

Level 3 Graphics

We all scream for ice cream!

Time for an ice cream cone! Single-scoop, double-scoop? Take your pick.

How are these treats alike? How are they different? They all have a cone with different numbers of scoops.

Sample page from *101 Ideas for Logo*

You'll need a procedure to draw the cone to begin each treat. Then you can use an input variable to draw the correct number of scoops of ice cream.

Your main procedure should take an input for the number of scoops. SCOOPS 1 might draw a single-scoop cone, for example. SCOOPS 2 would draw a double-scoop cone, and so on.

Write separate procedures to draw the cone and one scoop. You can repeat the scoop procedure for multiple-scoop ice cream cones. The ARC procedure from the Garden idea on page 71 may help you draw the half-circle.

Things to Try:

- Fill the scoops with color for different flavors: chocolate, strawberry, pistachio. It may look almost good enough to eat!
- For a challenge, add toppings or sprinkles.

from 101 Ideas for Logo 73

Meet Roamer!

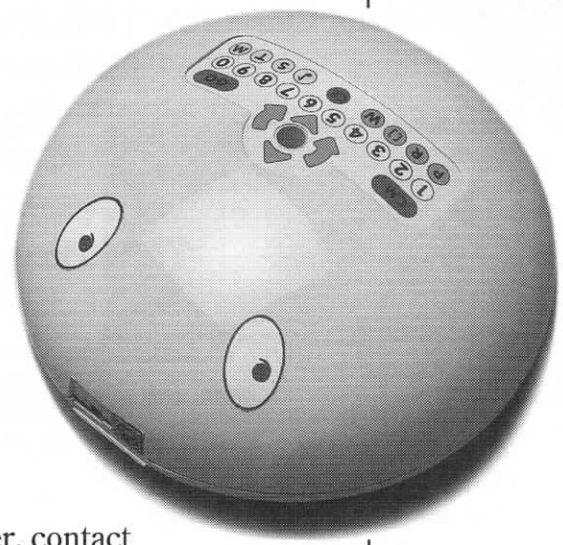
Introducing the very latest in Logo technology - Roamer! Combine the magic of the world of robotics with the fun of Logo for even the youngest child with Roamer, an easy-to-use and friendly robot.

Roamer is the ideal way to introduce Logo commands in your classroom. It brings Logo to life in a friendly and tangible way. Since Roamer has Logo already on-board, it's like having a computer dedicated to your Logo lessons. Children can touch, feel, and follow the Logo turtle as it moves about.

Begin Logo explorations with a true hands-on experience.

Roamer is designed to be sturdy, with few moving parts and a simple and friendly shape. It's easy to use - with a brightly colored touchpad featuring single key-stroke commands. Roamer is lightweight and robust. Roamer is battery-powered and offers you hours of Logo adventures - exploring, discovering and building.

Available kits make it possible to customize Roamer - eyes, nose, ears, a tail - let the children design their own! There are even four different shells to change Roamer's color to red, yellow, white, or green. Insert a colored marker pen and watch Roamer draw fascinating designs.



Roamer can also play music. Pitch, duration, and tempo add an extra dimension to any Logo lesson. A simple and clear User Guide and Activity Book accompany Roamer and will start your students on their way to hours of Logo fun and learning. **$299.95**.

For more information or to order your Roamer, contact Harvard Associates at 1-800-774-LOGO or fax 1-800-776-4610.

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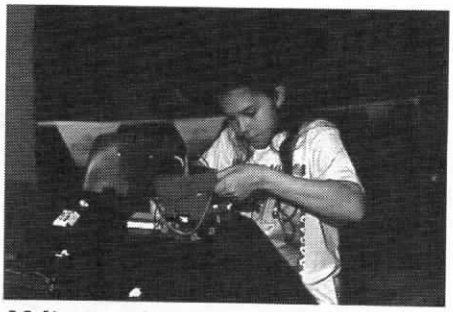
Continua...

Fred Martin, co-author of "Building and Leaning with Programmable Bricks" (Logo Update, spring 1995) reports that the Rhode Island School of the Future held its **Robotic Park** exhibition at the Peace Dale Elementary School in Wakefield, Rhode Island on April 29, 1995. Over 150 people from 15 schools attended the event.

During the morning a series of workshops were held for teachers, including discussions on the Internet, the Programmable Brick, and other educational technologies. For the main event, the gymnasium was set up as a safari theme park, with paper palm trees, six-foot high murals, and mood music. The children's work was on display along a path through the exhibit.

Among the projects demonstrated were a robotic dinosaur that tracked its prey (a Jeep), an alligator with snapping jaws, a cluster of miniature LEGO turtles, an elephant, a polar bear, and a LEGO crab with moving claws.



Melissa works on the Jeep

* * *

Logosium '95 was held in Baltimore on June 16th. There were presentations of classroom Logo projects, including *African Textiles* by Orlando Mihich, *Logo, Math, and Music* by Hope Chafiian and Eleanore Bednarsh, *Children & Publishing, Multimedia Style* by Susan van Gelder, and *MicroWorlds' Graphics Secrets* by Jerry Crisci. Steve Costa reported that *Logo Is Alive and Well Down Under* in Australia and Marian Rosen talked about the problems of *Keeping 'Em Down on the Logo after They've Seen MicroWorlds*. Doug Clements and Julie Sarama Meredith led a discussion about the past, present, and future of Logo reasearch.

Michael Tempel gave an overview of Logo telecommunications activity.

Sharnee Chait, of LCSI, and Dorothy Fitch, of Terrapin, fielded questions, suggestions, and demands from Logo users.

Tom Lough led a discussion about curriculum and project possibilites with LEGO® Dacta's new Control Lab™ while Mitchel Resnick offered a glimpse of the future with a session on the Programmable Brick.

Mitchel also led a workshop on StarLogo, a massively parallel version of Logo which he created.

Ihor Charischak and Gary Stager led sessions on Logo and mathematics.

Dorothy Fitch of *Logo Exchange*

Order **CRYSTAL RAIN FOREST** from the Logo Foundation. Turn to page 14.

and Michael Tempel of *Logo Update* hosted a "meet the editors" session.

Eleanora Badilla and Mel Levin described experiences with Children's Logo Conferences in Costa Rica and Philadelphia. Plans are under way to include children's activities in **Logosium '96**, which will be held in Minnesota on July 14th. See the Call for Participation on page 16.

* * *

In the winter 1995 issue of *Logo Update* we reported that the **Logo Foundation** and the **Global SchoolNet Foundation** had started a Logo discussion group on the Internet called **Logo-L**. Along with moderators Michael Tempel and John St. Clair over 200 people are discussing classroom projects, sharing ideas, exchanging information about Logo resources, and getting technical questions answered

The group has a new address: **Logo-L@gsn.org**. To join you need access to Internet e-mail. Send a message to **majordomo@gsn.org**. The message should contain just the single line:

subscribe Logo-L

You'll receive the group messages along with your regular e-mail.

* * *

Michael Tempel of the Logo Foundation is also looking after the LEGO/ Logo/ Microworlds area on **Scholastic Network**. Many Logo Foundation publications are being placed in the Library for downloading. If you're connected, check in through the Math Area or from the Technology Kitchen. For information about Scholastic Network call (800) 864-0425.

* * *

The St. Paul Logo Project and the Logo Foundation sponsored two **Logo Summer Institutes** last June and August. These one-week workshops offered an immersion in Logo theory and practice for dozens of St. Paul teachers and guests from across the United States and abroad. Most participants worked in MicroWorlds, creating spectacular graphics, animated stories, games, and multimedia extraveganzas. One of these projects, *Park* by Charles Lee is shown on page 4.

The Institutes included dialog groups that explored the role of technology in society and in education, and issues of learning styles and teaching strategies.

A follow-up workshop on LEGO Logo will be held in November and another session is scheduled for March.

Join us next summer in St. Paul for the 15th annual **St. Paul Logo Summer Insititutes**. See page 12 for more information.▲

Order *Object* **Logo** from the Logo Foundation. Turn to page 14.

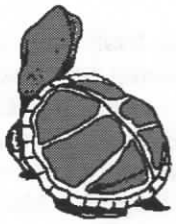
Summer's over. It's time to plan for next summer!

The 1996 Logo Summer Institutes

The Logo Summer Institutes are intensive five-day workshops that provide for an immersion in Logo theory and practice. The individualized approach of the Logo Summer Institute accommodates experienced Logo users as well as novices. Work in a variety of Logo environments to explore ideas in language, science, and mathematics. Design and build multimedia projects, games, and computer-controlled machines.

Logo St. Paul

Over the past 14 years the St. Paul Logo Project has provided a comprehensive professional development program for hundreds of elementary and secondary school teachers. A limited number of places are being set aside for people from outside the St. Paul Public Schools.



Summer at Spence

The Spence School, an independent school for girls located in the heart of New York City just steps from Manhattan's Museum Mile, is a leader in educational technology. Join the Spence staff for a week of Logo exploration and creation.

✔ Your registration includes
- all workshop materials;
- personal use of a computer – one machine per participant;
- use of a variety of Logo environments including MicroWorlds, Object Logo, StarLogo, Logo Plus, UCBLogo, HyperStudio, PCLogo, and others;
- follow-up workshops in November 1996 and March 1997, each a day and a half long.

✔ Big discounts on purchases of Logo software, books, and materials.

✔ St. Paul registrants may also receive three graduate quarter credits from Hamline University.

Logo St. Paul
When: June 17 - 21 or August 19 - 23
Where: St. Paul, Minnesota
Tuition: $490 per person
$120 for Hamline University credit

If you are a teacher in the St. Paul Public Schools these registration procedures and fees do not apply to you. Instead, contact Ms. Geraldine Kozberg at 360 Colborne Street, 228-3631.

Summer at Spence
When: June 24 - 28
Where: New York City
Tuition: $790 per person

Contact us for more information about Logo Summer Institutes and for registration materials. You may include your request on the order form on page 15.

Logo Foundation
250 West 57th Street
New York, NY 10107-2228
telephone: 212 765 4918
fax: 212 765 4789
michaelt@media.mit.edu

Attend **Logosium '96** on June 14th and stay for Logo St. Paul the following week! (See page 16 for Logosium information.)

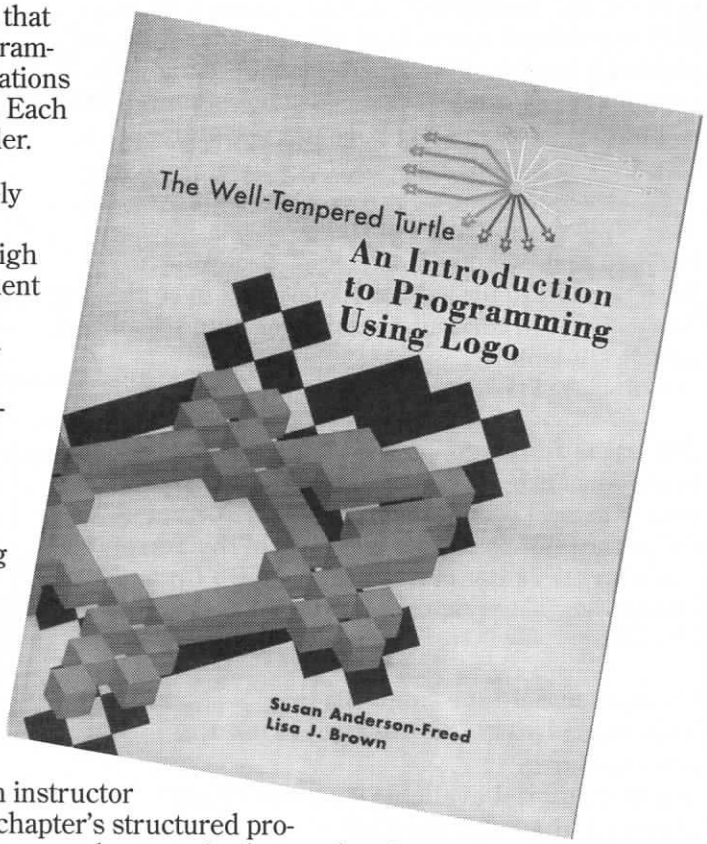
Order **The Well-Tempered Turtle** from the Logo Foundation. Turn to page 14.

The Well-Tempered Turtle

An Introduction to Programming Using Logo

by Susan Anderson-Freed and Lisa J. Brown

The Well-Tempered Turtle is a new curriculum that uses Logo as a means of testing and exploring programming concepts. It emphasizes learning Logo applications and highlights Logo's unique programming power. Each chapter is independent and may be used in any order.



The Well-Tempered Turtle has been extensively field-tested in introductory college level computer science courses and is appropriate for students of high school and college age. By utilizing Logo to implement examples, *The Well-Tempered Turtle* has students quickly writing their own programs to explore computer science concepts. Students build on simple introductory programs to explore increasingly complex subjects, progressing for example from line drawings to fractals and bit-mapped graphics.

The Well-Tempered Turtle also provides a complete introduction to computer science covering such topics as data types, control structures, graphics, natural language processing, and music. Appendices provide supplementary information on the history of computers, mathematics and grammar.

Since *The Well-Tempered Turtle* contains more material than can be covered in a semester, an instructor can pick and choose the topics to emphasize. Each chapter's structured progression encourages students to learn at their own pace and pursue further exploration.

The Well-Tempered Turtle is written by Dr. Susan Anderson-Freed and Dr. Lisa J. Brown, Professors of Computer Science at Illinois Wesleyan University. Together they have more than 27 years' experience teaching mathematics, programming and computer science. Their Logo courses are both highly demanding and in high demand among students at Illinois Wesleyan, and always fill immediately.

250 pages. **$49.95**

To order *The Well-Tempered Turtle,* please call 1-800-774-LOGO
or fax 1-800-776-4610

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Books and Software

Many of the items listed here are described elsewhere in this issue of Logo *Update*. Turn to the pages indicated for more information about these products.

Place your order now!

Minds in Play: Computer Game Design as a Context for Children's Learning
by Yasmin Kafai
"A mine of ideas for teachers in search of computer projects for their students or themselves" - Seymour Papert

LB110P	$24.95 (paperback)
LB110H	$59.95 (hard back)

Teaching With Logo
by Molly and Daniel Watt
This is a unique source book offering educators and parents a wealth of information about using Logo. It contains many samples of students' programs and techniques for managing Logo in the classroom.

LB111	$15.00

The Well-Tempered Turtle
by Susan Anderson-Freed and Lisa J. Brown
Turn to page 13 for a detailed description of this comprehensive curriculum guide for high school and college students.

LB112	$49.95

101 Ideas for Logo
by Dorothy Fitch
Lots of great Logo ideas for less than 20¢ apiece! A full description is on the last page of the Terrapin insert in the center of this issue of *Logo Update*.

LB113SC	single copy	$19.95
LB113SL	site license	$50.00

Computer Science Logo Style
Volume 1: Intermediate Programming
by Brian Harvey
The best tutorial available for learning Logo. It's out of print, but we still have a few copies left.

LB114	$22.95

Roamer
Look at the description of this creature on page 9.

LROAM	$299.00

MicroWorlds (page 5)

Macintosh	MSDOS		
LSMWM	LSMWD	Single Copy	$ 99.00
LSMW6M	LSMW6D	Six Pack	$350.00
LSMWSLM	LSMWSLD	Site License	$999.00

Logo Plus for the Macintosh (center insert)

LSLP	SingleCopy	$ 99.95
LSLPSL	Site License	$500.00*

* For up to 30 workstations. Add $10 for each additional computer.

PC Logo (page 7)

MSDOS	Windows		
LSPCD	LSPCW	SingleCopy	$ 99.95
LSPCDSL	LSPCWSL	Site License	$100.00*

* plus per-workstation fee:

1 - 20 workstations	$15.00 each
21 - 40 workstations	$12.50 each
41+ workstations	$10.00 each

Mach Turtles Logo for Windows (page 3)

LSMT	SingleCopy	$ 49.00
LSMT5P	Five-Pack	$ 99.00

Object Logo for Macintosh. (page 11)

LSOLSE	Student Edition	$ 75.00
LSOLFV	Full Version	$ 195.00
LSOL5P	Five-Pack	$ 341.00
LSOL10P	Ten-Pack	$ 487.00
LSOL20P	Twenty-Pack	$ 585.00

Crystal Rain Forest (page 10)

Macintosh	MSDOS		
LSCRM	LSCRD	Single Copy	$ 49.00
LSCRMS	LSCRDS	School Edition	$ 59.00
LSCRMSL	LSCRDSL	Site License	$250.00

Park
by Charles Lee
This is the project shown on page 4. The disk contains the program, which draws a different park each time it is run. A demo version of MicroWorlds is included on the disk.

LSPM	$ 2.00 (Macintosh only)

Professional Development

Request more information!

The Logo Foundation offers the best professional development services.

- **Quick Start Workshops** - If you've just traded up to a new version of Logo we can help you make an easy and efficient switch. Explore new features and new possibilities.
- **Project Building Workshops** - Design and construct curriculum projects, games, and multimedia presentations. Learn about working with graphics, text, animation, sound, music, and video.
- **Summer Institutes** - Spend a week investigating many aspects of Logo Learning in a relaxed setting.

✔ Get **big discounts** on software and books in conjunction with Logo Foundation workshops and institutes.

Order Form

To place an order:

1. For each item you want, fill in the form below with:
   - the item code (it begins with L)
   - name or description of the item
   - the quantity you want
   - the price for the quantity you want
2. Add up the cost of all your stuff and enter it under sub-total.
3. Figure out the shipping and handling charge. Regular shipments are via UPS or US Postal Service.
   United States: 5% of the sub-total with a minimum charge of $4.00
   Canada and Mexico: 10% of the sub-total with a minimum charge of $8.00
   The rest of the World: Inquire before ordering, stating whether you want us to ship by air or by sea.
   Rush Orders: We can ship overnight or second day delivery. Inquire about costs before ordering.
4. Add the shipping and handling charge to the sub-total and enter that amount under TOTAL.
5. Please consider making a tax-deductible contribution to the Logo Foundation. Thanks.
6. In the "Send me" section below, check off the items that you want more information about.
7. Send this form with a check or school puchase order to:

Logo Foundation
250 West 57th Street
New York NY 10107-2228
telephone: 212 765 4918
fax: 212 765 4789

Payment must be in US dollars.
Purchase orders and inquiries may be faxed.

Send me:

Information and registration materials for the Logo Summer Institutes:
❑ Logo St. Paul ❑ Summer at Spence

❑ Information about Logo Foundation Professional Development Services

❑ A free subscription to *Logo Update*

Place my order for:

item code	description	quantity	price
		sub-total	
		shipping & handling	
		tax-deductible contribution to the Logo Foundation	
		TOTAL	

Name _____

Address _____

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City _____ State _____ Zip _____

Telephone _____ Fax _____ e-mail _____

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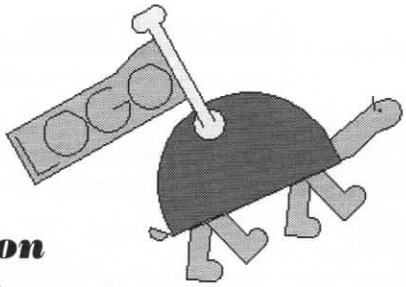
250 West 57th Street
New York NY 10107-2228

Logosium '96

St. Anthony Park Elementary School
St. Paul, Minnesota
Friday, June 14, 1996



Call for Participation

The third annual Logosium will be a day of Logo workshops, discussions, and presentations hosted by the world-renowned St. Paul Logo Project. This year Logosium will include sessions conducted by students sharing their projects with other students and with adults.

Sessions may be one-hour presentations or panel discussions, or two-hour hands-on workshops, on any topic of interest to the Logo community.

If you wish to offer a session, submit a one-page description of what you have in mind to:

Marian Rosen & Michael Tempel
c/o Logo Foundation
250 West 57th Street, Suite 2228
New York, NY 10107-2228
Telephone: 212 765 4918 Fax: 212 765 4789
e-mail: mbrosen@oui.com michaelt@media.mit.edu

The deadline for submissions is March 1, 1996.

For registration and hotel information contact:
NECC '96
1787 Agate Street
Eugene, OR 97403-1923
Telephone: 503 346 2834 Fax: 503 346 5890
e-mail: necc@oregon.uoregon.edu

Logosium is an NECC '96 post-conference activity sponsored by the Logo Foundation and ISTE's SIG Logo.

Attend Logosium and stay for **Logo St. Paul** the following week! (See page 12 for more information.)

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