

Logo Update

The Logo Foundation Newsletter ▲ Volume 5, Number 1 – Fall 1996

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Fifteen years ago Gerry Kozberg founded the St. Paul Logo Project. She has provided the Logo community with a unique leadership, keeping us focused on fundamental educational issues that surround our use of Logo. Just a few weeks before her retirement last summer she gave the keynote address at Logosium '96. That speech is the lead article in this issue of *Logo Update*.

The St. Paul Logo Project is primarily a teacher education effort, a key component of which is the Logo Summer Institute. In August 1997 Logo St. Paul will be held for the sixteenth consecutive summer with a limited number of places reserved for people from outside the St. Paul Public Schools. Logo Summer Institutes will also happen in New York City and in Colorado. Turn to page 7 to find out more.

Another summer activity is the fourth annual Logosium, which is scheduled for June 29 in Seattle, just prior to the annual NECC conference. The Call for Participation appears on page 16.

In "Understanding the Mathematics of Banking" Celia Hoyles and Richard Noss describe what happens when Logo enters unfamiliar territory.

Finally, throughout this issue of *Logo Update* you will find advertisements for the growing list of Logo products. You can obtain most of these at discount prices from the Logo Foundation. Ordering information is on pages 14 and 15.

Michael Tempel

Whatever Happened to the Revolution?

by Geraldine Kozberg

In the halcyon days of the early 80s, the technology was new and euphoria high. Logo would transform our schools. From all over the world, the Logo community converged on MIT. Logo 84. Logo 85. Logo 86. We were ready for Star Wars.

At the final session of Logo 86, however, Brian Harvey and Bill Higginson stunned the audience with the question, "Whatever happened to the revolution?" *Logo Exchange* asked me to respond to Brian and Bill, an open letter of sorts. Here are parts of that letter:

Dear Brian and Bill,

Your presentation at Logo 86 was stunning. It was a piece of theater, a *New Yorker* postscript, a witty, sophisticated, calculated statement on education in general, and Logo in particular.

You speak of revolution. You ask, "Whatever happened to the revolution?" It depends. It depends on definitions and perspectives.

Nikolai Lenin: From a Lenin-like view of revolution, we know that we have the weapons. We know how to teach; we have the tools and the resources. We do not have what Lenin called an "intolerable level of discontent." People bitch a lot, but not enough to upset the status quo.

Martin Luther King: From the teaching and life of Martin Luther King, we know that revolutions are not created by the masses, rather by the small committed minority. We have a small committed minority within the Logo community. We do not have a critical mass.

Stephen Jay Gould: From the theoretical mind of Stephen Jay Gould, we understand cultural change in terms of "transformation." Change is preceded by a slow accumulation of stresses that the culture resists until a breaking point is reached, moving the culture to the next higher level of transformation.

Learning in a computer culture in 1986 is learning in a changing culture.

continues on the next page



Gerry Kozberg at a 1986 Logo Summer Institute in St. Paul, Minnesota



Logo Foundation

250 West 85th Street

New York, NY 10024

Telephone: 212 579 8028

FAX: 212 579 8013

email: michaelt@media.mit.edu

http://el.media.mit.edu/groups/

logo-foundation/

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Whatever Happened to the Revolution?

continued from page 1

I would say we are a culture in transition, not revolution. We experience resistance, but the more things change ... the more things change!

Logo teachers see change. What do they see? They "see" students thinking. The following learning behaviors—there are eight—were culled from teacher observations and anecdotal reports.

Students talk to themselves and to others. The act of languaging one's thoughts is a form of verbal mediation, a way of mediating and clarifying understanding.

Students move. Heads, hands, shoulders move with the turtle. Syntonic learning appears to be firmly related to how children process their worlds.

Students draw upon mental images. Memory is grounded in words and images. Visual imagery facilitates the storage and retrieval of information and instruction.

Students regulate their work. Casual explorations with the turtle

give way to conscious control. Self-correction and evaluation are related to the sense of empowerment and control that we see in mature learners.

Students look for and create patterns. Pattern recognition is a basic strategy of organization and comprehension at the meta-cognitive state of learning awareness.

Students use Logo procedures as building blocks. The process of breaking problems into meaningful pieces of deconstruction has long been associated with formal problem solving.

Students compose and create. Artists describe the process of composition as impressionistic and generative. Ideas seemingly emerge, one idea triggering or guiding the next one, the subconscious driving the conscious.

Students present. Young people enter the adult world of presenters with confidence and poise. The work they present is their own.

These behaviors tell us something. Collectively, they give us an extraordinary new way of looking at learning. It may not be a revolution, but a new culture is emerging.

We call it a Logo culture. We are too close to it to fully understand it. The impact on learners and learning environments involves complex relationships. We have yet to tease out the nuances and subtleties. This is what I see:

Stronger Learners... stronger in the sense of learners who use their intuition, who claim ownership of their learning, and are thus free to risk in order to learn more. I see students using learning modalities that are not tapped by the present curriculum.

Real Work... a work intensity that is satisfying and worthwhile; a work ethic that encourages co-learning. Gender roles and age differences are blurred.

Expanded Vision... in the shape of new visual forms that expand our vision and guide us toward a clearer understanding of our changing world. Throughout history, artists have operated at the edge of social and cultural change. The fluid rhythms and transformations of Logo images are

visual expressions of a new aesthetic.

Thank you, Brian and Bill, for pushing us to new levels of consciousness and concern.

I leave you with the words of the poet, Robert Frost: "I bid you a one-man revolution."

Sincerely,

Geraldine Kozberg

The above letter is dated August 10, 1986. Ten years have passed.

My enthusiasm and support for Logo has not diminished. I still see stronger learners, real work, and new visions, but the realities of our schools are harsh and compelling. There has been no revolution. The promise of systemic change is yet to come as the power of Logo waits its turn.

It is time for another letter. This one is addressed to you, the larger Logo community.

Dear Friends,

Whatever *did* happen to the revolution? The conditions for revolution were not present: There was no intolerable level of discontent, no critical mass, no breaking point in the larger culture; some cracks, perhaps, but no breaking point.

Revolution? In my school district we talk about test scores, violence, poverty, immigration. Technology? We talk about computers and the Internet. We buy computers and we inventory them.

The Logo community has been unable or unwilling to confront the larger social issues that are tearing at public education. In 1981, I wrote: "Logo is one part of a larger change effort designed to serve as an intervention in learning and learning environments."

For the most part, this has not happened. The problem is not the technology, certainly not Logo. The problem is one of equity. Logo is for all kids, but the kids who need Logo the most have no access to it. They are relegated to educational games and instruction in the basic skills.

Logo remains the province of a small, somewhat special group of schools, teachers, and students:

- Teachers who are sophisticated learners themselves
- Students identified as gifted and talented
- Middle class and upper middle class populations
- Private and suburban schools

Logo is for all kids. That does not mean all kids are the same, or that the Logo experience is the same for all kids. Rather it talks to the power of Logo as a language of learning, an instructional process appropriate for a wide-range of learning behaviors.

Which brings me to my second point, learning and learning environments. We have not done a good job of helping teachers understand the learning process, not Logo, but learning itself. We have not paid serious attention to the social determinants of achievement, focusing instead on cognition and the technology. For some students, social and behavioral skills may be a pre-requisite to class-

room participation and learning.

Papert taught that the context for human development is always a culture, never an isolated technology. School is a social institution and Logo understands the principles of learning within the culture of the school. Learning takes place in a social context. Learning is grounded in our social and cultural histories. Why, then, doesn't Logo learning transfer? Why doesn't the integrated learning of Logo pervade the culture of the school?

In Czarist Russia, Jewish children were not allowed to attend the public schools. When Marc Chagall was thirteen, his mother bribed a local school official and Chagall entered the secular, academic world. In his autobiography, Chagall remembers a wondrous time in his geometry class of "... lines, angles, triangles, squares..." They carried me far away to enchanting horizons. And during those hours of drawing, I lacked only a throne."

Piet Mondrian, the Dutch artist. When we examine the structural evo-

lution of Mondrian's work, we begin to understand the deconstruction of the process into its most elemental forms. Reconstruction takes on different forms.

What could be more relevant for today's young people than the visual learning of Chagall, Mondrian, Logo?

The findings of Logo studies in Saint Paul suggest that improved achievement is more likely to occur at the lower end of the scale. Kids at the top already have their set of "gears" to work with. Kids at the bottom are still looking. The odds are that when they find their "gears," the learning process will be strengthened. It may be that Logo facilitates the development of natural learning systems, and especially for those youngsters who have not had the freedom to make learning connections in their own unique ways.

On Monday, we begin our 15th year of continuous Logo teacher education in Saint Paul. I hope the next fifteen years will concentrate on issues of equity and the dynamics of learning. Some will argue that I am

continues on page 4

Seymour Papert's new book is here!

The Connected Family: Bridging the Digital Generation Gap

is about children, families, and computers.

A special arrangement between the Logo Foundation and Longstreet Press enables **Logo Update** readers to obtain a copy NOW for only \$17.95 plus shipping and handling. That's \$5.00 off the regular list price.

The Connected Family is more than a book. It includes a Macintosh/Windows CD with demo versions of software, including **MicroWorlds™**, **My Make Believe Castle™**, **Hollywood™**, and **Juliard Music Adventure™**. Here's how to order:

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Whatever Happened to the Revolution?

continued from page 3

asking too much of Logo. Not so. I would ask why have we denied access to Logo for significant populations? I would ask why have we lost the educational context to technocentric commercial interests?

Logo takes on social and political perspectives as schools search for solutions that will act upon the forces that create and maintain inequity in public education.

At the end of the year, we plan to open five Logo centers in Cambodia, a small country half way around the world, ravaged by war and social upheaval. Phnom Penh ... Battambang ... Siem Reap ... Takeo ... Ratanakeri. Strange and exotic sounds that translate into people and places.

Phnom Penh, a city of one million. The Logo center will be housed in a high school serving 6,500 students in three shifts.

Siem Reap, a rice village, site of the ancient ruins of Angkor Wat, on

the edge of the jungle hiding Pol Pot and the Khmer Rouge guerrillas.

Ratanakiri, a remote mountainous province bordering Laos and Vietnam, accessible only by air. Electricity was installed last year.

Our challenge will be to apply the lessons of the first fifteen years: helping teachers understand the learning process, learning environments, and why Logo is for all kids.

I end this letter with a story: In old Cambodia, the people tell of three monks who were looking at a banner flying from the top of their temple. The first monk said, "The banner is moving." The second monk said, "No. The wind is moving." The third monk said, "It is the mind that is moving."

I heard this story in 1988 in a makeshift temple in a refugee camp on the Thai-Cambodian border. The image of "the moving mind" helped me transcend the suffering and deprivation of the camp, and moved me to focus on the wonder of the human mind and spirit. The mental image of the mind in motion has stayed with me. It is a fitting metaphor that helps

me understand Logo and learning in a computer culture.

Love,
Gerry

Gerry Kozberg may be contacted at:
740 River Drive
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Turn to page 7 for information about Logo St. Paul, and other 1997 Summer Institutes. Also look at the Logosium '97 Call for Participation on page 16.

When You Are Really Serious About Logo...

Introducing PC Logo, a powerful new version of the Logo programming language designed for the IBM PC and compatibles. PC Logo is versatile and flexible, suitable for novice as well as experienced programmers. With more than 300 built-in commands, PC Logo supports all the functions you would expect from a full-featured Logo program.

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Understanding the Mathematics of Banking

by Celia Hoyles and Richard Noss

The Swiss Bank Corporation came to us in May 1994 with a problem. Many employees did not have a robust grasp of the mathematics underpinning much of their work – they had little “feel” for the mathematics which would enable them to appreciate the models underlying the financial instruments they were using and to recognize their limitations. More generally, there was a lack of a mathematical culture in the bank. Many felt uncomfortable with mathematical ideas, and would certainly be unlikely to talk about them, or to display their ignorance of them.

We had no previous contact with banking and finance. It seems that one of the senior managers had come across a review of our book*, which

*Hoyles, Celia and Noss, Richard, editors, *Learning Mathematics and Logo*, 1992, MIT Press, Cambridge, MA

tells how programming computers can empower users (our “users” are mainly children) to learn mathematics. Our own work, and that of others in the research community, had made it painfully evident that many of those working in a range of commercial and industrial settings are often insufficiently qualified mathematically, and are sometimes unaware of the mathematics they encounter. Almost all this previous work has involved rather elementary mathematics (e.g. basic number operations). The situation described by the Swiss Bank was similar in essence but different in degree. It was similar in that it highlighted the problematic relationship between using a mathematical tool and understanding it; it differed in the content and the level of sophistication of the mathematical ideas involved.

We decided to accept the challenge to try to “do something” about the problem, and adopted an approach to teaching which uses Logo. We designed tasks around banking which exploited the following ideas:

Modelling: computer models of financial situations which encapsulate the relevant mathematical ideas, the “big” issues. Building models like this sowed seeds of familiarity with mathematical ideas by trying them out, and watching the feedback and in the process made them explicit, “friendly” and subject to change; and

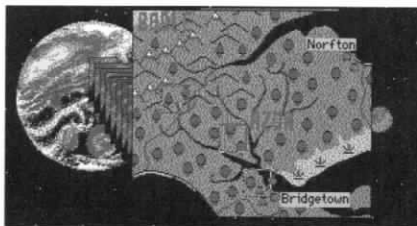
Debugging: an idea familiar to programmers, but relatively uncommon in the teaching of mathematics. Trainees would construct their own programming models, observe how, for example, cash flows are calculated and be confronted with the consequences of any mathematical misunderstandings they might have built into their models.

continues on page 6

THE CRYSTAL RAIN FOREST

"The Crystal Rain Forest is highly recommended."

– Doug Clements, *Teaching Children Mathematics*



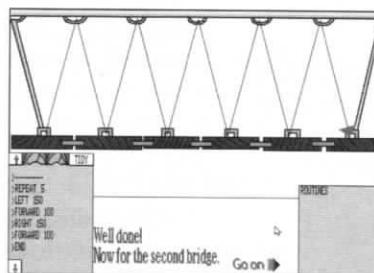
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can be run separately from the adventure, and its command names can be modified.

The Crystal Rain Forest is available as a single user version (\$49.95), as a single version for school use with curriculum materials (\$59.95), and as a building site license (\$250.00).

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Understanding the Mathematics of Banking

continued from page 5

We have summed up our approach as:

If you want to understand, teach someone else.

If you really want to understand, teach a computer.

We have used the modelling/debugging approach successfully with learners of all ages and experiences. We decided (maybe rather courageously) to treat bankers and infants alike – although clearly the mathematical content would be rather different! Thus our attempt to help SBC was built on four foundations:

- Identify what people already know and use this to build new learning and to debug existing misunderstandings
- Take seriously people's feelings about mathematics at work or

mathematics in general and make strenuous efforts to build up confidence alongside competence

- Take financial contexts as starting points but try to find ways to motivate moves beyond this (remember we were trying to get at underlying mathematical ideas, not simply train employees how to use them).
- Exploit the power of graphs and the visual display of information to display trends, and to help develop a "global" sense of any situation before we started more detailed analysis (for example, what happens if you compound your interest daily, hourly, by the minute?)

In a nutshell, we were not prepared to simply offer sets of "how to" rules and mathematical formulae in lecturing situations. The nature of the problem necessitated courses which were intensive, spread over

time, and based on a substantial element of learner activity with computers.

We have developed two modules entitled *Time Is Money* and *Rates and Change*. The first deals with the mathematics of simple, discount, and compound interest – a surprisingly rich and interesting area of mathematics, with plenty of scope for surprises and extensions. The second focusses on the growth of money, particularly bonds, in different situations. Each course comprises six half days spread over five to six weeks.

We piloted *Time Is Money* in November and December 1994 and, having made modifications, repeated it several times during 1995. To date we have noticed a considerable range of background and expertise amongst the participants, but all felt the need to have a better grasp of the mathematical theory underlying the financial instruments. This is interesting in itself. Some simply "knew" what was the right way to approach tasks in the banking context but not

continues on page 8



Logo PLUSTM for the Macintosh

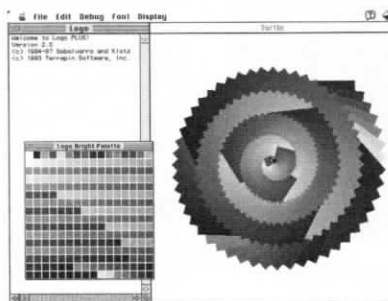
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The 1997 Logo Summer Institutes

The Logo Summer Institutes are intensive 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. The three components of the Summer Institute are:

- ✓ **Logo lab**, where you have an opportunity to experiment and develop projects in one or more Logo-based computer learning environments. You learn skills and explore ideas while modeling activities that your students will do during the coming school year. Choose from among several strands including multimedia, turtle geometry, simulations, game design, and Logo on the Internet.
- ✓ **Planning discussions**, organized by grade level and subject area, enable you to transfer your Summer Institute experience to the classroom.
- ✓ **Dialog groups** explore social, educational, and political issues raised by the technological transformation of school and the economy.

Summer at Spence New York City, June 23 - 27

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. Tuition is \$590.

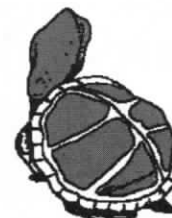


Colorado Logo Insititute Grand Junction, Colorado, July 28 - 31

Mesa State College is hosting its first Logo Summer Insititute. Join us for four days of learning and relaxation in beautiful western Colorado. The tuition of \$470 includes meals and daily recreational activities.

Logo St. Paul St. Paul, Minnesota, August 18 - 22

Over the past 15 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. Tuition is \$590*. Graduate credit is available from Hamline University for an additional \$126.



- ✓ Your registration includes
 - all workshop materials;
 - personal use of a computer – one machine per participant;
 - use of a variety of Logo-based learning environments including MicroWorlds, Object Logo, StarLogo, Logo PLUS, UCBLLogo, MSWLogo, HyperStudio, PCLogo, Mach Turtles Logo, and others;
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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. Also ask about organizing a Summer Institute at your school, and about other Logo workshop opportunities.

Logo Foundation
250 West 85th Street
New York, NY 10024

telephone: 212 579 8028
fax: 212 579 8013
michaelt@media.mit.edu

*If you are a teacher in the St. Paul Public Schools these registration procedures and fees do not apply to you. Instead, contact Ms. Jenny Croutcher at 360 Colborne Street, 228-3625.

<http://el.www.media.mit.edu/groups/logo-foundation/>

Understanding the Mathematics of Banking

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why. Others had forgotten or even felt themselves to have been "deskilled" by their reliance on machines at work. Judging by the comments of participants, everybody learned from the course and felt more empowered and confident after the experience. We have come up with three Big Ideas which we intend to use as guiding principles in future developments in the Bank:

- **Mathematical ideas should be connected**

We view all financial instruments in terms of their common mathematical structure, that of the notion of *mathematical function* (an idea which is under-rated in schools, but turns out to be surprisingly accessible). This viewpoint provides the glue by which different financial instruments can be compared, contrasted, and modelled.

- **Students should be and should feel empowered**

We provide the tools and windows –

the trainees extend them, exploit them for their own work and in their own projects, and reflect on the results of their application.

- **We start with intuitions**

It is often said that to do mathematics, there is no room for intuition – think of the expression "cold calculating." We disagree. We start from situations with which people are familiar (mostly personal finance) and use these as motivation for more formal, rigorous, and most importantly – *generalized* – mathematical relations through computer modelling.

We'll end with an example of the approach. We asked trainees a "simple" question: How is it that if 10% is added to a bill – say £100 – the answer is £110, yet reducing £110 by 10% does *not* leave £100? First we had better admit that not everyone saw we were right! But one trainee answered, somewhat disarmingly: "Yes. I've always wondered that too. I just think it's because numbers are funny!"

We will cut a long story short: this trainee concentrated hard on our

activities, learned to write short but succinct programs, and above all, had fun with mathematical ideas. She reports that this was the first time she had ever connected fun with mathematics! On the way, she sorted out for herself how the simple percentage question worked, and – most importantly – felt proud of her discovery.

It's too early yet to know if this case is merely an isolated example, or a symptom of something more general, the start of building mathematical understandings in the bank which begins to change the mathematical culture of the bank. Only time will tell but the quotes below from some of the participants last year describing a good experience in the course give us grounds for optimism:

"The ability to predict the way a graph might look from a particular function. At last I *nearly* have a feel for numbers. I don't feel quite so "mathematically challenged"!"

"Graphing the equations plugging in various values and visually interpreting the effects, seeing differences between simple and discount graphs. Mapping the math onto banking truisms."

continues on page 12

PowerMath Logo™ for the Macintosh

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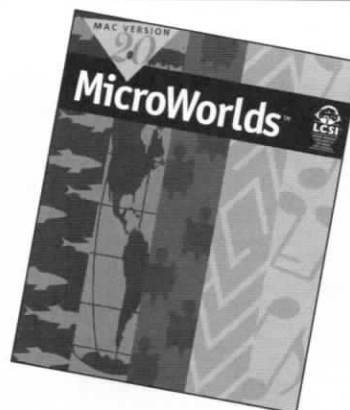
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Oops!

We forgot to mention
one small thing...



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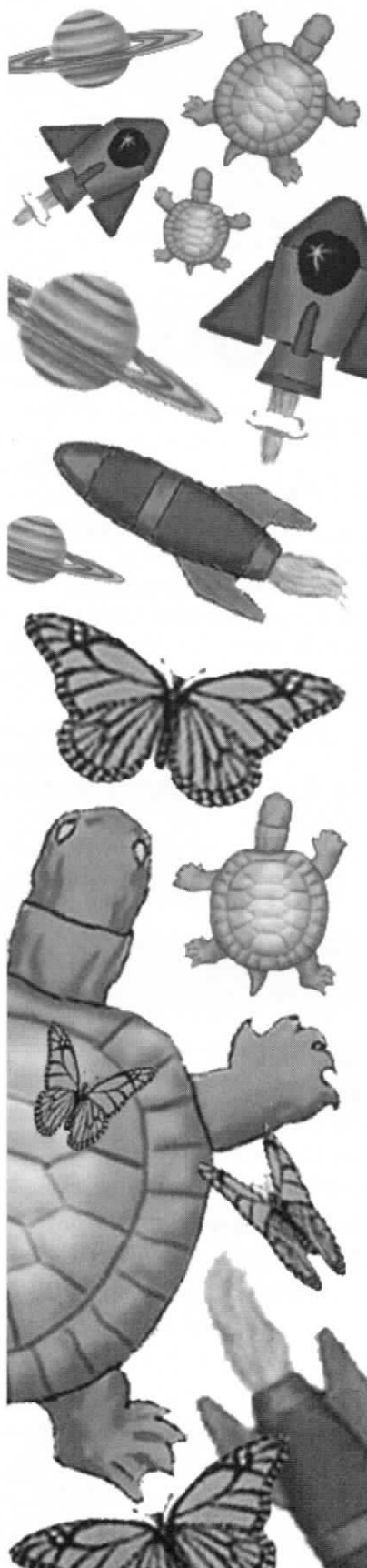
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- Create your own colorful sprites and backgrounds with this new painting program.

Windows® 95 Support!

- 32-bit programs with support for long file names.

New in this Version!

- Over 70 new Logo commands.
- Improved Listener.
- Complete set of workspace commands.
- Full printing support.
- New user manual! Over 230 pages of printed documentation.

Powerful Features!

- Application generator creates "stand-alone" programs.
- Screen saver builder.
- MIDI output and wave sound commands.
- Extensive on-line help.

Requires Windows® 95 and 256-color display.

\$89 U.S.

For more information or to order:

1-800-390-7971

Softsparks

P.O. Box 68039
Hamilton, ON L8M 3M7
519-836-9759

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.



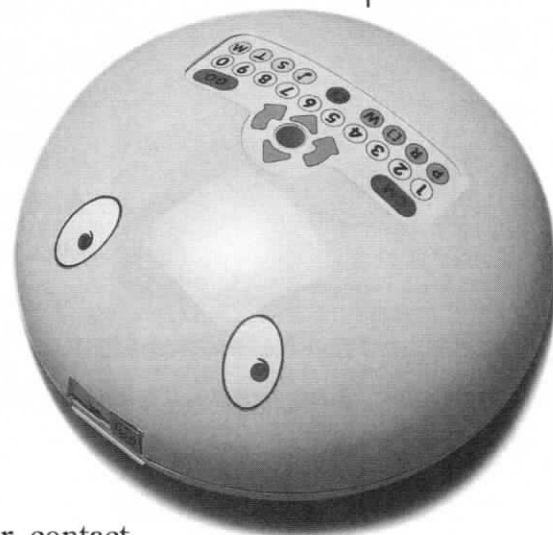
Roamer is the ideal way to introduce Logo commands in your classroom. It brings Logo to life in a friendly and tangible way. Since Roamer has Logo already on-board, it's like having a computer dedicated to your Logo lessons. Children can touch, feel, and follow the Logo turtle as it moves about.

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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10 Holworthy Street • Cambridge, MA 02138 U.S.A. • Phone (617) 492-0660
Fax (617) 492-4610 • Compuserve 70312,243 • Internet pclogo@harvassoc.com

Understanding the Mathematics of Banking

continued from page 8

"It was great remembering algebra. Plotting graphs to show the risk associated with a 10% movement in the underlying rate and discovering that over time there was a maximum movement, regardless of the size of the underlying rate – it would be great to understand why!" ▲

Celia Hoyles and Richard Noss
may be contacted at the
Institute of Education
University of London
20 Bedford Way
London WC1H 0AL UK
choyles@ioe.ac.uk rnoss@ioe.ac.uk

The authors have written a more extensive piece on the same subject: "The Visibility of Meaning: Modeling the Mathematics of Banking," which appears in the *International Journal of Computers for Math Education*, Vol. 1 No. 1, 1996, Kluwer Academic Publishers, The Netherlands

Exploring the 10% Problem with Logo

```
to 10%more :bill.amount
output :bill.amount + .1 * :bill.amount
end

print 10%more 100
110

print 10%more 50
55

to 10%less :bill.amount
output :bill.amount - .1 * :bill.amount
end

print 10%less 100
90

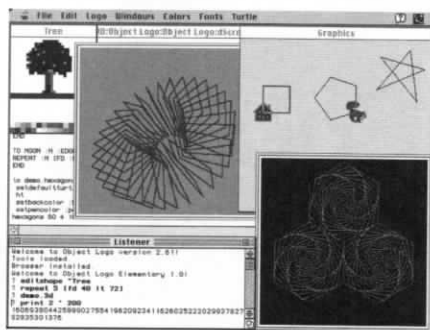
print 10%less 110
99

print 10%less 10%more 100
99

print 10%more 10%less 100
99
```

hmmmm.....

ObjectLogo™ for the Macintosh® - The Logo Language for All Ages!



Regarded by educators as the most powerful Logo on the market, *ObjectLogo* is now also one of the easiest Logo languages to learn and use. Thanks to the 180-page highly acclaimed tutorial, *Logo for the Macintosh*, by Harold & Amanda Abelson. Whether your interest is for home or school, give *ObjectLogo* a try. The Student Edition (includes the tutorial) is well-suited for the beginner. The Full Version (includes the tutorial and the Reference Manual) is for a more serious exploration of programming on the Macintosh. Lab Packs include both the tutorial and Reference Manual.

Features Include:

- Support for 32-bit Addressing
- Extensive Math Features
- Advanced List Processing
- Full Macintosh Color
- Complete Object System
- Fast Incremental Compiler
- Supports Multiple Windows
- LEGO® Logo Support
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Student Edition

\$75.00

Full Version

\$195.00

Five Lab Pack

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Ten Lab Pack

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Twenty Lab Pack

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SOFTWARE

P.O. Box 670 • Cambridge, MA 02142
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<http://www.digitool.com/object-logo/>

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.

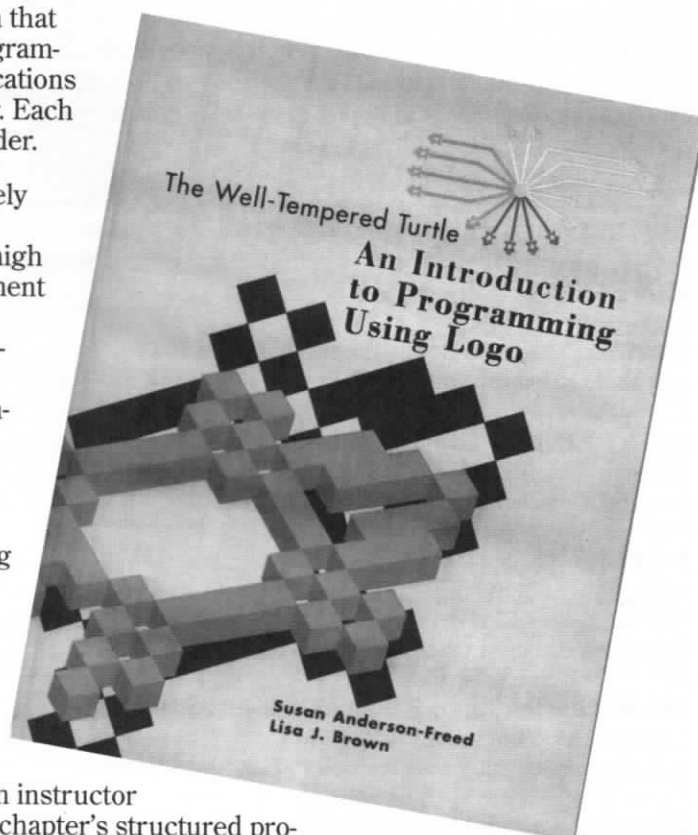
The Well-Tempered Turtle is written by Dr. Susan Anderson-Freed and Dr. Lisa J. Brown, Professors of Computer Science at Illinois Wesleyan University. Together they have more than 27 years' experience teaching mathematics, programming and computer science. Their Logo courses are both highly demanding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

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!**



Discount Prices

The Logo Foundation now offers commercial Logo software at below retail rates. The prices shown here reflect these discounts. Discounts are also available on lab packs and site licenses. Please contact us for current prices.

Even larger discounts apply when software is purchased by participants in Logo Foundation workshops and Summer Institutes, such as those described on page 7, and in conjunction with workshops we conduct in your school or district. Contact us for details.

Software:

MicroWorlds (page 11)

Macintosh MSDOS
LSMWM LSMWD Single Copy \$89.00
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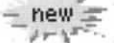
Logo PLUS for the Macintosh (page 6)

LSLP SingleCopy \$89.00
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PC Logo (page 4)

MSDOS Windows
LSPCD LSPCW SingleCopy \$89.00
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Mach Turtles Logo 2.0 for Windows 95 (page 10)

LSMTW95 SingleCopy \$85.00
Ask about discount prices for Lab Packs. 

Object Logo for Macintosh (page 12)

LSOLSE Student Edition \$ 69.00
LSOLFV Full Version \$179.00
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Crystal Rain Forest (page 5)

Macintosh MSDOS
LSCRM LSCRD Single Copy \$45.00
LSCRMS LSCRDS School Edition \$55.00
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UCBLogo may be downloaded for free from
<http://http.cs.berkeley.edu/~bh/>
If you can't get it that way, you may order it here.

Macintosh MSDOS
LSUCBM LSUCBD \$5.00

MSWLogo may be downloaded for free from
<http://www.softtronix.com/>
If you can't get it that way, you may order it here.
LSMSW \$5.00

Books:

101 Ideas for Logo

by Dorothy Fitch
Lots of great Logo ideas for less than 20¢ apiece!
LB113SC single copy \$19.95
LB113SL site license \$50.00

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.
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

Computer Science Logo Style

by Brian Harvey
The best tutorial available for learning Logo. A good companion to UCBLogo and MSWLogo. See page 13.
Volume 1: Intermediate Programming
LB114 \$22.95
Volume 2: Projects, Styles, and Techniques
LB115 \$21.95

Turtles, Termites, and Traffic Jams

by Mitchel Resnick
The book about StarLogo.
LB116 \$24.95

StarLogo may be downloaded for free from
<http://el.www.media.mit.edu/groups/el/projects/starlogo/>
If you can't get it that way, you may order it here.
LSSL \$5.00

Learning Mathematics and Logo

by Celia Hoyles and Richard Noss
Look at "Understanding the Mathematics of Banking" beginning on page 5.
LB133 \$49.50

Roamer

Look at the description of this creature on page 11.
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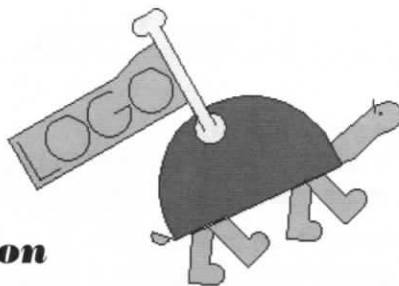
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Logosium '97

Seattle, Washington
Sunday, June 29, 1997



Call for Participation

The fourth annual Logosium will be a day of Logo workshops, discussions, and presentations. Once again 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 three-hour hands-on workshops, on any topic of interest to the Logo community. If you wish to offer a session, send a one-page description of what you want to do to:

Marian Rosen & Michael Tempel
c/o Logo Foundation
250 West 85th Street
New York, NY 10024
Telephone: 212 579 8028 Fax: 212 579 8013
e-mail: mbrosen@oui.com michael@media.mit.edu

The deadline for submissions is April 15, 1997.

For NECC registration and hotel information contact:
NECC '97

1244 Walnut Street
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Fax: 541 346 2565
e-mail: necc@oregon.uoregon.edu
Web: <http://www.neca.uoregon.edu>

Logosium is an NECC '97 pre-conference activity sponsored by the Logo Foundation and ISTE's SIG Logo.

LOGO USERS GROUPS

Long Island Logo Users Group
Contact: Marilyn Tahl
516 333-4018 (evenings)
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818 769-2473

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