

Many children find the idea of a Logo procedure difficult. **John Cunliffe** has his own answer to the problem.

Taking the blindfold off Turtle



Watching children working in the classroom with Logo, and attempting to facilitate their discoveries, over a number of years, I have become sharply aware of the barrier that looms ahead of them when they begin. The starting point is simple, and can be successfully introduced to very young children, in some such terms as;

"Here is a little arrow we call a turtle, and when we type `FD 300` it will move forward and draw a line."

This develops logically through `LT` `RT` and `BK`, and the turtle obeys in a precise manner, just as we have said. `PD` `PU` and `PE` may well follow, and these are a little more mysterious, since they appear to do nothing until the turtle is moved. However, we can live with this, though we would like a Logo that made such things visible. All develops nicely, and the children construct patterns of increasing complexity. And then the teacher decides that it is time to introduce procedures. The child is now faced with a "dead" turtle that no longer listens to commands. How many of the children will we lose at this stage? A good many, I find, will make little further progress. They will get stuck with long strings of direct commands painstakingly typed in. It's almost as bad as typing in BASIC programs from a magazine listing! What a number of conceptual and psycho-

logical barriers this method of writing procedures sets in the student's path! (And this often applies as much to adult as to child students.)

- The turtle is suddenly dead or deaf. The conceptual framework, built up from the beginning, is now changed for a quite different one. The "virtual machine" in the child's mind has to be replaced with a quite different one.
- The child has to move to a new level of abstraction, visualising what will happen when the procedure is executed.
- A much longer time-span is needed for the process of writing, testing, debugging, and re-testing procedures. The child's span of attention may not be long enough for this, specially with less able children, and frustration or loss of motivation will follow. Or, there may not be enough machines in the classroom for the child to have sufficient time to complete the process in any coherent way.

The Logo orthodoxy, I presume, is that children should go through a lengthy process in order to write procedures. They should plan procedures away from the computer, explore their intended graphics interactively, note all the turtle-steps on paper, write out their corrected procedure, type it in to the computer, test it, debug it, and perhaps print it out and save it to disk. In the average classroom this process is full of hazard. The difficulties involved in transcribing instructions are enough to sabotage the enterprise. There are spelling mistakes, broken pencils and lost scraps of paper to cope with. Go away from the machine to write out your procedure, and someone else will grab the com-



puter, or the bell will go for assembly or playtime in the middle of it. By the time it's your turn for the computer again, you've completely forgotten what the procedure was intended to do.

What happens, all too often, is that children write procedures at random. They type TO, followed by an arbitrary procedure name, then a series of commands, see what happens, then tack a purpose on at the end, to convince the teacher that there was some planned purpose from the beginning. I see little value in this, although some chance discoveries will be made. This could give Logo a name for sloppy and haphazard work.

But surely computers are intended to make things easy? This labyrinthine procedure-writing seems to make things laborious and indirect.

What is needed is a turtle that will execute commands at the time the procedure is being written. The SEETO procedure provides just this, and it is a wonderful tool for the beginner and for the practised programmer. We all make logical errors. Seeing what is going on is an immense advantage.

Instead of typing TO to begin a procedure, type;

SEETO 'NAME

The computer responds with;

TO NAME

and you can proceed to write your procedure, with the turtle following you, step by step. If you wish to delete a line, press the f0 key and the turtle will back-track. The system will even tolerate errors.

This is a great advance, but I want more. What about adding the same facility for the Logo Editor? I fancy we will need a new Logo implementation for that! And, watching children using SEETO, one sees some frustration at the back-tracking of the turtle all the way back to the start, specially if lengthy and slow routines have to be repeated and re-drawn each time an error is deleted using f0. Perhaps, though, this provides an incentive to debug each sub-procedure carefully, bottom-up, before constructing the overall plan? In spite of this, complex procedures and sub-procedures are constructed at a speed and a level of sophistication not before seen, and the interfacing of sub-procedures takes on a new meaning in the context of SEETO. ■

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SEETO was written by John Dickson, who works as a lab technician in Cumbria. It is included on Micromath Disk 4.

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