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Logo LinX

The Handwriting on the Screen
by Judi Harris

Handwriting...ugh! That was the part of the upper elementary curriculum I dreaded teaching the most. I wanted my students to experience learning as an intellectually stimulating, interesting, challenging, relevant endeavor. Handwriting skills may be exciting for eight-year-olds, but my prepubescent pupils found them, at best, boring and repetitive; at worst, a frustrating four years of building fine motor skills.

How might I make penmanship, at best, intriguing and pleasant or, at worst, tolerable? Eleven years ago, when our school microcomputers were still being used for BASIC and Bank Street Writer (Version 1), I taught my sixth graders to do simple calligraphy. I suspected that if handwriting could be seen and practiced in a new way (as an art form) by these reluctant pen-wielders, the readability and general aesthetic appearance of their handwritten work might improve voluntarily instead of under teacher-imposed duress. After all, I reasoned, they had been practicing Zaner-Bloser letters for more than one-third of their lives; it wasn't perfect letter formation that I should target but decreased teacher eyestrain, right? Readability should be the prime directive in upper elementary and middle school penmanship practice, right?

Well, at least my principal didn't stop the calligraphy lessons. (He had bad handwriting himself; had his handwritten notes to faculty been more readable, I might not have been permitted to restructure this curricular requirement so "creatively.") The students were mildly intrigued with the ancient-looking letters, and there was some improvement in the graphic clarity of their non-word-processed papers (as long as they didn't write them on the bus). But, as you might predict, the students with the best cursive writing were also the ones who presented beautiful calligraphied homework papers. The problem of perspective had been addressed, but attitude was improved with another alphabet rather than with the prescribed cursive content.

Now that Logo, LogoWriter, and Logo PLUS are common to intermediate-level classrooms, handwriting can be explored in another divergent way: as a vehicle through which to explore arc radii and degree measurements. In a way, the process-centered assumption behind this instructional suggestion is similar to my decade-old calligraphic curricular rebellion. If students are encouraged to examine cursive letter construction in conscious detail and from a new perspective, perhaps their handwriting will improve by default.

Draw It on the Line

Remember the special penmanship paper that made you feel like such a grown-up in those early years of school? Reproducing it on the LogoWriter screen is an interesting beginning-level programming challenge. My lines look like this, and are saved in a picture file called LINES.

```
CG
LOADPIC "LINES
PU
SETPOS [-120 -15]
PD
ST
```

The STARTUP procedure on the CURSIVE.WRITING LogoWriter page on my disk includes a series of commands that clear the screen, recall the "LINES picture, and position the turtle so that it can begin to form cursive letters:

```
CG
LOADPIC "LINES
PU
SETPOS [-120 -15]
PD
ST
```

The Zaner-Bloser Transition Recorder (Hackney, Myers, & Bloser, 1969), used in many elementary schools to assist children in switching from manuscript writing (printing) to cursive writing, presents the letters h and i as the first steps in crossing the bridge to handcrafted script. In this case of mathematics actively explored through practicing turtled penmanship, the bridge is curved into arcs of various radius sizes and degree amounts. Together, the two introductory letters spell a friendly word that the friendly turtle can be taught to write: "hi."

Let us begin with the first stroke of the h, an "undercurve stroke":

```
```

April 1991
In *LogoWriter*, this becomes

```
RIGHT 50
ARCL 200 30
```

ARCL is a tool procedure on the *LogoWriter* page TURTLE.TOOLS, included on the *LogoWriter* language diskette. It draws a user-specified degree section of a circle of user-specified size that turns to the left:

```
TO ARCL :RADIUS :DEGREES
  MAKE "STEPS (2 * :RADIUS * 3.1416 / 36)
  MAKE "REM REMAINDER :DEGREES 10
  REPEAT :DEGREES / 10 [LEFT 5 FORWARD :STEPS LEFT 5]
  IF :REM > 0 [FORWARD :STEPS * :REM / 10 LEFT :REM]
END
```

Now for the top of the *h*. If you look closely, you will see that it is really a 180-degree arc from a comparatively small circle. In *LogoWriter* commands, this can be expressed as

```
SETH 10
ARCL 5 180
```

Thus far, the cursive letter *h* has begun to take shape as a 30-degree arc from a 200 turtle-step circle and a 180-degree arc from a 5 turtle-step circle. The next stroke is a straight one, for which the turtle should be slightly repositioned.

```
RIGHT 5
FORWARD 90
```

Now the turtle must partially retrace its steps, reset its heading, and draw an arc in the opposite direction to the previous two. The ARCR procedure, also included on the TURTLE.TOOLS page, is identical to ARCL with the exception of the turn commands:

```
TO ARCR :RADIUS :DEGREES
  MAKE "STEPS (2 * :RADIUS * 3.1416 / 36)
  MAKE "REM REMAINDER :DEGREES 10
  REPEAT :DEGREES / 10 [RIGHT 5 FORWARD :STEPS RIGHT 5]
  IF :REM > 0 [FD :STEPS * :REM / 10 RIGHT :REM]
END
```

Using ARCR, the next steps in the formation of our cursive *h* can be taken:

```
RIGHT 180
FORWARD 25
RIGHT 10
ARCR 60 25
```

Thus far, the cursive letter *h* has begun to take shape as a 30-degree arc from a 200 turtle-step circle and a 180-degree arc from a 5 turtle-step circle. The next stroke is a straight one, for which the turtle should be slightly repositioned.

```
RIGHT 5
FORWARD 90
```

If you look closely, you will see that this section of the *h* , although appearing as one uninterrupted curve, is actually the concatenation of two right arcs from circles of very different radii:

```
``
I drew this portion of the letter with these commands:

\begin{verbatim}
ARCR 12 105
RIGHT 43
FORWARD 35
\end{verbatim}

Now the turtle must reverse its heading while drawing another arc. Notice that the radius of this arc is of almost the same size as that of the arc that formed the uppermost portion of the \textit{i}:

\begin{verbatim}
ARCL 6 180
\end{verbatim}

Voila! A beautiful cursive \textit{i}. The \textit{i} should be a much simpler mathematical matter.

An Eye for an \textit{i}

Here is another relatively straight undercurve stroke. I changed the turtle's heading and drew it like this:

\begin{verbatim}
RIGHT 15
ARCL 150 15
FORWARD 10
\end{verbatim}

According to the Zaner-Bloser model, the uppermost part of the \textit{i} is then retraced, leading into a slight left arc:

\begin{verbatim}
RIGHT 180
FORWARD 4
ARCL 150 15
\end{verbatim}

Only two steps remain—putting the "tail" on the \textit{i} and drawing its dot:

\begin{verbatim}
ARCL 6 180
RIGHT 25
FORWARD 10
\end{verbatim}

Turtled cursive writing may be time consuming, but it tinkers with a familiar form that is most mathematically satisfying. Want to try it? Exploring the geometrical structure of letters can be an intriguing way to restructure a tedious portion of required curriculum.

Reference


Judi Harris works as an assistant professor of educational technology at the University of Nebraska at Omaha, where she helps teachers learn to use computer-related technologies in their teaching. She is very glad to have use of numerous microcomputers there so that she does not have to form cursive letters very often with her fingers, and she is especially thankful that she does not have to teach penmanship at either the undergraduate or graduate level.

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\end{verbatim}