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A Warped Idea

Judi Harris
College of William and Mary

Logo LinX

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by Judi Harris

Logo LinX articles are about weaving Logo into traditional subject curricula; using Logo to teach, rather than teaching Logo. This month, I'd like to show you how weaving with Logo can be woven into Social Studies.

Does this look familiar?

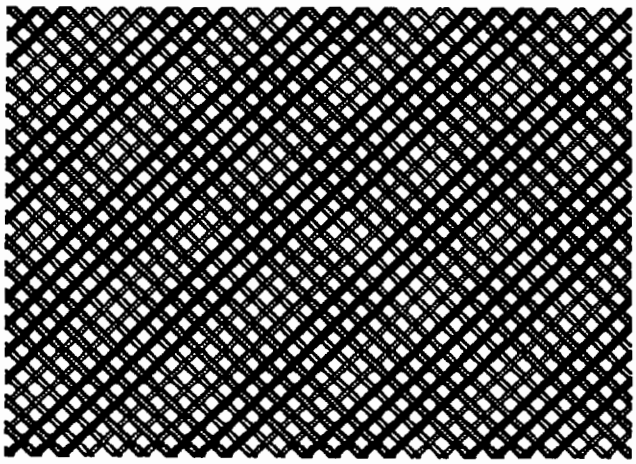

Figure 1

In every class, there seems to be at least one student who, given the opportunity, repeatedly chooses to explore these Logo plaids, often to the chagrin of his teacher, who would much rather that he explore more sophisticated procedural structures than this:

```
TO FIG1
RIGHT 45
REPEAT 100 [SETPC RANDOM 4
   FORWARD 9876 RIGHT 90]
END
```

I have observed several methods for discouraging persevering with plaids. Some teachers outlaw wrap-arounds; others limit all inputs to 140 or below; still others patiently wait until the child tires of entering multi-digit REPEAT values. Instead, why not make the plaids a subject of historical inquiry?

Scottish Fabrications

A *tartan* is a plaid pattern that is now primarily associated with Scottish clans, although such heraldic devices appeared in many countries throughout history, from Japan to Italy. Scottish tartans were originally worn by both men and women as a large rectangular cloth draped over the shoulder, belted at the waist, falling into a pleated skirt. The earliest references to tartans date back to the 13th century. Later, the tartan was separated into a kilt (skirt) and a plaid (shoulder-draped shawl).

Scottish tartans (in Gaelic, *breacans*) were usually woven from wool. All known tartans had colored stripes in two directions, crossing at right angles to form a regular pattern. The cloth could be of any size, and the colors of any intensity, but the pattern had to be proportionally identical across garments woven for a particular group.

A Different Mind Sett

The design of a Scottish tartan is called a *sett*. Different setts first represented different districts of Scotland; later they became symbols of large families or clans. After 1782, tartans were used to identify different military regiments. Early sett patterns were recorded with popsicle-sized *pattern sticks*. The exact number of threads of each color in the sett were wound around the stick in the correct color sequence, then fastened. Color orders were most often symmetrical in mirror- image form, i.e.,

blue-blue-green-red-red-white-white-red-red-green-blue-blue

The sett was the same for weft and warp, the two directions of woven cloth. Colors were often quite bright. Blues and purples were favorites at the end of the sixteenth century, yellows and blues 100 years later, and today, most tartans are primarily red or green.

Plotting a Weave (Instead of Weaving a Plot)

Why not encourage your students to do some tartan exploration with Logo? First, they could plan the color sequence with simple PATTERNSTICK procedures, such as these, each of which outputs an ordered list of values that will be used by the SETPC primitive.

```
TO PATTERNSTICK1
OUTPUT [2 2 2 3 3 3 3 3 1 1 0 0 1 1
   3 3 2 2 1 1 1 1 2 2 3 3 1 1 0 0 1
   1 3 3 3 3 3 2 2 2]
END

TO PATTERNSTICK2
OUTPUT [1 1 2 2 2 3 3 3 0 0 0 1 1 2
   2 2 2 2 3 3 0 0 0 0 3 3 2 2 2 2 2
   1 1 0 0 0 3 3 3 2 2 2 1 1]
END
```

One of the best ways to decipher and translate the act of weaving into procedural form is first to do it without a computer. A strong piece of cardboard, scissors, a ruler, masking tape, and scrap yarn are all that are needed for hand weaving. Help the students to cut evenly spaced 1/2-inch

Logo LinX -- continued

slits across two opposite sides of the cardboard, then use them to stretch parallel warp threads lengthwise on the miniature loom, securing them with masking tape on the back of the cardboard.

'Twill be Bonny

Weft threads can be shuttled across the fabric width in any regular pattern, according to the color sequences specified in PATTERNSTICK procedures. Scottish tartans were woven in a twill pattern, or, over two, under one, over two, under one warp threads, with the topside weft threads arranged in diagonals:

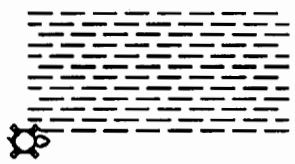

Figure 2

Warp (vertical) and weft (horizontal) shuttle passes can be simplified and executed in Logo like this:

```
TO WARP :THREADLENGTH
SETH 0
BACK :THREADLENGTH
FORWARD :THREADLENGTH
END

TO WEFT :THREADLENGTH
SETH 90
FORWARD :THREADLENGTH
BACK :THREADLENGTH
END
```

Weaving could then be done recursively, alternating shuttle passes between warp and weft in each recursion, and shifting X and Y starting positions from one recursion to the next.

```
TO WEAVE :COLORLIST :THREADLENGTH
              :XPOSITION :YPOSITION
IF EMPTYP :COLORLIST [STOP]
SETPC FIRST :COLORLIST
PU
SETPOS LIST :XPOSITION 0
PD
WARP :THREADLENGTH
PU
SETPOS LIST 0 :YPOSITION
PD
WEFT :THREADLENGTH
WEAVE :THREADLENGTH (BUTFIRST
   :COLORLIST) (:XPOSITION + 2)
   (:YPOSITION - 2)
END
```

An interesting set of Logo weaving explorations could emerge as students investigate other weaving methods. For example, dotted lines similar to those pictured above could be used instead of solid lines in WEFT and WARP procedures.

Interwoven Objectives

Weaving by hand or computer can be almost meditation-like. Perhaps this is what that persistent Logo plaid maker seeks when he gleefully enters multi-digit values for REPEAT and FORWARD, then enjoys the resulting graphic effects.

Indeed, weaving is a powerful metaphor for making unified wholes out of disparate parts by way of a repeated pattern of action. The shuttle is the new idea that restructures our perceptions. The resulting fabric often appears to be of quite a different form, even though its elemental components are quite familiar.

Weave, weave, weave me the sunshine
out of the falling rain.
Weave me the hope of a new tomorrow;
Fill my cup again!

—Peter Yarrow, 1972
(performed by Peter, Paul and Mary)

Judi Harris taught students in Philadelphia-area elementary through graduate schools to use computer in teaching and learning for six years. She now does similar work at the University of Virginia, where she is completing her doctoral work in Instructional Technology. She can be reached at

Judi Harris
621F Madison Avenue
Charlottesville, VA 22903
CIS: 75116,1207
BitNet: jbh7c@Virginia