Designing with L-Systems, Part 3:
Back to Basics — T-Sequence Design

The first article on L-Systems [1] described string rewriting systems, and the particular rewriting method used by L-Systems. The second article took a detour to show the power of L-Systems and their interpretation to produce graphic images [2]. This article gets back to weave design by showing how L-Systems can be used to create threading and treadling sequences — t-sequences.

The basic idea is simple: Design L-Systems in which the rules involve sequences of shaft or treadle numbers in such a way that successive generations produce increasingly intricate sequences.

An Example

Here is an example:
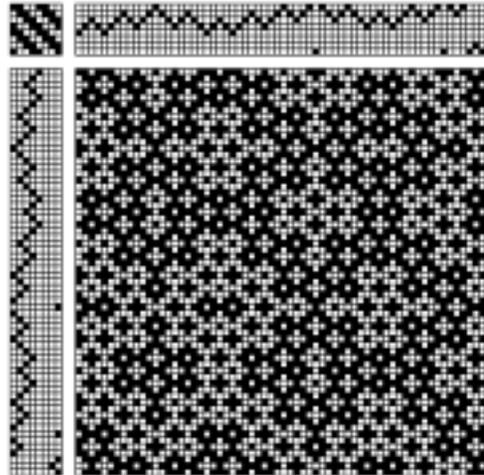
seed: 123456787654321
rules: 1 → 23432
        2 → 34543
        3 → 45654
        4 → 56765
        5 → 67876
        6 → 78187
        7 → 81218
        8 → 12321

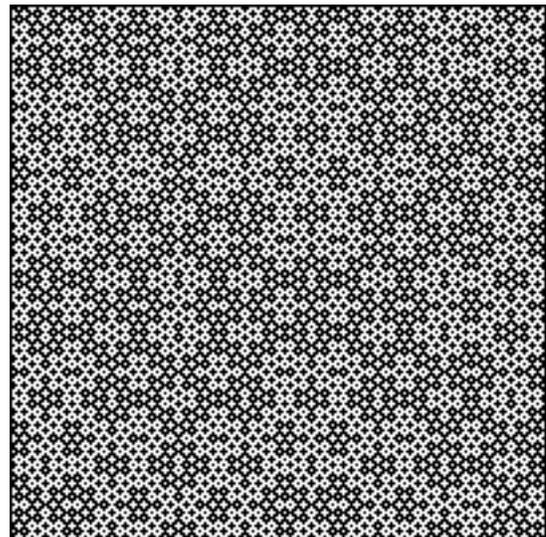Thus every 1 in a string is replaced by 23432 and so on.

The length of successive generations increases by a factor of 5. The first generation is

    23432345434565456765678767818781218
    12321812187818767876567654565434
    5432343

Here is a partial draft using the third generation of this L-System for threading and treadling sequences:

Here's the weave design:

Note: This is a crackle weave.

Another example, also a crackle weave, is given on the last page of this article.

L-System Design for T-Sequences

If numbers greater than 9 are needed, the letters a, b, c, and so forth can be used in the L-System and interpreted after generation as 10, 11, 12, and so on. The trick to using L-Systems for t-sequence design is to build into them interesting patterns that are elaborated in successive generations.

This is not so easy. L-System design in general is not particularly intuitive. In this case it requires understanding not only design principles for t-sequences but also how L-Systems work.

Coming Up

Subsequent articles will describe more sophisticated uses of L-Systems for design.

References

1. *Designing with L-Systems, Part 1: String Rewriting Systems*, 2004:
   http://cs.arizona.edu/patterns/weaving/webdocs/gre_ls01.pdf

2. *Designing with L-Systems, Part 2: A Side Trip to Graphics*, 2004:
   http://cs.arizona.edu/patterns/weaving/webdocs/gre_ls02.pdf

Ralph E. Griswold
Department of Computer Science
The University of Arizona
Tucson, Arizona

April 1, 2004; revised July 25, 2005

April 1, 2004; revised July 25, 2005