

# Digital Illumination

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**Abstract** Donald Knuth has given us *Digital Typography*, and through Metafont *Digital Calligraphy*, this work explores how these tools can be used for *Digital Illumination*.

The Celtic monastic scribes produced such masterpieces as The Book of Kells and the Lindesfarne Gospels. These show a highly developed artistic style, with very fine intricate detail. There are three main styles looked at here, knots, key-patterns, and spirals.

Knots and key-patterns can be drawn from block elements treated as characters, and large carpet pages built from these standard elements. However the Celtic scribes show a high degree of geometry and geometrical construction in their work.

A knot can be described as one or more strands that loop, cross and re-cross many times. Can the curves be described and then a Metafont algorithm used to split them up to generate the under-over-under-... pattern?

A key pattern does have a base form that is then tiled to form the page. The base pattern does have a simple sequence of numbers that define it. A sequence such as (1,1,2,2,7,2,2,1,1) gives a pattern such as...

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This pattern can then be tiled. The edges of the region modify the pattern to produce borders.

Can these simple sequences be used to program Metafont to generate larger patterns?

Similarly, spiral patterns can be constructed using a pair of compasses. How can Metafont's geometrical programming be used as a digital pair of compasses to create these beautiful patterns?

Finally what new Illumination can be produced by a tool as highly versatile as Metafont? Can the transformations in Metafont implement conformal mapping and be applied to patterns generated as above? If the patterns can be described in a parametric form, can an Escher like tiling be achieved where the pattern changes across the page?

The so called “Dark Ages” produced a flowering of the work of Celtic scribes, culminating in the “Golden Age” of the Scribes art. Knuth has given us tools to usher in a Golden Age of Typesetting and Digital Illumination.