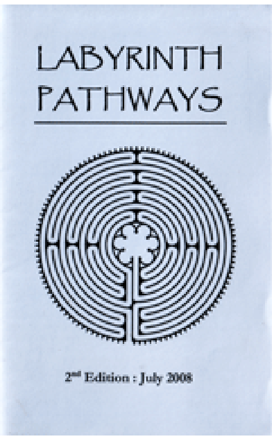

Labyrinth Pathways (2nd Edition, Jul 2008)

Some Sticks and a Spiral, by Thorn Steafel

Though they have peripheral walls, centres and can fill all space between these two with their circuits, spirals are not labyrinths, under the common definition of labyrinth as given by Hermann Kern - a distinction based primarily on the spiral's all-clockwise (or all-anticlockwise) motion within its circuits, so different to the 'continual, pendular change of direction'[i] within the labyrinth.

Yet spirals and labyrinths are surprisingly close relatives nonetheless[ii], and this article explores the labyrinth from the view that all labyrinths are mutated spirals - for any circular labyrinth can be 'hung' upon a spiral. We shall also note

a) how an evolutionary process exists in which the spiral (one of the primary shapes a human being discovers in doodling, requiring simple outwards/inwards motion without lifting the stylus from its medium), easily evolves into the labyrinth by throwing a stick onto that spiral and observing a law of motion possible with this 'new wall',
b) how this law of motion - described as the 'stick rule' - and thus the movement patterns created by it we know as the classical labyrinth (and, as we shall see in Part II, the medieval) - can be discovered without awareness of the cross-angles-and-dots seed pattern being known by the artist beforehand
c) and how, perhaps, that seed pattern itself (Fig 1) came to be discovered - after the labyrinth itself was discovered. (In modern terms, how the zip file might have been created from the source code.)

Figure 1: Seed pattern

For brevity, this article considers only 'how'. The 'why', 'who by', or 'when' are not my focus. To further simplify proceedings, a simple notation to describe the labyrinths uncovered in our hypothetical 'fossil record' is used as described below.

Figure 2: Three labyrinths

1: Notation

What is commonly referred to as 'the' classical labyrinth, can be described as a seven-circuit four-fold classical (left, in Fig 2); other variants (two-fold, eight-fold etc.) are possible, for in the n-fold classical family, n marches towards infinity. Usually circuit-and-fold notation is enough if the labyrinth remains regular (i.e. reflects, like a symmetrically-perfect kaleidoscope, around each axis-leg in its seed). But more unusual variants, as shown in the centre and right of Fig 2[iii], cannot be easily described with this terminology.

Figure 3: Motion through meander

However all three labyrinths in Fig 2 can be described if we list which of the three possible components that a one-axis, circular classical labyrinth can contain, the labyrinth is comprised of. These components are the spiral, the rebound, and meander (Fig 3).

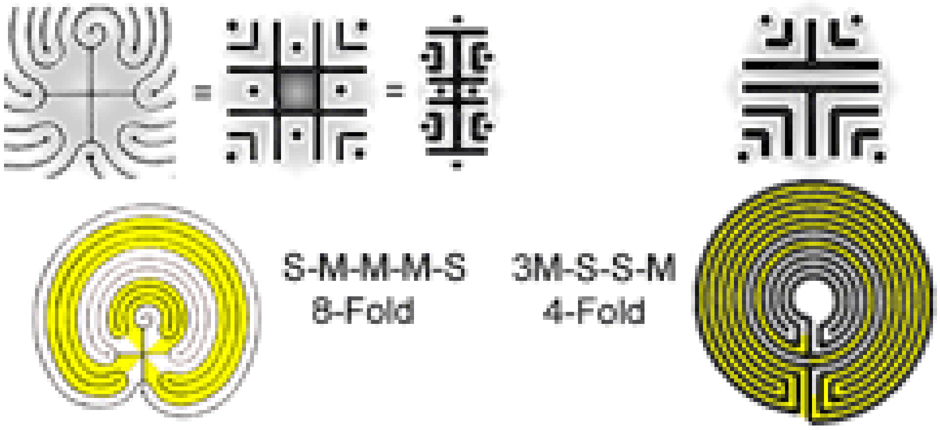

Figure 4: Seed patterns

We simply list each component along an imaginary 6 o'clock axis line running from entrance to centre. Because a spiral circuit fills one complete circuit, a rebound two, and a meander three, this notation means that folds, numbers of circuits and any irregularities in seed pattern symmetry are now accommodated: even Fig 2's oddballs can be described easily (Fig 4 - seed patterns normalised for clarity).

(Note that 2M under this system can define a double meander, 3M a triple meander, and so forth; single meanders are simply noted as M.)

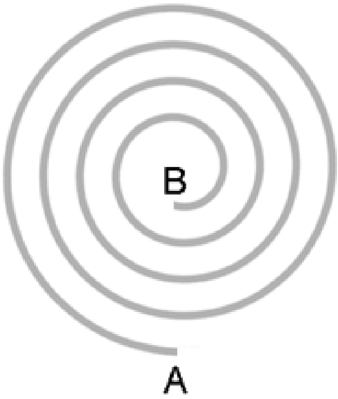

Figure 5: Simple spiral

2: A Stick and a Three Circuit Spiral Invents the Two-Fold Classical Labyrinth

Our artist, who has never conceived the idea of a labyrinth before, draws a spiral (Fig 5). It has three circuits and its start point (marked A) lies vertically below its end point (B). Our artist follows the spiral's motion with a finger tracing the blank path between the 'walls' formed by the coiled line drawn from A to B. Next, in play or accident, a stick is dropped onto the spiral, linking A and B. Now, our artist notes that the shortest route between A and B is no longer the coiling spiral path, but along this stick.

Figure 6: Stick upon spiral

When our artist seeks to spiral inwards from A, their finger is immediately blocked by the new stick leading upwards. But if this straight stick is treated like the curving spiral 'wall' the artist drew from A to B, and imagined to flank a vertical path (just as the curving lines flank a spiral path), then motion can continue, as in Fig 6. The finger follows the stick towards the centre, leaves the stick at B and enters a spiralling motion outwards. (The previously-remembered spiral direction from 2.1, would encourage this motion.) Upon hitting the stick again at A on the outermost circuit, it is logical for our artist to follow it inwards again and now find themselves deposited at the pattern's centre.

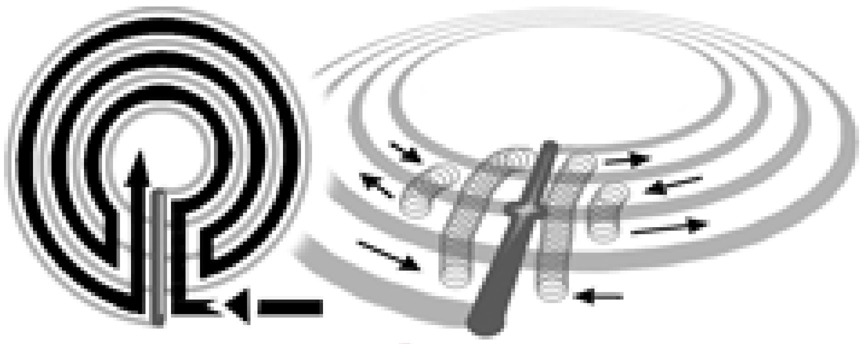

Figure 7: The 'stick rule'

However, it is clumsy to have flipped around the centre of the stick on first meeting it (and also on meeting it the last time, taking us to the centre), whilst having spiralled under the stick in our spiral motion in the two innermost circuits. Since the idea of flipping around the halfway point of the stick is already in place, why not flip again on the innermost circuits? (Fig 7; flips and half-point emphasised).

Now the stick is interacted with whenever it is met, under the stricture of a simple rule governing motion which we can call our 'Stick Rule':

Figure 8: The 2-Fold Classical

When you meet a stick, a) flip over its halfway point to land at an equidistant point from the halfway point, and b) go back into the spiral's curving circuits in the same vertical half of the pattern that you entered from in a).

When we draw this now, adding 'small' walls to further clarify motion, we can that see our artist has discovered a labyrinth. It's a two-fold classical labyrinth (Fig 8; seed pattern illustrated for clarity), and using our notation from 1.2, can be described as 'M' since its simple meander spans all three circuits.

3: A Stick and a Five Circuit Spiral Invents the Three- and Four-Fold Classical Labyrinths

Next our artist experiments with the same stick, but on a larger five-circuit spiral[iv]. There are two outcomes here. If a bigger stick than that used in 2.2 links A and B, our artist will simply create the same, but larger, two-fold classical labyrinth playing out now in five circuits (not illustrated).

But if our artist takes the same-sized stick used in 2.2 and lays it on the five-circuit spiral, they discover three, completely-new types of labyrinth:

Figure 9: The 3-Fold Classical

First, a two-fold classical inside a double spiral (Fig 9) - i.e., read from outwards in, two spirals and a meander, SSM.

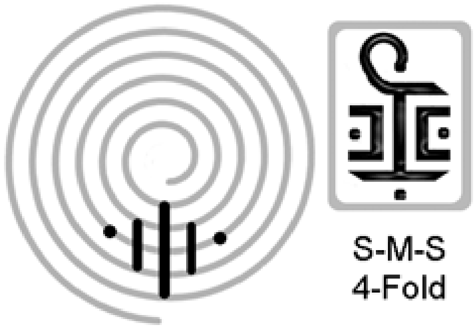

Figure 10: The 4-Fold Classical

Second, a two-fold sandwiched between two spirals (Fig 10) - an irregular four-fold described as SMS. (If you're ever confused which fold a labyrinth is, count the 'loose wall ends' inside the design, or the dots in the seed.)

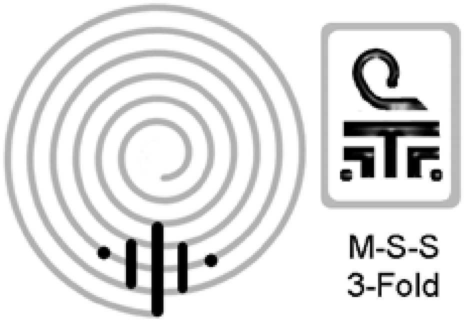

Figure 11: An alternative 3-Fold Classical

Third, a double spiral inside a two-fold classical (Fig 11); MSS.

So three new labyrinths result, from adding two circuits to the spiral! Undoubtedly our artist is encouraged to explore further, advancing the spiral to seven circuits.

4: A Seven Circuit Spiral and Two (or One) Stick(s) Invents the Four-Fold Classical Labyrinth

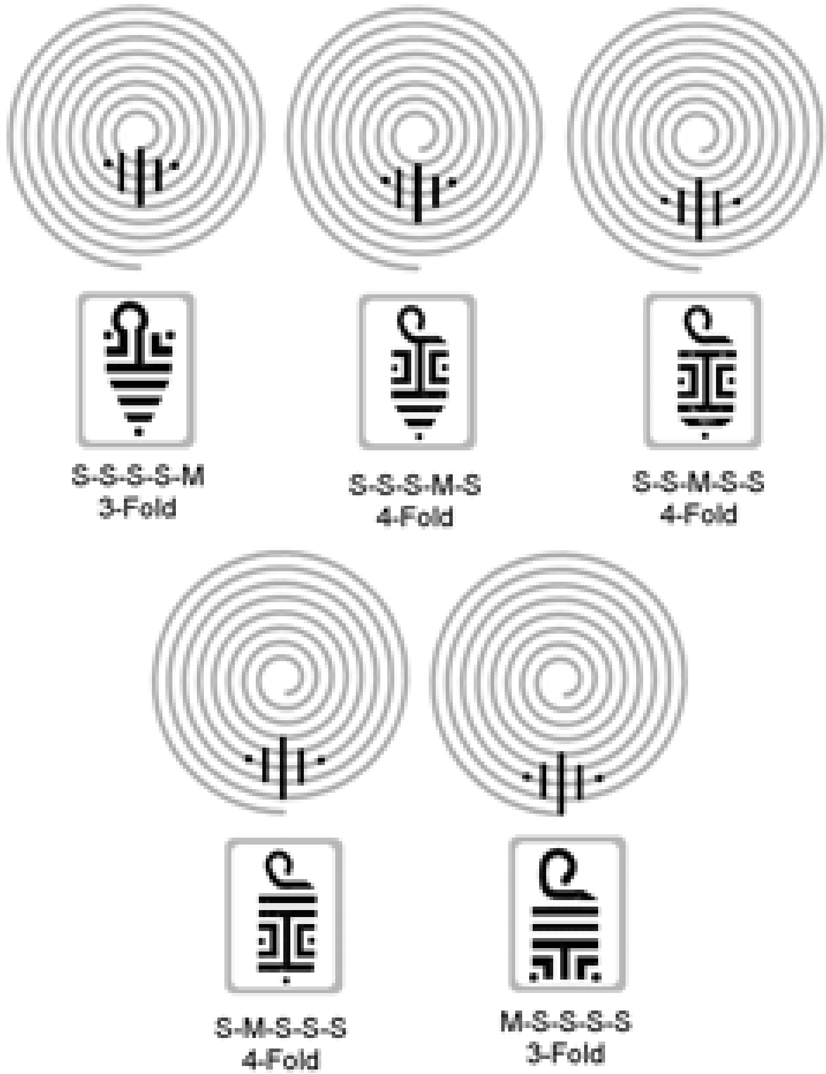

Figure 12: Outcomes of a 2-fold stick on larger spirals

On a seven circuit spiral, if our artist simply links A and B with a stick large enough to span seven circuits, they create a larger, two-fold classical labyrinth (not illustrated).

But our artist got interesting results with the smaller-sized stick from 2.1, and so if they once again lay the stick and use the Stick Rule to navigate the resultant patterns, the labyrinths are discovered as shown in Fig 12.

Essentially our simple meander (our two-fold labyrinth) is hop-scotching through the circuits, throwing out variant labyrinths that apart from the centre example, which arises historically, are not so interesting. But the first and the last pattern of Fig 12 do lead to something interesting - the realisation that another stick will fit inside the pattern.

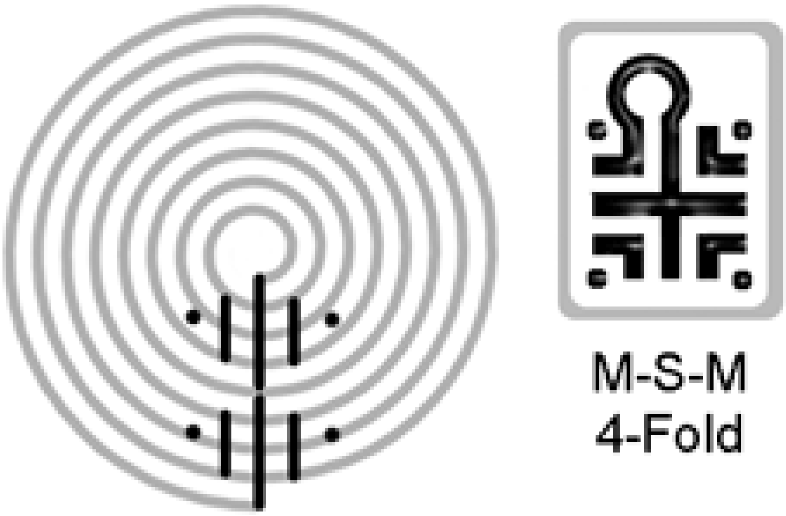

Figure 13: The 4-Fold created from two 2-Fold Classicals

Inserting an extra stick to fill those four spiral circuits, transforms them into one spiral circuit and one extra meander, the familiar four-fold classical labyrinth (Fig 13) - arrived at without knowledge of seed pattern, by playing with sticks and a spiral.

(Note that using 2.1's shorthand notation, Fig 13 is MSM. It is easy to forget there is a spiral circuit, linking the two meanders in this design.)

Given that this is the most common form of ancient labyrinth, it is worth asking here: can Fig 13's labyrinth be invented in this depicted form by playing with sticks and a spiral and not passing through stages 2.1 to 4.3, i.e. by not having prior knowledge of two-fold or three-fold labyrinths, or indeed the labyrinth concept at all?

The answer of course is yes. (Indeed, based on historical evidence, the answer perhaps must be yes.) One might indeed invent this classical labyrinth (as in Fig 13) by throwing one-meander-sized sticks onto a spiral, noting the movement, and formulating a Stick Rule; but this article has moved through 2.1 to 4.3 to make our argument easier to understand.

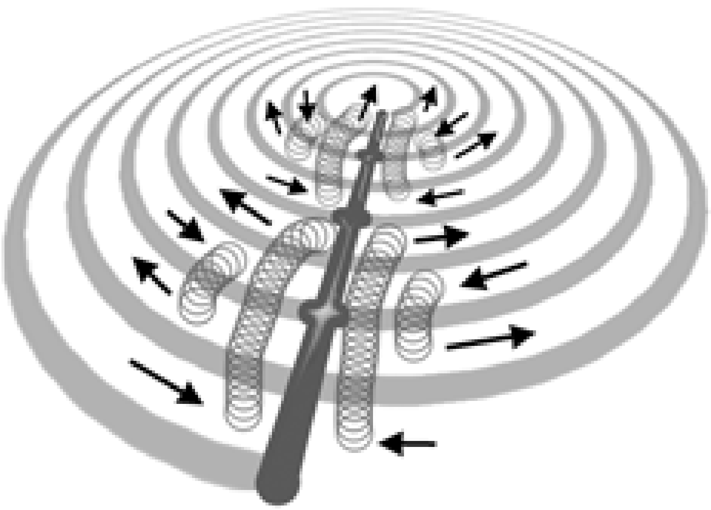

Figure 14: Motion of a 4-Fold Classical

Can Fig 13's labyrinth be invented with one stick running A to B, and devising a 'flip' rule based on the resultant motion? (I.e., invented with one stick, one spiral, and no prior knowledge of what labyrinths or seed patterns are?) Again, the answer is yes, if you experiment yourself to see; we just have to update our stick rule cosmetically to reflect the changed nature of the halfway points in those two smaller sticks, which become quarter-points of one large stick. The logic of movement is unaltered. From the 'flips' highlighted in Fig 14, our stick rule now reads:

When you meet the stick, a) flip over the nearest quarter-point (but not the halfway point) to land at an equidistant point from the quarter-point, and b) go back into the spiral's curving circuits in the same vertical half of the pattern that you entered from in a).

(Note that referring to the stick's halfway point now is in fact irrelevant, for the motion demanded in this stick rule creates a flip/follow circuit/flip/follow circuit pattern that repeats throughout. There is never an opportunity, given this motional dance, for the halfway point to be arrived at and flipped over in the way the quarterpoints are.)

Whether our artist got to this point by following 2.1 to 4.3, or by simply joining us at 4.4 or 4.5, we can see that they need not be aware of the existence of the seed pattern. Yet here, I suggest, is where the seed pattern would first be discovered:

In Figs 13 and 14, cursory observation of how movement is directed by the 'flips' around the AB axis, will lead the eye to transform the 'walls' flanking circuit 4 as it runs up and back again, into the left and right horizontal branch of a cross. Plus, the vertical motion up and down AB in its 'quarters', if given vertical 'walls' to clarify them as we have done in our illustrations, builds the familiar cross-and-angle seed motif of Fig 1. Like a picture found inside a Magic-Eye 3D design, the seed pattern appears, and any artist clever enough to have discovered the labyrinth without using the seed pattern, will be clever enough to see how the seed 'zips up' the essential information that mutates spiral into labyrinth. It is hereafter easily remembered and communicated with others, pictorially, regardless of language spoken.

5: Summary

This article halts its hypothetical evolution of labyrinths from spirals at four-fold classicals; exploration of the larger higher classics (five- and six-fold, and also the medievals, themselves four-axis eight-fold classicals) is covered in the depth deserved in Part II.

My goal has been to offer a perspective onto how the classical labyrinth can be discovered without reference to a seed pattern - discovered by accident, in other words, through playing with sticks and a spiral.

I am not arguing this globally did happen. It undoubtedly did, here and there, but does not explain the commonest labyrinth type, which is the four-fold of Fig 13. As Jeff Saward notes, this labyrinth 'is found dating form prehistory around the shorelines of the Mediterranean sea and on the Atlantic seaboard of the Iberian peninsula. Across the whole region, and elsewhere throughout the world, the design, almost without exception, is the same'[v]. A random flick through Hermann Kern's catalogue, too, gives the same impression. Where are the two- and three-folds?

The only explanation is that such non-Fig-13 variants as exist are provincial or individual experimentation upon the already-understood, four-fold labyrinth form - or, that a catalogue such as

Kern's listed only the patterns he recognised as 'true' (i.e. for classicals, primarily four-fold) labyrinths and did not include many others, an idea that seems unnecessarily alarmist and unfounded, given the interest in labyrinth-research that has blossomed since his book appeared.

Why the four-fold arose over the other (often less complicated, and easier to discover) classical family members, is one of the endearing mysteries of the field we perhaps shall never answer. But it is hoped this article, rather than clouding matters by raising the chicken-egg argument of which did come first, labyrinth or seed, will stimulate further the exploration of how these wonderful creations first arose. Whether that very first batch grew from seeds - or spirals - or something else again!

Works Cited:

- Kern, Hermann. Saward, J; Ferré, R (trans). *Through the Labyrinth: Designs and Meanings over 5000 Years.* Prestel. 2000.
- Lonegren, Sig. 'From Labyrinths to Mazes: The Stockholm Archipelago'. *Caerdroia* 26 (1993).
- Saward, Jeff. *Labyrinths and Mazes: A Complete Guide to Magical Paths of the World.* Gaia. 2003.

Notes:

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[i] Kern, p. 23.

[ii] Not least in the discovery that when we take a two-fold classical labyrinth down to one-fold, and thus lose space for an axis line...we create round our single fold, a spiral!

[iii] Left: Seven-circuit four-fold classical. Centre: Contemporary Indian design, from Kern, p. 294. Right: Södra Berghann, from Lonegren, p. 40.

[iv] We will expand our spiral in this argument each time by two circuits rather than one primarily to save time; even-numbered spirals do not allow higher folds of classical labyrinths room to appear.

[v] Saward, p. 16.

