

## Three-Dimensional Generalizations of the Triskele

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### Abstract

The Triskele is a familiar, traditional, 3-armed Celtic design motif, related to meanders and labyrinths. Its symmetry consists of a 3-fold axis of rotation without mirror reflection and so it comes in left-hand and right-hand forms. We present work in progress focused on creating sculptural forms inspired by the triskele, but elegantly distorted into 3D and no longer necessarily symmetrically. Wood, wire, clay and Zometool investigation models are discussed and illustrated.

### The triskele: a scientific and metaphysical image

*The triskele already belonged to the mental universe of the Neolithic (Raymonde REZNIKOV [1])*

The triskele is a Celtic symbol that prefigures the timeless essential, existential interrogations (the before, during and after: who are we? Where do we come from? Where are we going?). The scarcity of answers incites us rather to creative action and here we seek possible sculptural interpretations of the basic planar figure (Figure 1a), restricting ourselves to geometric beauty rather than to symbols. For newcomers to the triskele we have appended [2] on the Conference CD-Rom a (somewhat) biased introduction based on its history, it explores the parallels that exist in the world of meanders and labyrinths, and how we concentrate on its basic form, so abandoning other mathematical figures it has integrated. This reference also cites different kinds of 3D triskele-like objects found in literature. A flavor of the numerous variations is given here in Figure 1b.

### Mixing grace, lightness and depth into a harmonious 3D-triskele

Starting from there, let's describe in nine stages our (wide-ranging, like science itself!) meander-like creative investigation: **1.** First approach (Figure 1c): deep wood carving, starting from a sketchy idea related to something between a 'triquetra' (cornered 'trefoil') and 'borromean rings' [2], then precisely outlined on a square flange, and better defined with a perspective view, but not realized, because next: **2.** When it became clear that trefoils and borromean rings were later additions or replacements to the 'basic triskele with spiraling arms', a sketch and a precise drawing on a second flange were followed by actual carving which soon proved impractical to pursue in a prototyping campaign due to the tedious work involved given the properties of wood and the desire for refined 3-D spirals, and so it was left for a later artistic work (Figure 1d). **3.** Strong electrical wire 2D-formed on a sketch and assembled with thread then 3D-distorted, appeared a more satisfying medium to explore 3D triskele skeletons. Unexpectedly, and rather

inspiring for the future of our work, the first try (Figure 1e) looked symmetrical, like a Chartres labyrinth, only to reveal one spiral winding round to a different side as against the two others, which indeed we feel represents an interesting plastic avenue. **4.** Double spirals are needed to make the triskele into a looping circuit [2], and we also carried out experiments with wires (Figure 1f). **5.** The idea surged forth to use metal forming and forging: a triskele arm was tried out by weaving iron wire (Figure 1g). **6.** Fiddling with raw clay put 'meat on the bones' to obtain a 3D volume, there again our first (and still only) non-'artistic' instance proves non-symmetrical (Figure 1h). **7.** Zometool and vZome [3] offer another quick and comprehensive mean of developing a series of triskele skeletons. Let's consider nine identical 'blue' Zometool struts and nine balls, arranged in a triangle whose vertices receive three two-strut legs developing in 3D space. On Figure 1i, a tower on yellow struts stacks about half of the possible triskeles with the first strut bound in the plane of the triangle at an acute angle; indeed, a very small number of the possibilities that-if there weren't blocking interferences and undesirable 2D instances-would amount to almost a thousand rotationally symmetric triskeles; half a million if one accepts three different arms, and more than four billion when the spiral meat added to the skeletons can choose between two winding directions. No need to get them all: strange and interesting arrangements readily show up (Figure 1i insert: some symmetrical triskele examples sporting right angle arms) and feed the progress to our artistic goal.

Envisioned next steps: **8.** mastering computational modeling to finally get to: **9.** 3D-printing of pleasing small triskeles up to large stone-like, hollow ones containing LEDs shining through outside hole alignments to model above spiraling circuits.



**Figure 1:** Images referred to in the text. The letters can introduce multiple images.

(Sources: **a** adapted from Wikipedia; **b** 3ntini Editore, Photo Tatouage, Wikipedia, Wikipedia, Facebook, Wikipedia, George Hart)

## Acknowledgments and References

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[1] Raymonde Reznikov, *Les Celtes et le druidisme: Racines de la tradition occidentale*, Ed. Dangles, 3<sup>rd</sup> ed. (1999).

[2] Jacques Beck, Françoise Beck and Samuel Verbiese, *Biased introduction to Triskeles*, in the CD-Rom of the Bridges Enschede Conference, 2013.

[3] <http://www.zometool.com>, <http://vzome.com>.