

Crafty Maths

Umpty tump years ago, when I was studying topology at Exeter University, I had great trouble trying to visualise what a two-dimensional drawing of a real projective plane with a cross-cap was actually supposed to be showing me. I stayed up one night, starting from the basic definition of how to stick the sides of a rubber square together to make a projective plane, and eventually came up with something I could make in paper in three dimensions, with an intersection of the surface, which made sense to me. This was my first mathematical manipulative and developed into the net which is part of one of the projects here, along with its matching Klein bottle.

My mum was a great knitter. I showed her a picture of a Julia set one day and, jokingly, asked if she fancied trying to knit that. Her response was that if I gave her the pattern on graph paper, she would knit it. Well, you can't fail to rise to a challenge like that, can you? At work I scabbled about in the back of a cupboard to find an old dot matrix printer, printed out a nice bit of a Julia set and enlarged the print out on the photocopier until I could see the dots a bit more clearly. Then one evening and on into the night I was counting dots and drawing crosses onto graph paper. I still have the resulting jumper she knitted for me in red and white, with added side panels to compensate for me getting slightly fatter as the years passed!

I was taught to knit, but I never really got past the basic square. Then I read somewhere that it was possible to knit a Mobius strip with an intrinsic twist. At this point I couldn't find an explanation of HOW anywhere. It was one of those things that sat around in my mind as I was lying in bed, trying to imagine how it could be done and making no headway. Then I discovered Sarah-Marie Belcastro's written instructions on how to do it and I was hooked. These are written instructions, mark you, with no pictures and a provisional cast on with scrap yarn. I bought myself a set of circular needles and taught myself how to do it, but found it very fiddly. Over time I tried different methods, but it was when I had discovered the videos posted on YouTube by the Sockmatician that I realised that his adaption of Judy Becker's magic cast on was the perfect way to start a mobius strip easily if you use two sets of circular needles. There are so many videos and instructions on how to cast on for a mobius scarf on the internet now that it seems strange to remember that they just weren't there when I first got interested.

The Sockmatician is my knitting hero, a practical knot-theorist with his own website. I have learnt many techniques from his videos. I learnt how to do double knitting from him and this led to the algorithmic fractal knitting project. Many of my friends and relatives got a fractal potholder made in two natural tones of pure wool the first Christmas after I worked that one out.

Crochet was never something I could get the hang of as a child, but one summer holiday a few years back, my daughter, who had taught herself from YouTube, showed me how to do double crochet. My immediate thought was – but that makes it so simple to make a Mobius strip with an intrinsic twist! The holiday cottage where the family was staying for the week was suddenly blossoming with

deformed mobius strips as I practised and improved my crocheting skills. I remembered hearing someone mention “hyperbolic crochet” and soon found Daina Taimina’s website and read how she used crochet to demonstrate hyperbolic surfaces to her students. As ever, I had to sort out things in my own way and the resulting surfaces I created are described here.

I don’t pretend that all the projects here are unique – lots of people have knitted Mobius strips and hyperbolic surfaces – but all of them are my own take on mathematical ideas. At Exeter Maths School I have been encouraged and supported to develop and describe these projects so that others can give them a go. I hope someone out there will be inspired to try one of these projects, to adapt and change them, to be inspired to do something else because of them. You don’t have to start from a base of knowing how to knit or crochet or sew. You can learn. I had never done any cable knitting before I made the bell ringing scarf. I didn’t know how to crochet a few years ago. You can learn so much from videos on the internet. All you have to do is believe that you can.

Here are some of the websites which have inspired me and within them are lots and lots more links to mathematical crafts:

[hyperbolic crochet \(hyperbolic-crochet.blogspot.com\)](http://hyperbolic-crochet.blogspot.com)

[Woolly Thoughts](#)

[The Home of Mathematical Knitting \(toroidalsnark.net\)](http://toroidalsnark.net)

[Sockmatician - YouTube](#)

[Everybody wants a rock...: thomasina's Guide to Geeky Knitting \(typepad.com\)](http://typepad.com)

All Joy!

Claire

