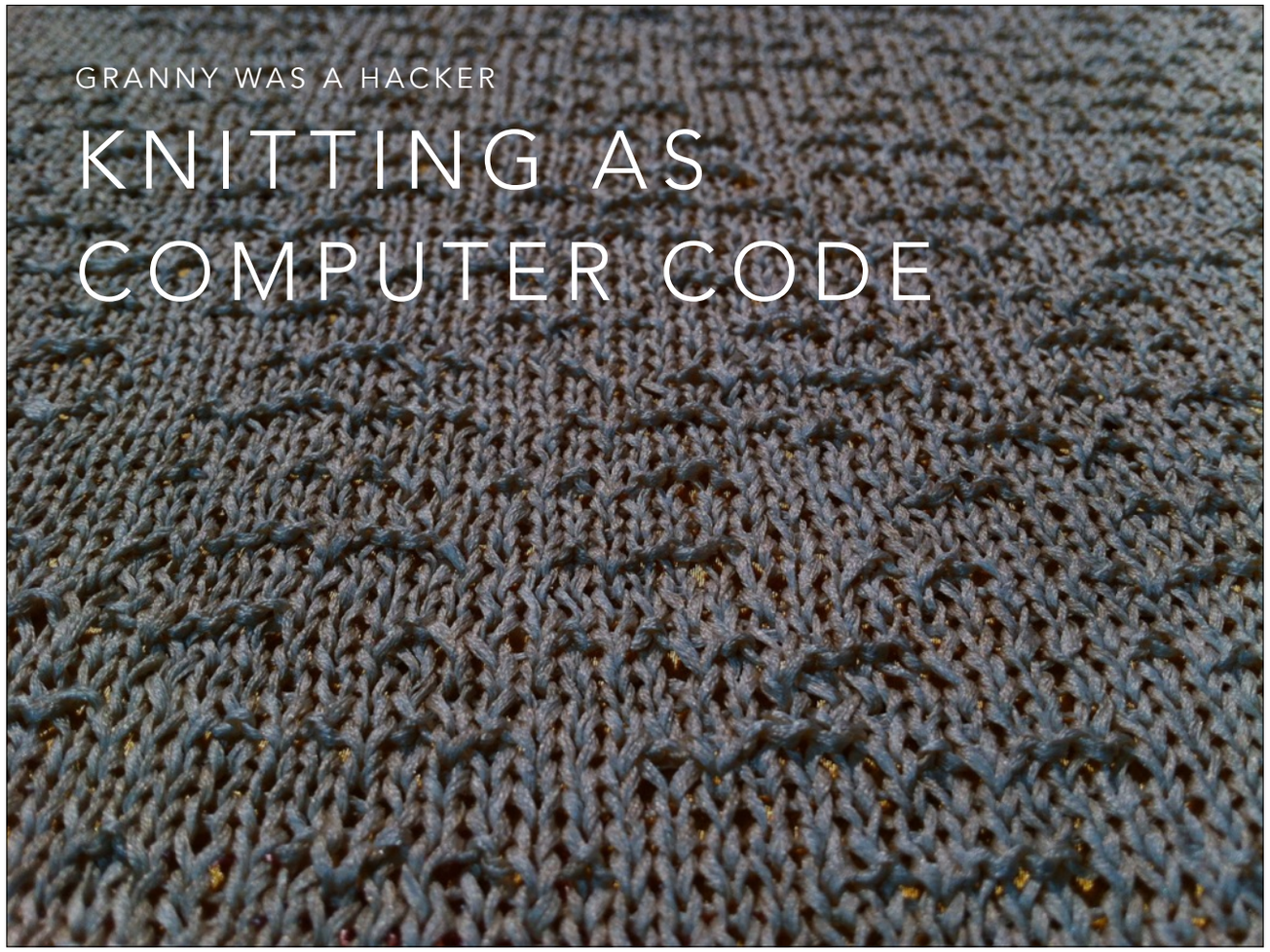

FLICKR: @STÉFAN



I'm guessing that pretty much everyone is this room understands the general concept of "code" - an algorithm that represents symbols from some source alphabet with encoded strings in some other target alphabet. But what you may not realise is that your Granny did pretty much the same thing with two sticks and some wool. I thought it might be fun to run you through some ways you can use knitting to encode data and secret messages.

BINARY KNITTING

- “Decoder Hat” by Zabet Stewart
- Ribbing used to encode binary message.
- One = knit; zero = purl
- Message length restricted by size of hat. 96 stitches = 12 ASCII characters in binary at 8 stitches each

Those of you who’ve actually tried knitting know that it only consists of two stitches - knit and purl. And as you might guess, that makes it pretty easy to encode binary data simply by mapping those stitches to ones and zeroes. In this case, one = knit and zero = purl. The ribbing on this hat encodes up to 12 ASCII characters of your choice. Sadly, the length of your message is dictated by the size of your head!

BINARY KNITTING

- “Binary Scarf” by heycarrieann
- Source code of ravelry.com (knitting website) converted into binary

A scarf gives you a lot more room to work with. This scarf consists of the source code of the ravelry.com home page converted into binary. Again, ones are knits and zeroes are purls.

BINARY KNITTING

- “The Viral Knitting Project” by Kirsty Robertson and Roberto Buiani
- Code Red computer virus turned into a knitting pattern

One of the most interesting uses of the technique I’ve seen is the Viral Knitting Project, where a team of activists knitted the source code to the code red computer virus into a scarf. You can actually download the pattern and knit it yourself. So it’s soft, handmade, giftable… and intrinsically dangerous. Pretty cool.

If you want to get a little more sophisticated, you can actually represent binary code with cables. The hat on the left represents the numbers from 0-15 in binary notation, depending on where the crosses occur. The example on the right uses cables to more literally depict zeroes and ones across a scarf.

BINARY KNITTING

- “Braille Socks” by Jessica Landers
- Uses knit and purl stitches to mimic Braille writing
- Encodes a stanza from Dr. Seuss’s *Oh, The Places You'll Go!*

This last form of binary knitting relies on the unique bumpy texture created by mixing knit and purl stitches. These socks are actually Braille. The pattern repeat is actually a stanza from Dr. Seuss’s “Oh the Places You’ll Go.”

CODED COLOURS

Enough about stitch patterns. Let’s move on to colour! There are thousands of colours of knitting wool which offer a lot more possibilities for encoding messages. The stripes on this jumper, for example, actually spell out “Hello World” in binary.

CODED COLOURS

- “Morse Code” by Kate Atherley
- Uses colour to represent dots and dashes
- Left mitten reads “My Left Mitten”, thumb reads “Thumb”, etc

These mittens use colours to represent the dots and dashes in Morse code! The left mitten reads “My Left Mitten”; the right mitten reads “My Right Mitten”; and the thumb says “Thumb”. You know, in case you get confused.

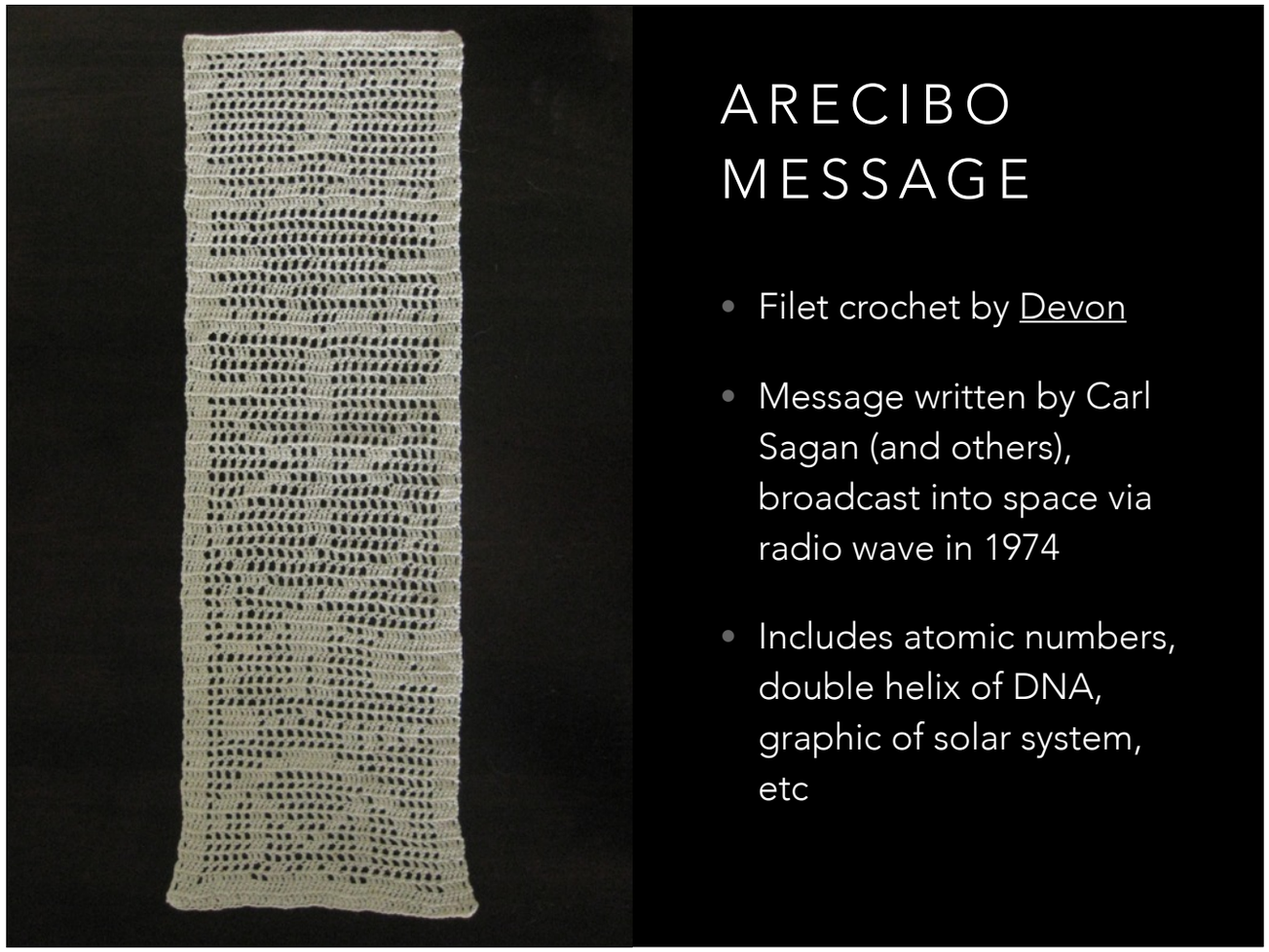
Some more examples of using colour for encoding. The sample on the left is actually the word PEACE. Each letter is mapped to its corresponding number of the alphabet, then the digits are graphed and mirrored to be used as a knitting chart. The mitts at the top are much simpler and encode a birthdate by using each digit as the number of rows for a coloured stripe. And the afghan is actually a substitution cypher, where each colour stands for a separate letter of the alphabet. If you go to woollythoughts.com, you can try your hand at solving it.

Here’s a much more literal example of knitting as code: actual ones and zeros knitted into a scarf. I can report that your average scarf will hold about 120 bytes of information. It’s obviously open source, but it’s not exactly subtle walkin’ around with the matrix around your neck.

Like this guy. Yes, that is a QR code knitted into his scarf. And yes, it really does work. And I know, because I knitted the mittens. They were actually my entry for the 2013 Sydney Royal Easter Show, where I'm proud to say they came in second place. The main difficulty is that knitted stitches aren't quite square, so I went through about 6 prototypes before I found the right tension and resolution to get them to work. The URL actually takes you to a page with the pattern to knit them, which is why I called them "Self-Replicating Mittens".

REALLY GEEKY STUFF

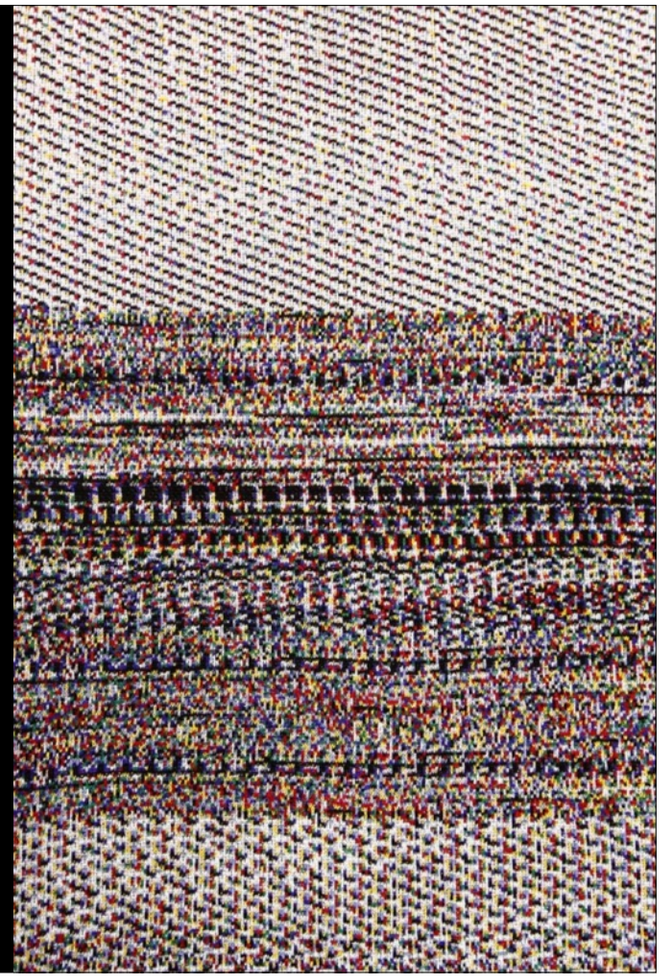
And that leads us into the really geeky stuff. This scarf isn’t code so much as scientific output. The stripes are actually a representation of the emission spectrum of the element Molybdenum. How cool is that?



This one is deceptively simple. I should note that it isn't actually knitting but rather filet crochet, which allows you to create nicer squares and thus is great for reproducing 8-bit graphics. This piece is actually a graphical representation of the Arecibo Message, which was broadcast into space on November 16, 1974. Carl Sagan and a bunch of other really smart people wrote it. It was aimed at the globular star cluster M13 some 25,000 light years away, and helpfully includes a map of our solar system (among other things).

KNITTED APPLICATION

- iTunes No. 6 by Phillip Stearns
- Digital forensics tools used to extract, process, and visualise raw binary data
- Knitted and woven by computer



And lastly, we have a knitted application. And I mean just that. This blanket by textile artist Phillip Stearns is iTunes. I mean, he used digital forensics tools to extract, process, and visualise the raw binary data of the application. The pattern was then fed into a computerised knitting machine to create the blanket.

THANK YOU

Kris Howard @web_goddess

I've really only shown the tip of the iceberg here, and there are lots more ways of encoding messages using techniques like lace stitches and beaded knitting. So if I've inspired you to learn to knit, come see me and I'll help you out! Or go ask your Granny the hacker.