**Representing Braids with Stranded Cellular Automata**

We can use Stranded Cellular Automata to model various types of braids with different numbers of strands. Braids, unlike weaves, have finite width because they reuse the same strands. This means that there is no need to let the border cells “wrap around” as Hao Yang defined them in his work with weaves. In a similar vein, our turning rule for representing braids will not be fixed due to the nature of braids containing both slanted and upright parts.

We started off by constructing physical models of the braids to analyze. We then transcribed the crossings and strands as their corresponding cell states in a Stranded Cellular Automata. Upon checking the output of each neighbor pairing, we were able to derive an initial condition, turning rule, and crossing rule that generated a braid identical to the model.

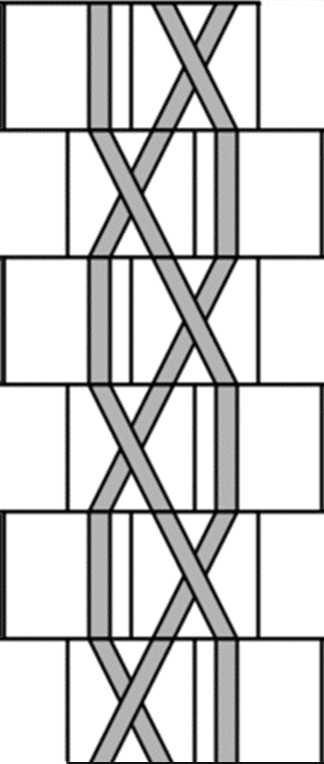
 

Figure 1: 3-Strand Braid and its SCA counterpart (Turning Rule 68, Crossing Rule 32)

After analyzing the simple 3-strand braid and finding no issues with converting it into an SCA, we decided to add another strand to add to the complexity. We found two 4-strand braids that were representable by SCA, a “flat” and “square” pair of braids that both used the same turning rule but different crossing rules.

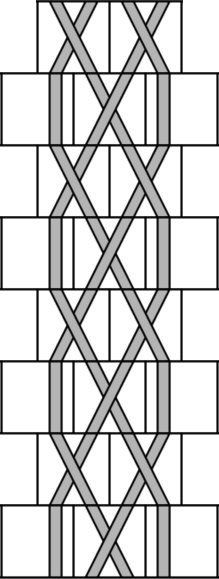
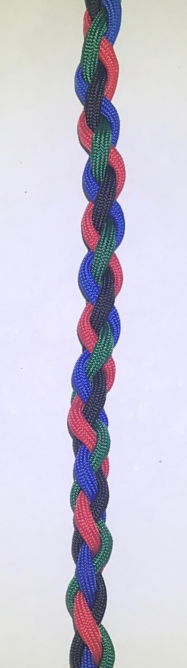
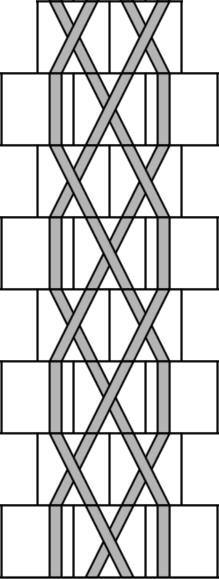
   

Figure 2: Flat 4-Strand Braid with SCA counterpart Figure 3: Square 4-Strand Braid with SCA counterpart

* Double slant 5-strand
* V-shaped 5-strand
* Over under 3+2 braid
* Over only 3+2 braid