Mathematics of Braids

There are people who study the mathematics of braids. To a mathematician, a braid is any collection of strands which cross each other. A braid does not have to have a pattern. A braid really does not even have to have any crossings--mathematicians consider a collection of straight pieces of string to be a braid. What distinguishes one braid from another is the number and order of crossings.
This is the usual braid.

This is a braid even though there's no pattern.

This is the straight braid.
The Four Basic Ideas of Braid Math

1. If you glue two braids together, you still have a braid. (They both must have the same number of strands).

2. If you glue the two left hand braids together first and then glue them to the right hand braid, the result will be the same as the result of first gluing the two right hand braids together and then gluing the left hand braid onto them.
Doing either

or

as the first step results in
3. If you glue straight, uncrossed strands onto your braid, you really haven't changed the braid any. You still have the same number and order of crossings.

4. No matter what your braid looks like, you can find a braid which will make it unravel if you glue them together. The braid which makes your braid unravel is its mirror image.