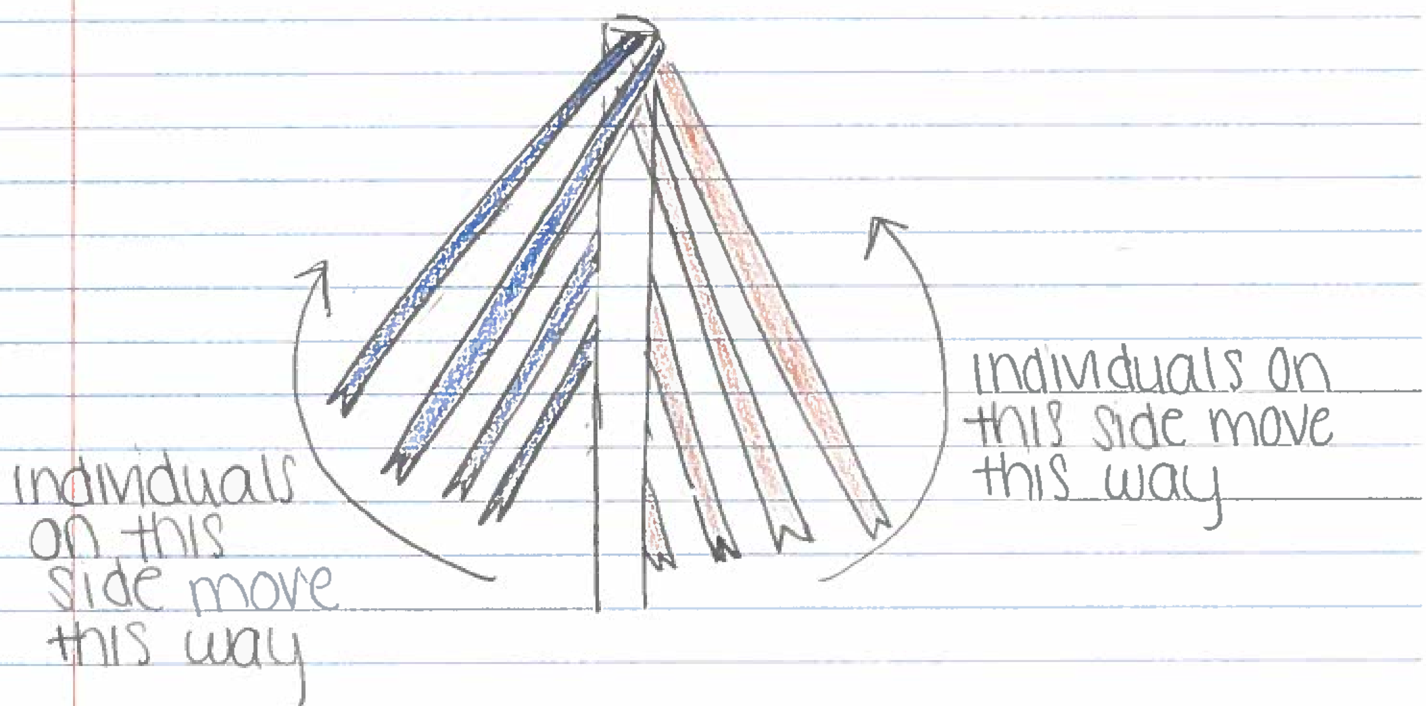
23/25

context.

nice intro!

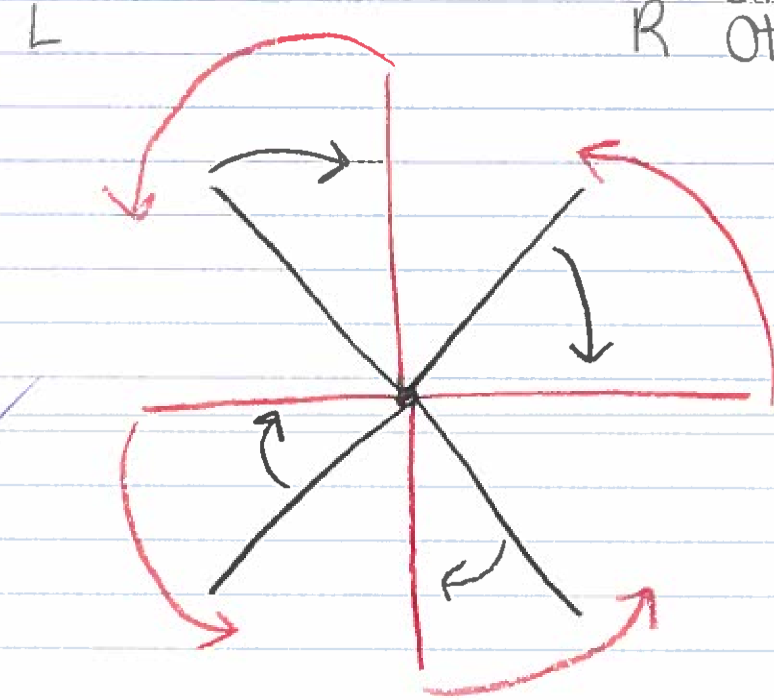
In our math class, we danced the maypole. It is a traditional dance from European folk festivals. It involves a tall wooden pole with various colored ribbons attached at the top. From the bottom, people hold the ribbon and dance in a particular way. In the case of our class, this is what we did:



this picture looks like RR RR BB BB
but we did RB RB RB RB, right?
The ribbons should be mixed up

aerial view

ribbons were dispersed every other

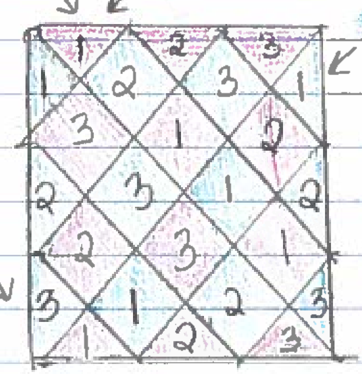


This picture is showing that there were 8 ribbons total 4 were black and 4 were red. In each case a black is paired with a red. all people with black ribbons would move left and under the red ribbons, while the red ribbons move right and over the black ribbons. The dance is over when you run out of ribbon. while the dancers move around the pole, with ribbon in hand, the ribbons cross over eachother and make a pattern on the pole. my job is discovering the mathematics behind this dance.

The math

In our case, the patterns looked much like a basket weave. Each ribbon either crosses over or under another ribbon. Each ribbon also moves all the way around the pole. Is there a way for us to track the interactions of each ribbon and when it will meet up with its original partner again? Lets find out:

3 couples
6 ribbons
  3 pink
  3 blue



Now when will the original partners meet again for the first time. Lets follow the 1 and the 1.

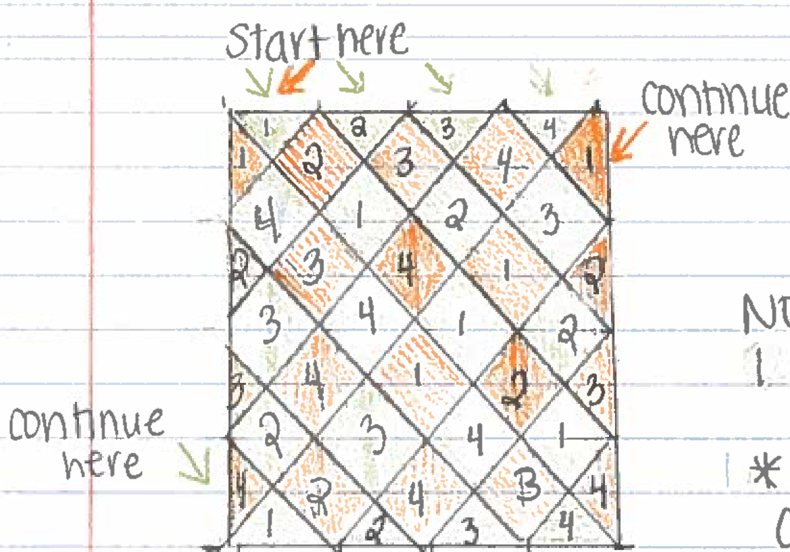
pink tracker: 1 goes over 1, then 1 goes under 2, from there 1 goes over 3, and under 1
then 1 goes over 2
and under 3
then, finally 1 goes over 1 again.

NOTE: this interaction is technically not the same as the first because 1 went OVER 1 the first time.

blue tracker: 1 goes under 1, then 1 goes over 3. From here, 1 goes under 2 and over 1.
Then 1 goes under 3 and over 2
Finally 1 goes under 1 again.

So, why does this occur? ~~In~~ For an odd number of couples, each time the couples go completely around the pole, to meet again, their situation will switch. Blue will be under pink the first time, then over pink, then under, etc.

Examine what happens where there is an even number of couples



4 couples
8 ribbons
4 green
4 orange

Now lets follow 1 and 1

* all green ribbons go ↘
all orange go ↙.

green tracker

1 goes over 1 then 1 goes under 2
Next, 1 goes over 3 and under 4
Following this, 1 goes over 1 again

orange tracker

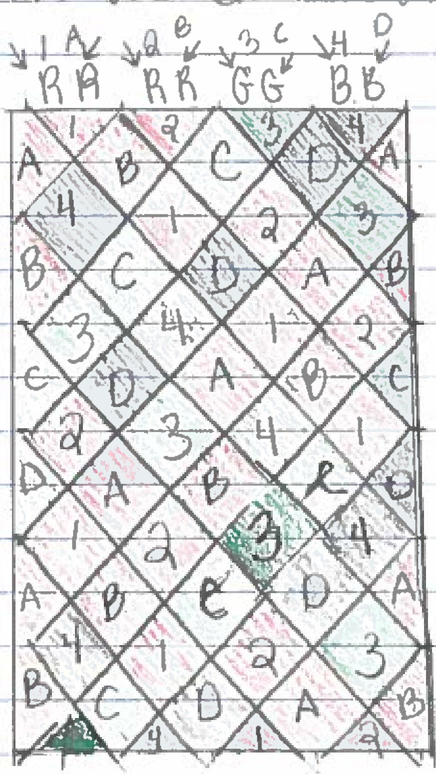
1 goes under 1, then 1 goes over 4
Next 1 goes under 3 and over 2
finally 1 goes under 1 again

Why does it work perfectly on the first interaction in even numbers of couples and not for the odd?

Well each new encounter the individual alternates over, under. With three couples an individual might go over, under, over. Two encounters are over while only one is under. Thus making it disproportionate. But if there are 4 couples an individual might go under, over, under, over. There is an equal number of over : unders, and each interaction will have the same result.

Use odd + odd = even and even divisible by 2 to avoid the vague term "disproportionate"

Pattern we did last class.



by disproportionate I mean that each time one meets with original partner again it will alternate between over and under each rotation. This is because there is not an equal number of partners, or interactions, there is not an equal # of "over" "under" opportunities.