Visual Phasing Part 1

Tanner Tolman, Research Specialist, AG®

tanner.tolman@familysearch.org
7 January 2022

DNA Visual Phasing

- Visual phasing is a process by which the DNA of siblings is compared to determine all of the segments each received from all four of their grandparents
- Visual phasing is best done by comparing the DNA of three full siblings, but can be done with more or less
- Visual phasing can be done with half-siblings but only for the half that is in common
- Each person gets exactly half their DNA from mom and dad, but beyond that is random
- At any given point you have DNA from only two of your grandparents
- The places where your DNA switches from one grandparent to another are called recombination points
- Maternal DNA has about 70% more recombination points than paternal DNA

Benefits of Visual Phasing

- Visual phasing allows you to determine which of your four grandparents a genetic match is related to
- This builds confidence in proof arguments and helps you to focus in on those whose DNA can be used to solve your brick walls
- It's really fun

Phasing Platforms

- Visual phasing requires comparing the sibling's DNA in a chromosome browser
- GedMatch is strongly preferred, 23andme will work ok if necessary
- FamilyTreeDNA and MyHeritage's chromosome browsers will not work because they do not distinguish FIR regions
- You will need software where the chromosomes can be compared side by side
- Microsoft Excel and PowerPoint are great options
- My case studies will use GedMatch and Excel

GedMatch's Chromosome Browser

- When comparing full siblings in GedMatch each chromosome will have segments highlighted with three colors. The three colors are green (full match), yellow (half match), and red (no match). The blue bar underneath simply highlights matches to make them easier to see.

- The places where the siblings inherited DNA from the same grandparents on both sides are green, the places where the siblings inherited from the same grandparent on one side but opposite grandparents on the other side are yellow and the places where they inherited from opposite grandparents on both sides are red.
- Long green segments are usually only seen in full siblings unless there is endogamy. Other relations will only have yellow and red.
- Yellow often has lots of green static in it, and red often has lots of yellow static. Do not worry about that. Worry about the main colors.
- Green sometimes has thin yellow lines through it. Often these are because of incorrectly reported values along the genome. DNA tests are over 99% accurate but there are about 16 incorrect values per test. If you have several yellow lines next to each other it could actually be a small yellow segment sandwiched between two green segments. On the One-One Autosomal DNA comparison you can see the DNA more clearly by checking the “Full Resolution” box and then scrolling to the part in question. In the image further down in this handout, the green segments have some thin yellow bars. In this case they are of no concern.

The Set Up

- Compare siblings A and B, A and C, and B and C in GedMatch’s One-to-one Autosomal DNA comparison.
- Leave the default settings the same. If you do change something I like to put a 3 in the box next to the “Minimum segment cM size
- to be included in total:” box. Many segments smaller than 7 cM are false positive and I end up excluding them, but it can be nice to at least have the small matches highlighted for the times they are real
- Each chromosome must be done individually. Take screenshots of one of the chromosomes and put the comparisons in excel. Line up the chromosomes as best you can and try to have them all the same size
- Click and drag the boundaries of the cell columns and line them up with the recombination points. The recombination points are where the chromosomes switch from one color to another.
- Now you need to identify which sibling owned each recombination. This is usually the sibling who switches from one color to another in both of his comparisons. For example, in the image below at the first point siblings A and B go from yellow to green in the same spot that siblings A and C go from yellow to red. Therefore, sibling A probably owns that recombination point.
- Put initials of the siblings or something to help you remember who owns each one above each recombination point.
- Next I recommend coloring in six bars below the chromosomes with a neutral color. This is where you will fill in the solution. See the image below.
- Finally select four colors. It doesn’t matter what colors you choose put pick two for the top chromosomes for each child and two for the bottom. Be consistent for all three siblings.