VIDEO TRANSCRIPT

Why Did My Ancestry Results Change?

Link to video.

[**narrator**]: For Daisy's birthday, her friends surprise her with an ancestry testing kit. If you've seen our video "How does Ancestry Testing work? Exploring Admixture Testing", you may remember that Daisy has taken one of these tests before. If you haven't seen it yet, we recommend that you watch that video first, before continuing here.

Even though Daisy has done an ancestry test before, she decides to do this one as well. The test that her friends gave her for her birthday is an admixture test, just like the test she did last time. However, this one is from a different company than the first test that she did.

When Daisy receives her results, she is surprised to find that they are different from her previous admixture results. How is this possible? She is after all the same person with the same DNA. Why did her Ancestry Results change?

To answer this question, let's have another look at how Ancestry Testing works.

The first step in the process is to provide the ancestry testing company with a sample of your DNA. For example, the company may ask for a sample of your spit or a swab from the inside of your cheeks. This sample is then sent to the ancestry testing company for further analysis. One possible source of error is if the company swaps your sample with someone else's. This is rare, but mistakes can happen.

In the lab, your DNA is analyzed to determine which variants you carry at specific sites in your DNA.

This process, however, is not without error. In some cases, it is possible that instead of correctly reading Daisy's code as ATC, the analysis process might make a mistake and read AAC instead. Because Daisy has the dark green DNA variant, she should be assigned Asian ancestry for this specific DNA site. However, because of the error that was made in reading her DNA code, she will be assigned European ancestry instead.

With the latest genetic technologies, errors in reading your DNA code are very rare. Nonetheless, when analyzing hundreds of thousands of sites, these errors can happen. This source of error is one of the reasons why identical twins, who carry nearly identical DNA, might receive different ancestry results.

Another reason why your ancestry results can differ from one company to another is because companies include different sets of DNA sites in their analysis. And the decision of which DNA sites to include or exclude in the analysis, can change over time. This explains why even within the same company; your ancestry results might change.

For admixture testing, companies compare the DNA variants that you carry to reference populations. To understand how reference populations can cause admixture results to differ between companies or over time, let's have a closer look at how these reference populations are chosen.

First a company needs to decide which populations they would like to include into their database. The fictional companies in this video chose to look at continental populations. More commonly, companies might choose to use sub-groups on these continents as reference populations such as 'Northern Europeans' or 'Southern Europeans'. Some companies might have even more narrowly defined reference populations, such as 'British', 'Italian', or 'Portuguese'. Even within the same company, the reference populations that are used can change over time.

To build a distinct reference population, you need enough DNA samples from people that belong to that specific population. Those samples are collected, by finding people whose family has lived within that specific country or region for multiple generations.

This means that building an accurate reference population depends in part on people knowing the history of their biological family.

Companies can obtain DNA samples for reference populations from existing databases that are available to them. Alternatively, companies can reach out to people from different parts of the world to ask for a DNA sample.

Some companies will grow their reference population database by adding DNA samples from their own customers who meet the requirements. Depending on their customer base, this means that a company might have thousands of DNA samples for one reference population and only dozens for another. Therefore, each company has their own unique mix of individuals to build each reference population.

Because these individuals are just a sample of the total population, the reference population for a specific region or country can differ from one company to the next. Even within the same company, a reference population can change over time as more people are added to the database. And these differences in reference population composition will affect the estimate of a person's ancestry.

It is also key to remember that a company's database does not include representatives of all of the world's populations. If DNA samples are not available from a certain group, it means that that group will not be represented as a reference population. This may be because these populations were never asked to participate, or because the populations themselves are wary of participating in genetic research.

The final step in ancestry analysis, is to compile all the data and provide customers like Daisy with an estimate of their ancestry. Companies use complex mathematical formulas, to come up with the result. Each company uses their own formulas, and these can change over time. One more reason why ancestry results can differ between companies. And why the estimates from one company can change over time.

Throughout this video, we've explored several reasons for why Daisy's ancestry results from two companies were different. One set of reasons is technical: errors may have occurred when her sample was processed or when her DNA variants were read. Other

reasons may be related to how each company interprets Daisy's results. Each company has its own way of doing the admixture analysis - using different sets of DNA sites, different reference populations, and different formulas to estimate Daisy's ancestry. In addition, each company selects different individuals to represent each reference population.

So, there are many factors that influence how an ancestry testing company comes up with an estimate for your ancestry. And it is the combination of all of these factors that explains why your DNA does not change, but your ancestry results might.