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Chapter 1 : The 5 Best DNA Tests for Ancestry in - Which Testing Kit is Best & How to Choose

Generally, such tests weigh differences between groups (or between two or more time periods) against the variability that is seen in the data within each of the groups (or within each time point). When differences between groups or over time grow larger than would be expected given the variability observed within groups or within individual time points, then they become less likely to be due to chance alone.

The other two sets of hypotheses Sets 2 and 3 are one-tailed tests , since an extreme value on only one side of the sampling distribution would cause a researcher to reject the null hypothesis. When the null hypothesis states that there is no difference between the two population proportions i. It should specify the following elements. Often, researchers choose significance levels equal to 0. Use the two-proportion z-test described in the next section to determine whether the hypothesized difference between population proportions differs significantly from the observed sample difference. Analyze Sample Data Using sample data, complete the following computations to find the test statistic and its associated P-Value. Compute the standard error SE of the sampling distribution difference between two proportions. The test statistic is a z-score z defined by the following equation. The P-value is the probability of observing a sample statistic as extreme as the test statistic. Since the test statistic is a z-score, use the Normal Distribution Calculator to assess the probability associated with the z-score. See sample problems at the end of this lesson for examples of how this is done. The analysis described above is a two-proportion z-test. Interpret Results If the sample findings are unlikely, given the null hypothesis, the researcher rejects the null hypothesis. Typically, this involves comparing the P-value to the significance level , and rejecting the null hypothesis when the P-value is less than the significance level. Test Your Understanding In this section, two sample problems illustrate how to conduct a hypothesis test for the difference between two proportions. The first problem involves a a two-tailed test; the second problem, a one-tailed test. The company states that the drug is equally effective for men and women. To test this claim, they choose a a simple random sample of women and men from a population of , volunteers. The solution to this problem takes four steps: We work through those steps below: The first step is to state the null hypothesis and an alternative hypothesis. The null hypothesis will be rejected if the proportion from population 1 is too big or if it is too small. Formulate an analysis plan. For this analysis, the significance level is 0. The test method is a two-proportion z-test. Using sample data, we calculate the pooled sample proportion p and the standard error SE. Using those measures, we compute the z-score test statistic z. Since we have a two-tailed test , the P-value is the probability that the z-score is less than We use the Normal Distribution Calculator Interpret results. Since the P-value 0. If you use this approach on an exam, you may also want to mention why this approach is appropriate. Specifically, the approach is appropriate because the sampling method was simple random sampling, the samples were independent, each population was at least 10 times larger than its sample, and each sample included at least 10 successes and 10 failures. One-Tailed Test Suppose the previous example is stated a little bit differently. Suppose the Acme Drug Company develops a new drug, designed to prevent colds. The company states that the drug is more effective for women than for men. Based on these findings, can we conclude that the drug is more effective for women than for men? The null hypothesis will be rejected if the proportion of women catching cold p1 is sufficiently smaller than the proportion of men catching cold p2. Since we have a one-tailed test , the P-value is the probability that the z-score is less than

Chapter 2 : Paired difference test - Wikipedia

Specific methods for carrying out paired difference tests are, for normally distributed difference t-test (where the population standard deviation of difference is not known) and the paired Z-test (where the population standard deviation of the difference is known), and for differences that may not be normally distributed the Wilcoxon signed-rank test.

Because it does not rely on the 23rd chromosome, autosomal DNA tests can be done in both men and women with the same results. What is an autosomal DNA test? Remember that half our DNA comes from our father and half from our mother. Going back in generations, that means that roughly one-fourth of our DNA comes from each of our grandparents, one-eighth from each of our great-grandparents, and so on. The further you go back, the less DNA you have inherited from a particular ancestor, and the harder it is to prove that you are related. So autosomal DNA tests are only useful for about four or five generations. That means they could link you with relatives as distant as third or fourth cousins, but usually not more distant than that. This can be very useful if you know very little about your parents or grandparents, and are having a hard time locating living relatives. Many times, relatives located by the test are researching the same family lines as you, and you can share research with them. Autosomal DNA can also provide an estimate of your ethnicity, or the regions of the world where your ancestors lived within the past few hundred years, or even a thousand or more, since people used to move a lot less often. The companies that provide the testing divide the world up into 20 to 25 regions. They give an estimate of what percentage of your ancestry comes from each. This can provide additional clues on where to be searching for more of your family history. In fact, mtDNA changes extremely slowly â€" it might remain exactly the same for dozens of generations! Among other things, that means the test only has to examine about 16, genetic base pairs, instead of the 3. The test normally looks at only specific portions of the mtDNA and compares them to established samples. An mtDNA test will identify how closely related you are to a haplogroup. A haplogroup is basically a group of people with a single common ancestor. Historically, everyone living in the same region might belong to the same haplogroup, or very closely related ones. This means that your haplogroup can identify where your maternal line originated. It could also help you locate distant relatives, but some of them could be very distant. In some cases, mtDNA can remain nearly identical for 50 generations or more. While a perfect match means you are related, you might be 48th cousins! Women have two X-chromosomes, while men have one X and one Y. Y-DNA tests examine only the Y-chromosome. Because you can only get a Y-chromosome from your father, and he from his father, that means it tends to change very little over time. The first is a short tandem repeat STR test. The second is a single-nucleotide polymorphism SNP test. An STR test is often used to determine how closely two people with the same surname are related, if at all. The SNP test is more detailed, and among other things assigns you to a haplogroup. A haplogroup is a group of people with one common ancestor and who lived in one or more specific regions. Both Y-chromosome tests can help you locate relatives. But like mtDNA, because the Y-chromosome changes slowly, you might be related many generations back. And because the Y-chromosome is only passed down through males, the test can only tell you about your direct paternal line. Y-DNA testing is especially useful for adoptees as well as jewish ancestry. It all depends on what you want to know. Autosomal DNA For most genealogists, the autosomal DNA test is the clear winner, and it is the one test that every testing company offers. Because your autosomal DNA comes from all of your ancestors, this test is good for finding a range of ancestors and living relatives. It can also provide you with reasonable estimates of the ethnicity of your ancestors, or the regions of the world where they lived. The main drawback to autosomal DNA is that it gets so jumbled together after a few generations that it becomes unreliable the further you try to go back. Most of the time, an autosomal DNA test is only useful for about five generations â€" that is, to your great-great-great-grandparents. In terms of living relatives, that means it extends to your third cousins or maybe fourth cousins. Still, combined with websites that let you connect with close matches, autosomal DNA can provide some great leads on finding others who are researching the same family tree as you. You can use it to prove a common ancestor with someone else, but only in a direct maternal line. It can, however, trace that line back a very long way â€" sometimes 10, years or more. But it is less useful when finding living relatives.

The mtDNA test also tends to be more expensive. Y-DNA is most useful if you want to prove a connection to a certain ancestor. Say that you have a common surname, like Smith, and want to know if you are related to someone else named Smith. A Y-DNA can prove or disprove that the two of you are related. It can also tell you the ethnicity or region of origin of your paternal line. However, a woman can still find Y-DNA results by having a close male relative take it for her, such as her brother, father, paternal uncle, or cousin by a paternal uncle but not her son, since he got his Y-chromosome from his paternal line, not hers. In the same way, you can trace other paternal lines by asking an appropriate family member to take the test and share the results with you. Points of Origin and Ethnicity All three of the DNA tests can provide you with information on where your ancestors lived. But the information they provide varies from test to test. Y-DNA and mtDNA tests will link you to very specific genetic lines, but keep in mind, they represent only a fraction of your family tree. Autosomal DNA covers your entire family tree, but gets so mixed up after a few generations that it can only provide estimates. The companies that provide DNA testing divide the world up into regions in different ways. Most companies currently use regions, but the number, location, and names of regions vary from company to company. That means that two different testing companies may give you different ethnicity estimates for the exact same DNA. As more and more data get collected, companies update their regions, too. Some companies have had problems with their ethnicity estimates in the past. AncestryDNA , for example, used to be well-known for overestimating Scandinavian ancestry. When a company does improve its ethnicity estimates, your profile will automatically be updated, too. Chances are they will not email you with the update. Consider the case of Alsace-Lorraine, a 5, square mile region on the border of France and Germany. During the 17th and 18th centuries, it was annexed by France. In , following the Franco-Prussian War, it was annexed by Germany. Following World War I, it was returned to France. You can only say that your ancestors came from that region. Many people in the United States want to know if they have any Native American ancestry, and if so, from what tribes. An autosomal DNA test will provide an ethnicity report, but keep in mind it only goes back about five generations. The bad news is none of the tests can tell you what tribe your ancestors may have come from. And none of them can be used as proof of ancestry when it comes to applying for tribal rolls. The best any of them can say is the general region of North or South America where your ancestors likely lived. How is the DNA Collected? DNA is collected either with a cheek swab or a saliva sample, depending on which company you use. It will usually take six to ten weeks for your sample to be processed - but could take longer after the holidays since DNA tests are a popular gift. Depending on the company and the test, your results may include: See the table for a full comparison. Amazingly, you can even buy a test for your dog! It also lets women use the Y-DNA test by having a male relative take it for them. All of these sites offer autosomal DNA testing. All of them will provide you with a geographical breakdown of where your ancestors lived. Beyond that, each one has its pros and cons. Here are the top six options, listed based on how useful overall I think they are for genealogists. They have the most extensive database of DNA results for comparison and many other features for genealogists, but a few more drawbacks than Family Tree. Read our full AncestryDNA review.

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Chapter 3 : GuideStar - Research Papers: Analyzing Survey Data: Tests for Differences

The hypothesized value is the null hypothesis that the difference between population means is 0. We continue to use the data from the "Animal Research" case study and will compute a significance test on the difference between the mean score of the females and the mean score of the males.

The number of degrees of freedom for the problem is the smaller of n 1â€” 1 and n 2â€” 1. An experiment is conducted to determine whether intensive tutoring covering a great deal of material in a fixed amount of time is more effective than paced tutoring covering less material in the same amount of time. Two randomly chosen groups are tutored separately and then administered proficiency tests. The next step is to look up t. The computed t of 1. This test has not provided statistically significant evidence that intensive tutoring is superior to paced tutoring. Estimate a 90 percent confidence interval for the difference between the number of raisins per box in two brands of breakfast cereal. The difference between and is The degrees of freedom is the smaller of 6 â€” 1 and 9 â€” 1 , or 5. A 90 percent confidence interval is equivalent to an alpha level of 0. According to Table 3 in "Statistics Tables," the critical value for t. The interval may now be computed. The interval is â€”2. You can be 90 percent confident that Brand A cereal has between 2. The fact that the interval contains 0 means that if you had performed a test of the hypothesis that the two population means are different using the same significance level , you would not have been able to reject the null hypothesis of no difference. If the two population distributions can be assumed to have the same varianceâ€”and, therefore, the same standard deviationâ€” s 1and s 2 can be pooled together, each weighted by the number of cases in each sample. For this reason, the pooled variance method should be used with caution. Random samples of students from a typing class are given a typing speed test words per minute , and the results are compared. Significance level for the test: Next, you look up t. This value is larger than the absolute value of the computed t of â€”1.

Chapter 4 : Two-Sample z-test for Comparing Two Means

What if we want to test for differences between more than two groups. ANOVA (which stands for "Analysis of Variance") is the way to go. Analysis>Compare Means>One-Way ANOVA Select the variable(s) you want to test and move into the "Dependent List" pane.

This sample difference between the female mean of 5. However, the gender difference in this particular sample is not very important. What is important is whether there is a difference in the population means. In order to test whether there is a difference between population means, we are going to make three assumptions: The two populations have the same variance. This assumption is called the assumption of homogeneity of variance. The populations are normally distributed. Each value is sampled independently from each other value. This assumption requires that each subject provide only one value. If a subject provides two scores, then the scores are not independent. The analysis of data with two scores per subject is shown in the section on the correlated t test later in this chapter. The consequences of violating the first two assumptions are investigated in the simulation in the next section. For now, suffice it to say that small-to-moderate violations of assumptions 1 and 2 do not make much difference. It is important not to violate assumption 3. We saw the following general formula for significance testing in the section on testing a single mean: In this case, our statistic is the difference between sample means and our hypothesized value is 0. The hypothesized value is the null hypothesis that the difference between population means is 0. We continue to use the data from the "Animal Research" case study and will compute a significance test on the difference between the mean score of the females and the mean score of the males. For this calculation, we will make the three assumptions specified above. The first step is to compute the statistic, which is simply the difference between means. The next step is to compute the estimate of the standard error of the statistic. In this case, the statistic is the difference between means, so the estimated standard error of the statistic is. Recall from the relevant section in the chapter on sampling distributions that the formula for the standard error of the difference between means is: Since we are assuming the two population variances are the same, we estimate this variance by averaging our two sample variances. Thus, our estimate of variance is computed using the following formula:

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Chapter 5 : P-value in a two-sample z test for the difference of proportions (practice) | Khan Academy

*Hypothesis Test for Difference of Means If you're seeing this message, it means we're having trouble loading external resources on our website. If you're behind a web filter, please make sure that the domains *www.nxgvision.com and *www.nxgvision.com are unblocked.*

The power is about 0. Significance Tests for Unknown Mean and Unknown Standard Deviation In most practical research, the standard deviation for the population of interest is not known. In this case, the standard deviation is replaced by the estimated standard deviation s , also known as the standard error. Since the standard error is an estimate for the true value of the standard deviation, the distribution of the sample mean is no longer normal with mean and standard deviation. Instead, the sample mean follows the t distribution with mean and standard deviation. The t distribution is also described by its degrees of freedom. For a sample of size n, the t distribution will have n-1 degrees of freedom. The notation for a t distribution with k degrees of freedom is t k. As the sample size n increases, the t distribution becomes closer to the normal distribution, since the standard error approaches the true standard deviation for large n. The test statistic follows the t distribution with n-1 degrees of freedom. The test statistic z is used to compute the P-value for the t distribution, the probability that a value at least as extreme as the test statistic would be observed under the null hypothesis. Example The dataset "Normal Body Temperature, Gender, and Heart Rate" contains observations of body temperature, along with the gender of each individual and his or her heart rate. The t test statistic is equal to This result is significant at the 0. Data presented in Mackowiak, P. Matched Pairs In many experiments, one wishes to compare measurements from two populations. This is common in medical studies involving control groups, for example, as well as in studies requiring before-and-after measurements. Such studies have a matched pairs design, where the difference between the two measurements in each pair is the parameter of interest. Analysis of data from a matched pairs experiment compares the two measurements by subtracting one from the other and basing test hypotheses upon the differences. Usually, the null hypothesis H0 assumes that that the mean of these differences is equal to 0, while the alternative hypothesis Ha claims that the mean of the differences is not equal to zero the alternative hypothesis may be one- or two-sided, depending on the experiment. Using the differences between the paired measurements as single observations, the standard t procedures with n-1 degrees of freedom are followed as above. Example In the "Helium Football" experiment, a punter was given two footballs to kick, one filled with air and the other filled with helium. The punter was unaware of the difference between the balls, and was asked to kick each ball 39 times. The balls were alternated for each kick, so each of the 39 trials contains one measurement for the air-filled ball and one measurement for the helium-filled ball. Given that the conditions leg fatigue, etc. The Sign Test Another method of analysis for matched pairs data is a distribution-free test known as the sign test. This test does not require any normality assumptions about the data, and simply involves counting the number of positive differences between the matched pairs and relating these to a binomial distribution. The concept behind the sign test reasons that if there is no true difference, then the probability of observing an increase in each pair is equal to the probability of observing a decrease in each pair: To perform a sign test on matched pairs data, take the difference between the two measurements in each pair and count the number of non-zero differences n. Of these, count the number of positive differences X. Example In the "Helium Football" example above, 2 of the 39 trials recorded no difference between kicks for the air-filled and helium-filled balls. Of the remaining 37 trials, 20 recorded a positive difference between the two kicks. This value indicates that there is not strong evidence against the null hypothesis, as observed previously with the t-test.

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Chapter 6 : Hypothesis Test: Difference in Proportions

The difference between running a one or two tailed F test is that the alpha level needs to be halved for two tailed F tests. For example, instead of working at Î± = , you use Î± = ; Instead of working at Î± = , you use Î± =

Survey Quote Tests for Differences Rarely are two or more percentages or averages in your data exactly the same. Even when, in reality, there are no meaningful differences between groups or no real changes over time, there will be fluctuations in the data that arise solely from sampling or measurement error. Consider flipping a coin. One will usually seem "more" and the other "less. As a result, it is often necessary to apply some statistical criterion or criteria to decide which differences are large enough that we will not simply attribute them to normal random fluctuations in the data. In essence, we use a statistical test to help us decide how much of a difference is likely to be a real difference. Which statistical tests we use is dependent on the nature of the data that we collect. Generally, such tests weigh differences between groups or between two or more time periods against the variability that is seen in the data within each of the groups or within each time point. When differences between groups or over time grow larger than would be expected given the variability observed within groups or within individual time points, then they become less likely to be due to chance alone. By convention, when the differences observed are likely to be seen less often than once in twenty times by chance alone a probability of less than 0. If we make many comparisons, we will also consider the pattern of findings, so that occasional differences that arise within the context of many comparisons are evaluated within the context of the findings as a whole. Ideally, individual significant differences will form a pattern that increases our confidence that they are meaningful. The specific tests that are applied for any given comparison will vary depending on the nature of the data that are being analyzed. Unless you have a solid background in measurement and statistics, it is likely that you will need the assistance of a professional analyst to conduct such tests and to interpret their findings. At GuideStar Research, evaluating the significance of group differences and changes that occur over time is a routine part of our strategic consulting and reporting services. The most powerful statistical tests are referred to as parametric tests. The t-test and analysis of variance procedures are common tests within this category. These tests compare average mean scores across groups or within one or more groups over time. Though more powerful than other alternatives, these procedures are designed for data that is collected using interval-level measurement and that is normally or at least symmetrically distributed. If you do not have an interval level measure or if your data are not normally distributed, then these procedures may not be acceptable for your analyses. Data that are collected using categorical variables nominal or ordinal data are usually analyzed with non-parametric statistical procedures. These include procedures that use a variety of approaches suitable to a range of different comparisons. Some, for example, compare the observed frequencies in data tables to what we might expect from chance e. Others rank the data within each group and then compare ranks in each of the groups e. When data are not normally distributed e. Again, this is where the expert consulting we provide at GuideStar Research plays an important role in the research process. As an alternative, you can also view differences in light of the margin s of error or the confidence interval s. Differences that exceed 1. As a result, we would suggest caution in interpreting this as a meaningful increase in approval ratings. When using this kind of rule of thumb, however, be advised that margins of error that apply to the sample as a whole will be smaller than the margin of error for subgroups within the data. When comparing two subgroups, you will need the margins of error for those groups to use this approach. When averages mean scores are computed, we can also compute the confidence intervals for those averages. When the confidence intervals for two averages means do not overlap, then it is also likely that the scores will be significantly different. When they do overlap, then unless the groups are very large, they are unlikely to be significantly different.

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Chapter 7 : Hypothesis test for difference of means (video) | Khan Academy

The t-test and the one-way analysis of variance (ANOVA) are the two most common tests used for this purpose. The t-test is a statistical hypothesis test where the test statistic follows a Student's t distribution if the null hypothesis is supported.

The other two sets of hypotheses Sets 2 and 3 are one-tailed tests , since an extreme value on only one side of the sampling distribution would cause a researcher to reject the null hypothesis. When the null hypothesis states that there is no difference between the two population means i. It should specify the following elements. Often, researchers choose significance levels equal to 0. Use the two-sample t-test to determine whether the difference between means found in the sample is significantly different from the hypothesized difference between means. Analyze Sample Data Using sample data, find the standard error, degrees of freedom, test statistic, and the P-value associated with the test statistic. Compute the standard error SE of the sampling distribution. The degrees of freedom DF is: Some texts suggest that the degrees of freedom can be approximated by the smaller of n1 - 1 and n2 - 1; but the above formula gives better results. The test statistic is a t statistic t defined by the following equation. The P-value is the probability of observing a sample statistic as extreme as the test statistic. Since the test statistic is a t statistic, use the t Distribution Calculator to assess the probability associated with the t statistic, having the degrees of freedom computed above. See sample problems at the end of this lesson for examples of how this is done. Interpret Results If the sample findings are unlikely, given the null hypothesis, the researcher rejects the null hypothesis. Typically, this involves comparing the P-value to the significance level , and rejecting the null hypothesis when the P-value is less than the significance level. Test Your Understanding In this section, two sample problems illustrate how to conduct a hypothesis test of a difference between mean scores. The first problem involves a two-tailed test; the second problem, a one-tailed test. Two-Tailed Test Within a school district, students were randomly assigned to one of two Math teachers - Mrs. After the assignment, Mrs. Smith had 30 students, and Mrs. Jones had 25 students. At the end of the year, each class took the same standardized test. Test the hypothesis that Mrs. Jones are equally effective teachers. Assume that student performance is approximately normal. The solution to this problem takes four steps: We work through those steps below: The first step is to state the null hypothesis and an alternative hypothesis. The null hypothesis will be rejected if the difference between sample means is too big or if it is too small. Formulate an analysis plan. For this analysis, the significance level is 0. Using sample data, we will conduct a two-sample t-test of the null hypothesis. Using sample data, we compute the standard error SE , degrees of freedom DF , and the t statistic test statistic t. Since we have a two-tailed test , the P-value is the probability that a t statistic having 40 degrees of freedom is more extreme than We use the t Distribution Calculator Interpret results. Since the P-value 0. If you use this approach on an exam, you may also want to mention why this approach is appropriate. Specifically, the approach is appropriate because the sampling method was simple random sampling, the samples were independent, the sample size was much smaller than the population size, and the samples were drawn from a normal population. The engineer in charge claims that the new battery will operate continuously for at least 7 minutes longer than the old battery. To test the claim, the company selects a simple random sample of new batteries and old batteries. The old batteries run continuously for minutes with a standard deviation of 20 minutes; the new batteries, minutes with a standard deviation of 40 minutes. Assume that there are no outliers in either sample. The null hypothesis will be rejected if the mean difference between sample means is too small.

Chapter 8 : Z-Test - Basics and the Different Z-tests

Chapter 9 : Types of Statistical Tests | CYFAR

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Many students and parents begin the college prep process by comparing the ACT and SAT tests. The SAT and ACT generally cover the same topics. Both ACT and SAT scores are used for college admissions decisions and awarding merit-based scholarships.