

Exercise 40 chi squared

Sport & Tourism, Fitness



Researchers routinely choose an α -level of 0.05 for testing their hypotheses. What are some experiments for which you might want a lower α -level (e.g., 0.01)? What are some situations in which you might accept a higher level (e.g., 0.1)? An alpha level of 0.05 is arbitrary and was set as a standard by scientists. One of the key concepts in hypothesis testing is that of significance level or, the alpha level, which specifies the probability level for the evidence to be an unreasonable estimate.

Unreasonable means that the estimate should not have taken its particular value unless some non-chance factor(s) had operated to alter the nature of the sample such that it was no longer representative of the population of interest. (Price, 2000) As a researcher, you have complete control over the value of this significance level. The alpha level should be considered based on the research context and of the researcher's personal convictions about how strong they want the evidence to be, before concluding that a particular estimate is reasonable or unreasonable. Price, 2000) An alpha level of 0.05 is the recommended norm for a two tailed test. The alpha level should be considered based on personal convictions of how strong you want your evidence to be. The alpha level is the probability or p-value that the researcher is willing to accept as significant. It can also be interpreted as the chance of making a Type 1 or Type 2 error. When you set a more stringent (smaller) alpha level, like .01 or .001, (which decreases the probability of making a Type I error) you increase the likelihood of making a Type II error.

Hence, it is suggested that an alpha level of .05 is a good compromise between the likelihoods of making Type I and Type II errors. An experiment where you may want a lower alpha level (e.g., 0.01) would be for example

a drug study for coagulation times. You would want to be certain the drug is effective, therefore a lower alpha level would be prudent. Within this same drug study, you would accept a higher alpha level when looking for drug side-effects. (University of Texas-HoustonHealthScienceCenter , 2013)

References Price, I. (2000).

What Alpha Level? In I. Price, Inferential Statistics (p. Chapter 5). New England: University of New England. University of Texas-Houston Health Science Center . (2013). Hypothesis Testing . Retrieved March 21, 2013, from Biostatistics for the Clinician : http://www.uth.tmc.edu/uth_orgs/educ_dev/osser/L2_2.HTM 4DQ1 How would you explain the analysis of variance, assuming that your audience has not had a statistics class before? When examining the differences between two or more groups, you can use the analysis of variance which is known as ANOVA.

This is a statistical technique that is used to compare the means or averages of more than two groups. There are three uses of ANOVA which are the one-way, the two-way and N-way Multivariate ANOVA. (Solutions, 2013) The determining factor when to use one of the “ways” is dependent upon how many “treatments” are used in the study. We use the term treatment because ANOVA originated in the 1920’s to test different treatments of fertilizers’ crop yields. (“Analysis of Variance,” 2012, p. 2) Here, we will cover the one-way and the two-way ANOVA.

The one-way between groups, ANOVA is used when you want to test the difference between two or more groups. This is the simplest version of ANOVA. (Crossman, 2013) This could be used for example in a study on the ages of patients on different cardiac medications. Here we are only looking

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at the various ages of patients. The two-way ANOVA between groups is used to look at complex groupings. (Crossman, 2013) For example, the patient's ages in the previous example could be extended to include the patients from other countries to see if the ages vary from those in the U. S.

So you would have three two effects from this ANOVA: the effect of the ages and the effect of abroad versus local. Using ANOVA in this study, you could also add diet to see if there is any association between cardiac meds, patient's ages, and differences of abroad versus local. ANOVA creates a way to test several null hypotheses at the same time. (Solutions, 2013) There are however, certain assumptions that need to be met for true comparison of means prior to conducting the analysis which are: 1. The population in which samples are drawn should be normally distributed. 2.

Independent of case: the sample cases should be independent of each other.

3. Homogeneity: Homogeneity means that the variance between the groups should be approximately equal. (Solutions, 2013) “ ANOVA is used very commonly in business, medicine or in psychology research. In business, ANOVA can be used to compare the sales of different designs based on different factors. A psychology researcher can use ANOVA to compare the different attitude or behavior in people and whether or not they are the same depending on certain factors. In medical research, ANOVA is used to test the effectiveness of a drug”. Solutions, 2013) References Chapter Fourteen Analysis of Variance. (2012). Retrieved from [www. ssc. wisc. edu/~aaradill/310_spring2012_chapter14. pdf](http://www.ssc.wisc.edu/~aaradill/310_spring2012_chapter14.pdf) Crossman, A. (2013). Analysis of Variance. Retrieved March 25, 2013, from About. com: Sociology: [http://sociology. about. com/od/Statistics/a/Analysis-of-variance. htm](http://sociology.about.com/od/Statistics/a/Analysis-of-variance.htm)

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Solutions, S. (2013). Analysis of Variance. Retrieved March 25, 2013, from Statistics Solutions: <http://www.statisticssolutions.com/academic-solutions/resources/directory-of-statistical-analyses/analysis-of-variance/>

What is an interaction? Describe an example; what are the variables within your population (work, social, academic, etc.) for which you might expect interactions? An interaction is the variation among the differences between means for different levels of one factor over different levels of the other factor. (Easton & McColl, 2013) In statistics, an interaction may occur when considering the relationship among three or more variables. It describes a situation in which the simultaneous influence of two variables on a third is not additive. (PediaView. om, 2013) For example, an intra-operative vascular study on the use of gelfoam for topical hemostasis is being conducted. Half of the surgical patients received gelfoam with normal saline, and the other half received gelfoam with topical thrombin 5, 000units/5cc of normal saline. All of the surgical patients received IV protamine to reverse the IV heparin. It was found that gelfoam with normal saline alone was effective, and gelfoam with topical thrombin alone was effective in reducing bleeding in the operative site (main effect of gelfoam and main effect of gelfoam and topical thrombin with IV protamine).

Also, for those patients who didn't receive the thrombin, the gelfoam worked equally well (main effect of gelfoam); those who received gelfoam and normal saline got the benefits of both (main effect of gelfoam and main effect of IV protamine). However, it was found that those patients who receive gelfoam and topical thrombin got the benefits of both plus a bonus,

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an interaction effect (main effect of gelfoam with thrombin and the main effect of protamine plus an interaction effect). Reference Easton, V. , & McColl, J. (2013).

Design of experiments & ANOVA. Retrieved March 25, 2013, from Statistics Glossary: [http://www. stats. gla. ac. uk/steps/glossary/anova. html#intern](http://www.stats.gla.ac.uk/steps/glossary/anova.html#interaction) PediaView. com. (2013). Interaction (Statistics). Retrieved March 25, 2013, from PediaView. com: [http://pediaview. com/openpedia/Interaction_\(statistics\)](http://pediaview.com/openpedia/Interaction_(statistics)) 5DQ1 What is an example in the world around you for which you would use a Chi-square analysis? 5DQ2 Now that you are familiar with the basic concepts of statistics, what are some examples of when you have seen or heard statistics used inappropriately?