Choosing the Right Statistical Test

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Type, number of variables and relationship vs difference

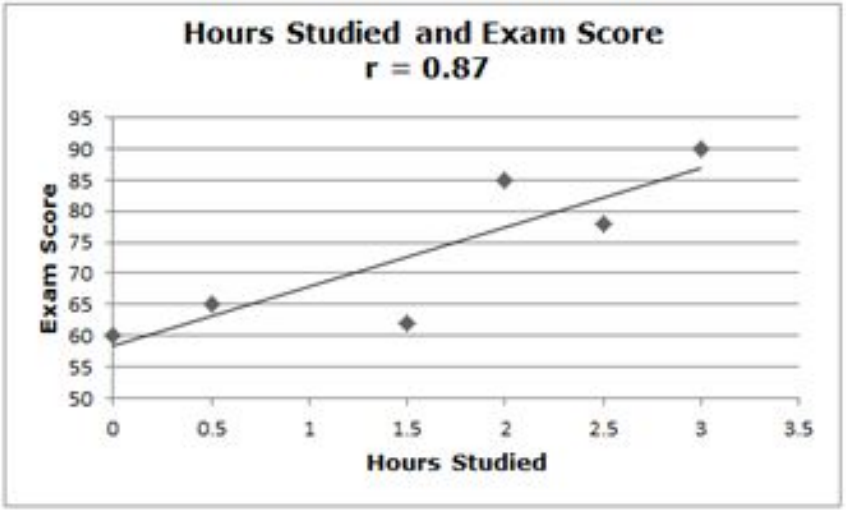
Types of variables	Example	Number of variables	Type of test
• Continuous	Height, Price	• 1	• relationship
• Rank	Olympic medals	• 2	• difference
• Categorical	College	• 3 or more	

Correlation

2 continuous or rank variables, relationship

Example

measure salt intake and fat intake in different people's diets, to see if people who eat a lot of fat also eat a lot of salt



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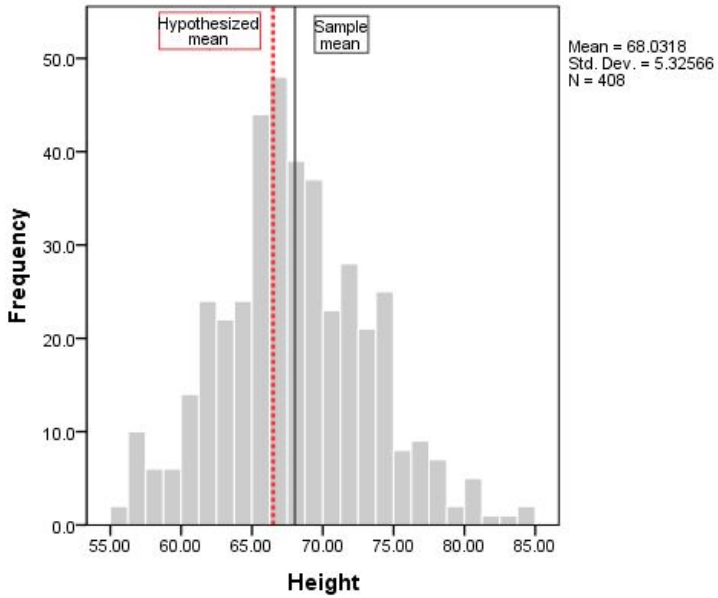
Z test/one sample t-test

1 continuous target, difference

Example

blindfold people, ask them to hold arm at 45° angle, see if mean angle is equal to 45°

Use the one sample t-test if (1) sample size is <30 (2) population variance is unknown



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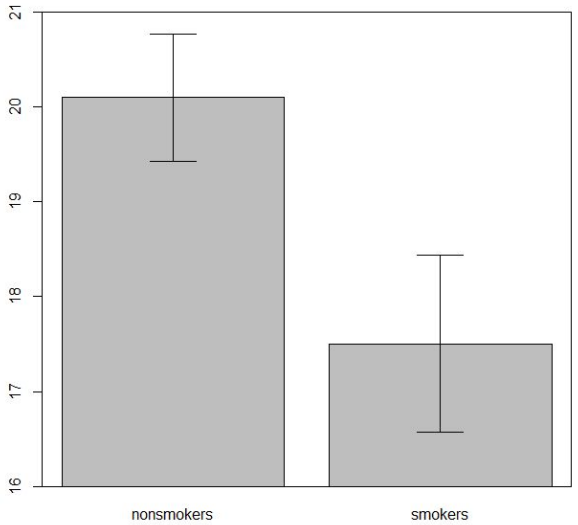
two sample t-test, independent samples

1 continuous target, 1 categorical factor (2 levels), difference

Example

compare mean heavy metal content in mussels from Nova Scotia and New Jersey



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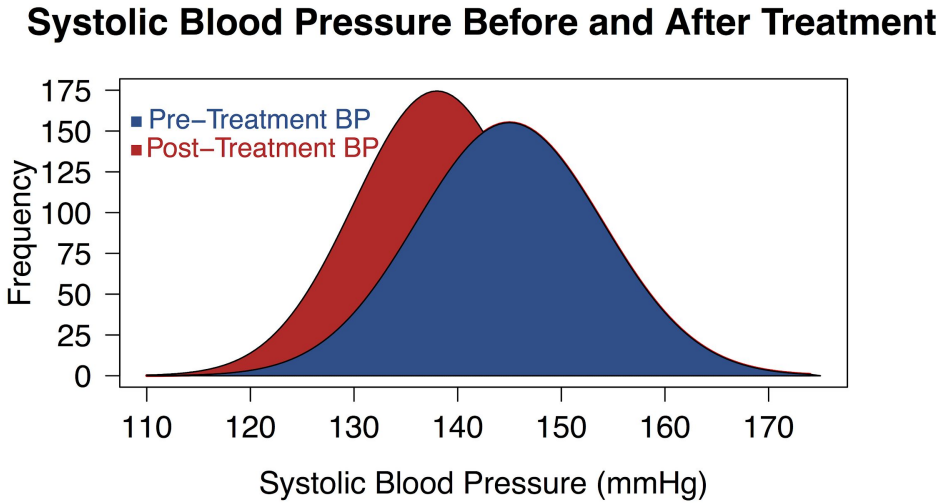
two sample t-test, repeated measures

1 continuous target, 1 categorical factor(2 levels), difference

Example

compare the cholesterol level in blood of people before vs. after switching to a vegetarian diet



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Mann–Whitney U test, independent samples

1 rank target, 1 categorical factor (2 levels), difference

Example

2 varieties of corn are ranked for tastiness, and the mean rank is compared among varieties

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Wilcoxon signed rank test, dependent samples

1 rank target, 1 categorical factor (2 levels), difference

Example

compare the cholesterol level in blood of people before vs. after switching to a vegetarian diet, only record whether it is higher or lower after the switch

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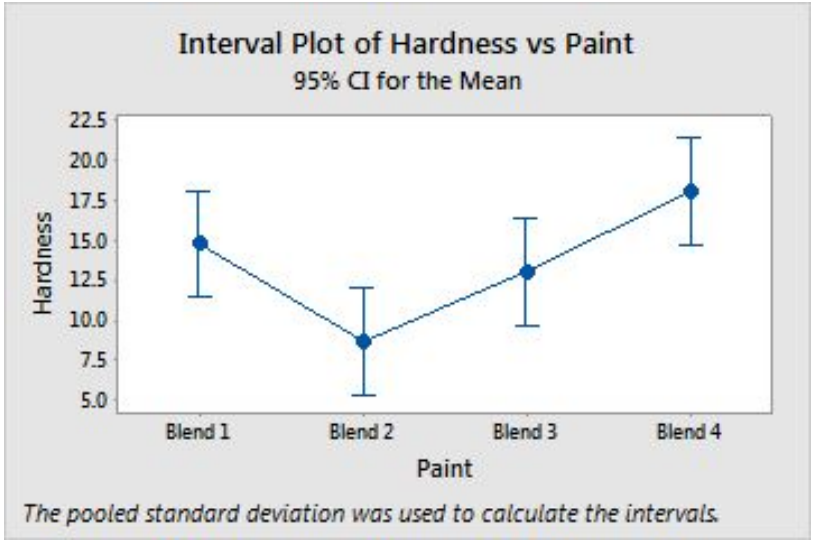
One-way ANOVA

1 continuous target, 1 categorical factor (3 or more levels), difference

Example

compare mean heavy metal content in mussels from Nova Scotia, Maine, Massachusetts, Connecticut, New York and New Jersey

Run post-hoc analysis for individual difference



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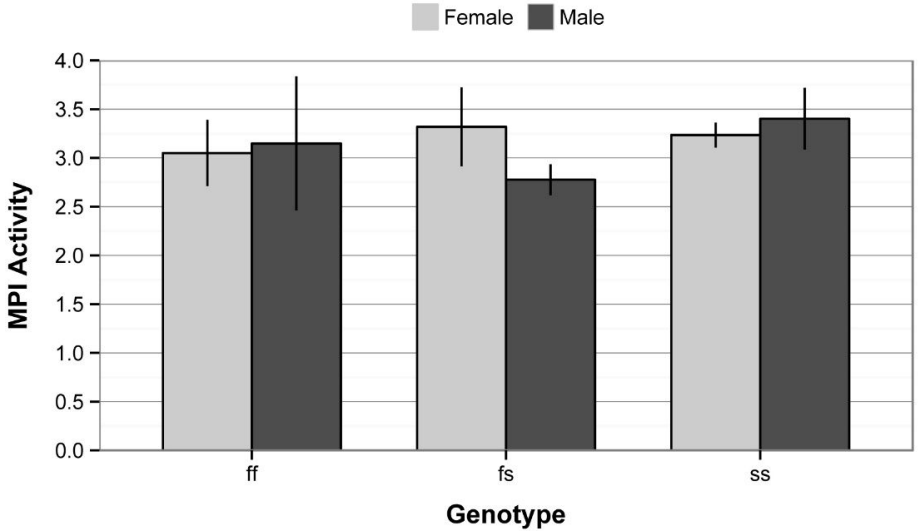
Multi-way ANOVA

1 continuous target, 2 or more categorical factor (2 or more levels each), difference

Example

compare weight loss at different levels of diet and exercise



Run post-hoc analysis for individual difference

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Chi-square test

1 categorical target , 1 categorical factor, (2 or more levels each) difference

Example

count the number of live and dead patients after treatment with drug or placebo, test the hypothesis that the proportion of live and dead is the same in the two treatments

Material	Location 1	2	3	Total
Glass	8	23	29	60
Cardboard	28	61	91	180
Plastic	39	85	116	240
Metal	25	31	64	120
Total	100	200	300	600

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Choosing the right statistical test links

http://www.biostathandbook.com/testchoice.html

https://stats.idre.ucla.edu/other/mult-pkg/whatstat/