

Comparison of two groups

Note Title

11/7/2008

Chapter 5:

Claim is typically: $H_A: \mu > \mu_0$

population mean

null value

Chapter 6:

Claim becomes $H_A: \mu_1 > \mu_2$

population mean of group 1

population mean of group 2

1. Answer the following questions regarding the study in Exercise 6.4. (Data file: Chapter 6/ex6-4.csv)

(a) Present a short description of the study and the data, including summary statistics for each variable.

Preliminary experiment was conducted to investigate the effect of cold on hypertension in rats. Two random samples of 6 rats were exposed to different environments. One group of rats was held in a normal environment at 26 C environment. The other group was held in a cold 5 C environment. Blood pressures were measured for rats in both groups.

Variables:

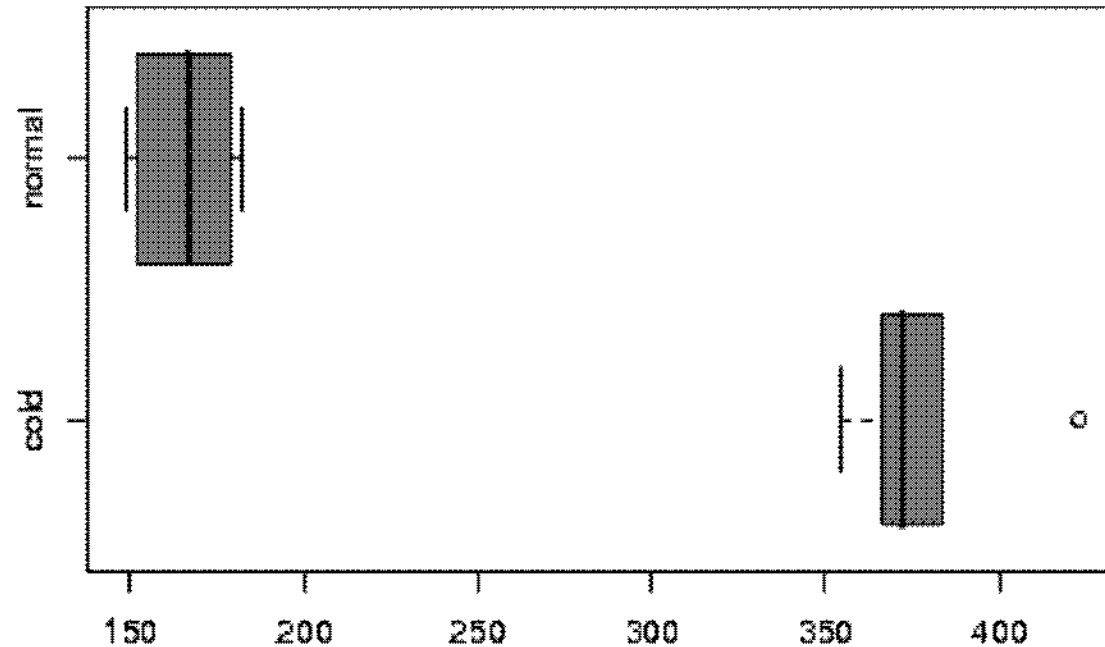
Temp: The indicator of two groups, either "cold" or "normal"

Blood pressure: The measurement of blood pressure.

Summary statistics

Temp	Mean	S.D	L.Quartile	Median	U.Quartile
cold	378.5	23.95621	366.75	372	381.75
normal	165.8333	14.77047	153.25	166.5	178.25

(b) Present the comparison of the two groups in boxplot, and comment on the data based on the visualization.



The sample size is very small. The data under the normal temperature is symmetric, but the group for the cold temperature has an outlier. The boxplot suggests that the rat blood pressure under the normal temperature is at least 150 units lower than that of the cold temperature.

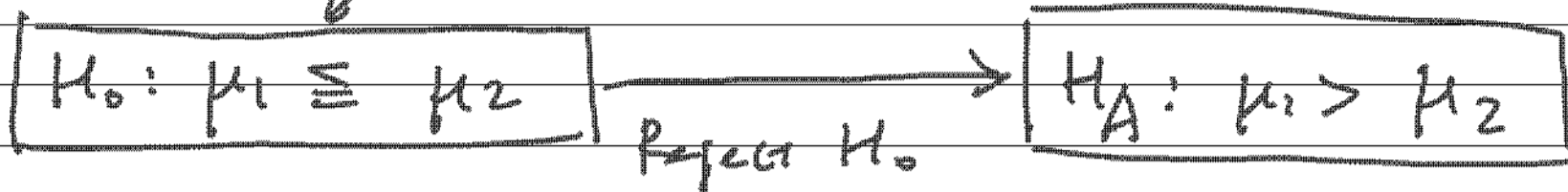
(c) Do the data provide sufficient evidence that rats exposed to a cold environment have a higher blood pressure than rats exposed to a normal environment? Construct the null and the alternative hypothesis for the test.

μ_1 = the average blood pressure under the cold environment (Group 1)

μ_2 = the average blood pressure under the normal environment (Group 2)

Claim: $\mu_1 > \mu_2$

the opposite



How to decide whether we reject H_0 or not?

p-value $\leq \alpha$ = your choice of significance level

⇓

We reject H_0 . There is evidence to support the claim

(d) Calculate the test statistic and the p-value of the test.

Procedure	t statistic	p value
General	18.50948	2.35E-08
Pooled	18.50948	2.28E-09

$$\begin{aligned} &\leftarrow 2.35 \times 10^{-8} \\ &= 0.0000000235 \end{aligned}$$

The sample size is very small, and the general t-test procedure is not a good choice.

(e) Choose the significance level, and interpret your findings.

We choose $\alpha = 0.01$, and reject H_0 .

The result is highly significant, and there is strong evidence to support the claim.

(f) Construct a 95% confidence interval for the difference in the two population means.

