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The *R* Workshop

Applying the Integrated Suite of Software
Facilities for Statistical Computing and Graphics

University of Georgia
Department of Workforce Education, Leadership, and Social Foundations
College of Education Research Office




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7. One- and Two-Sample Tests

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One-sample t-test

- Given a sample from a population, want to know if the population mean could be a particular value μ_0 ?
 1. Compute the sample mean.
 2. Compute the normalized difference (t-statistic) between the sample mean and the hypothesized mean μ_0 .
 3. Compare it with the reference distribution (t-distribution).



One- & Two-Sample Tests

One-sample t-test

```
# Daily energy intake in kJ for 11 women
daily.intake <- c(5260, 5470, 5640, 6180, 6390, 6515,
  6805, 7515, 7515, 8230, 8770)
# To investigate whether women's intake deviates
# from a recommended value of 7725kJ
mean(daily.intake)
sd(daily.intake)
boxplot(daily.intake); abline(h=7725, col=2, lty=2)
t.test(daily.intake, mu=7725, alternative="less")
# alternative = "greater", "two.sided"
```



One- & Two-Sample Tests

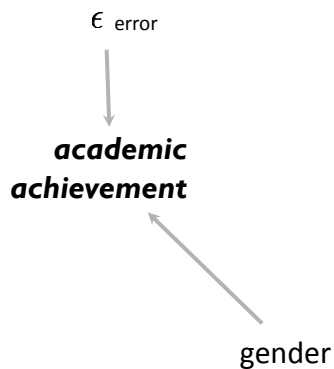
One-sample Wilcoxon Signed-Rank Test

- Assume only that the data distribution is symmetric around the theoretical mean.
 - Subtract the theoretical mean and rank the differences.
 - Ignoring the sign, calculate the sum of positive or negative ranks.

```
wilcox.test(daily.intake, mu=7725)
```



One- & Two- Sample Tests



id	gender	GPA
1	M	4.0
2	M	3.8
3	M	3.5
4	M	3.1
5	F	3.3
6	F	3.5
7	F	4.0
8	F	4.2
9	F	3.8
10	F	3.7

Two-sample t-test

- Given one sample each from two population, want to know if the population means could differ each other?
 1. Compute the sample means.
 2. Compute the normalized difference (t-statistic) between the sample.
 3. Compare it with the reference distribution (t-distribution).



One- & Two-Sample Tests

Two-sample Tests

```
group <- c(rep("M", 4), rep("F", 6))
y <- c(4.0, 3.8, 3.5, 3.1, 3.3, 3.5, 4.0, 4.2, 3.8, 3.7)
boxplot(y~group)

# Two-sample t-test
t.test(y~group)

# Wilcoxon rank-sum test
wilcox.test(y~group)
```



One- & Two-Sample Tests

Paired Tests

```
library(ISwR)
attach(intake)
intake
t.test(pre, post, paired=T)
t.test(pre, post) # WRONG!!!
wilcox.test(pre, post, paired=T)
# Or...
diff <- post-pre
t.test(diff, mu=0)
wilcox.test(diff, mu=0)
```

One- & Two-Sample Tests

