

Independent t-test markdown file

```
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title: "Independent t-test Assignment"
output:
  md_document:
    variant: markdown_github
---
```

Independent t-test

This R markdown document provides an example of performing a regression using the `lm()` function in R and compares the output with the `ttestlS()` function in the `jmv` (Jamovi) package.

Package management in R

```
```{r}
keep a list of the packages used in this script
packages <- c("tidyverse", "rio", "jmv")
```
```

This next code block has `eval=FALSE` because you don't want to run it when knitting the file. Installing packages when knitting an R notebook can be problematic.

```
```{r eval=FALSE}
check each of the packages in the list and install them if they're not installed already
for (i in packages){
 if(! i %in% installed.packages()){
 install.packages(i,dependencies = TRUE)
 }
 # show each package that is checked
 print(i)
}
```
```

```
```{r}
load each package into memory so it can be used in the script
for (i in packages){
 library(i,character.only=TRUE)
 # show each package that is loaded
 print(i)
}
```
```

t-test is a linear model

The t-test is a type of linear model. We're going to compare the output from the `lm()` function in R with t-test output. To use a categorical variable in a linear model it needs to be dummy coded. One group needs to be coded as 0 and the other group needs to be coded as 1. If you compare the values for F from `lm()` and t from the t-test you'll see that $t^2 = F$. You should also notice that the associated p values are equal.

Open data file

The rio package works for importing several different types of data files. We're going to use it in this class. There are other packages which can be used to open datasets in R. You can see several options by clicking on the Import Dataset menu under the Environment tab in RStudio. (For a csv file like we have this week we'd use either From Text(base) or From Text (readr). Try it out to see the menu dialog.)

```
```{r}
Using the file.choose() command allows you to select a file to import from another folder.
dataset <- rio::import(file.choose())
This command will allow us to import a file included in our project folder.
```
```

Get R code from Jamovi output

You can get the R code for most of the analyses you do in Jamovi.

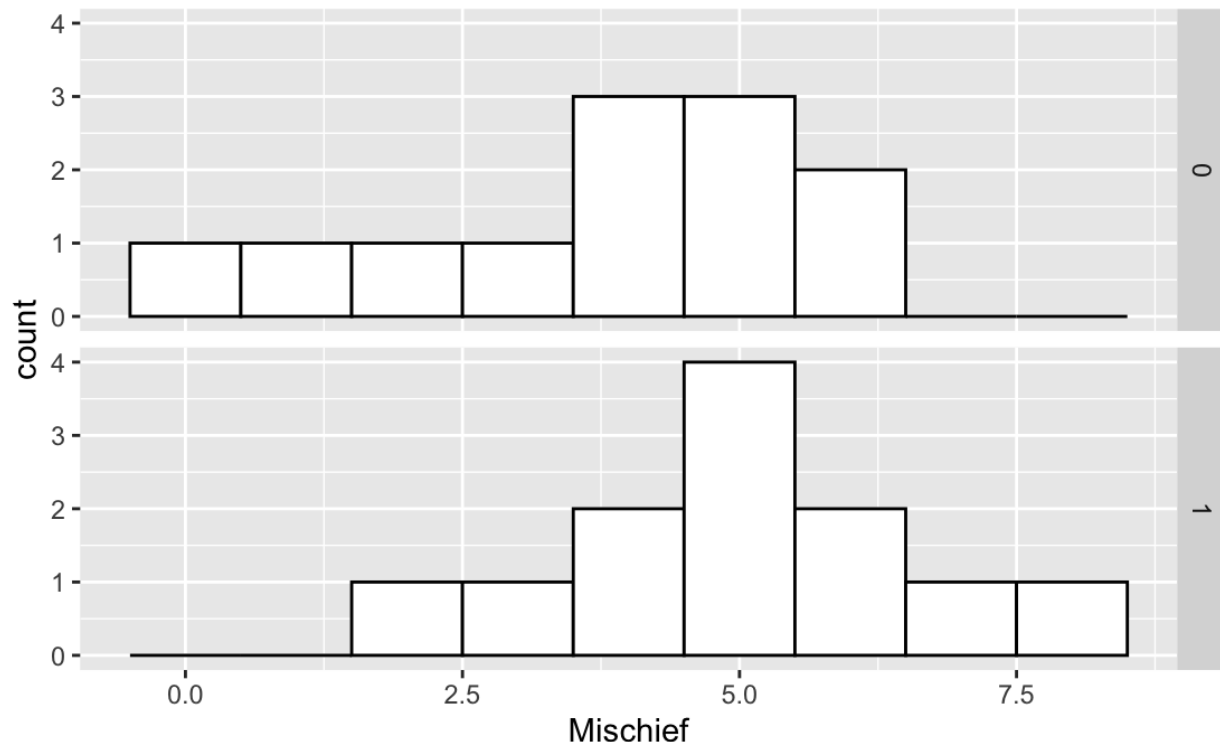
1. Click on the three vertical dots at the top right of the Jamovi window.
2. Click on the Syndax mode check box at the bottom of the Results section.
3. Close the Settings window by clicking on the Hide Settings arrow at the top right of the settings menu.
4. you should now see the R code for each of the analyses you just ran.

lm() function in R

Many linear models are calculated in R using the lm() function. We'll look at how to perform a regression using the lm() function since it's so common.

Visualization

```
```{r}
ggplot(dataset, aes(x = Mischief))+
 geom_histogram(binwidth = 1, color = "black", fill = "white")+
 facet_grid(Cloak ~ .)
```
```



```

```{r}
Make a factor for the box plot
dataset <- dataset %>% mutate(Cloak_f = as.factor(Cloak))
levels(dataset$Cloak_f)

```

```

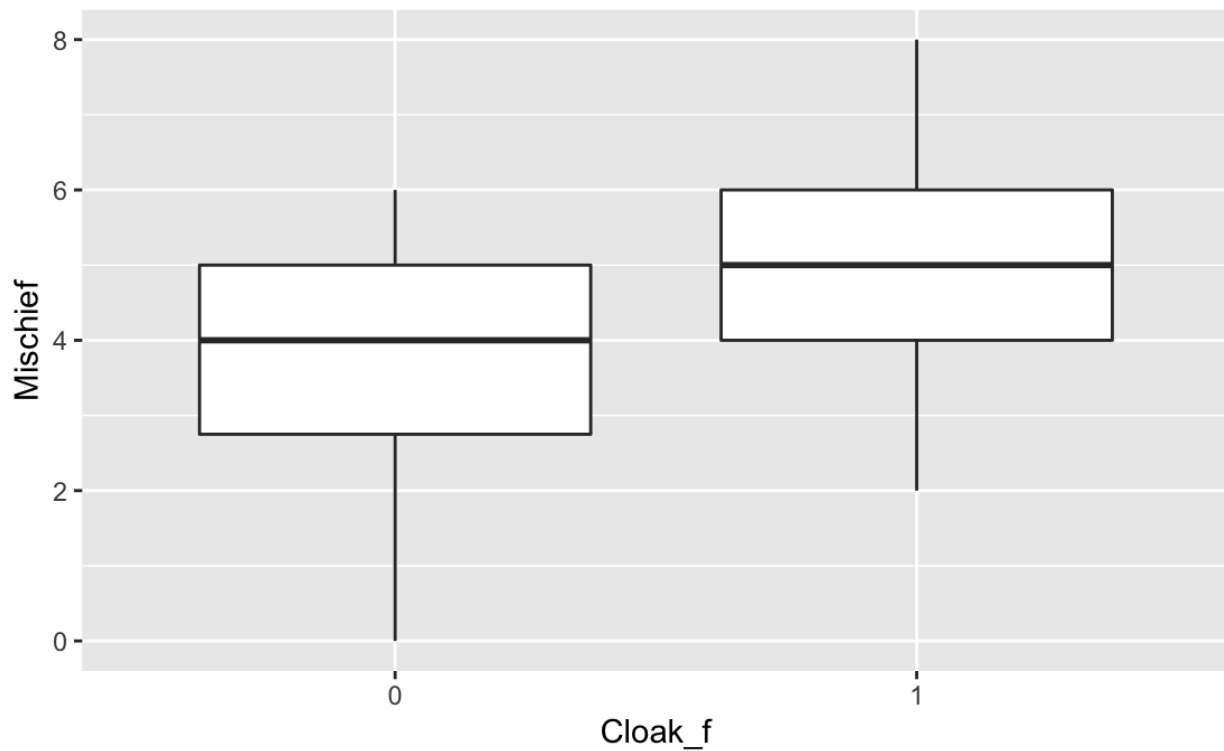
[1] "0" "1"

```

```

```{r}
ggplot(dataset, aes(x = Cloak_f, y = Mischief)) +
  geom_boxplot()

```



Computation

```

```{r}
model <- lm(formula = Mischief ~ Cloak, data = dataset)
model

```

Call:  
lm(formula = Mischief ~ Cloak, data = dataset)

Coefficients:  
(Intercept) Cloak  
3.75 1.25

#### Model assessment

```

```{r}
summary(model)

```

```
```
```

Call:

```
lm(formula = Mischief ~ Cloak, data = dataset)
```

Residuals:

| Min    | 1Q     | Median | 3Q    | Max   |
|--------|--------|--------|-------|-------|
| -3.750 | -1.000 | 0.125  | 1.250 | 3.000 |

Coefficients:

|             | Estimate | Std. Error | t value | Pr(> t )     |
|-------------|----------|------------|---------|--------------|
| (Intercept) | 3.7500   | 0.5158     | 7.270   | 2.79e-07 *** |
| Cloak       | 1.2500   | 0.7295     | 1.713   | 0.101        |

```

```

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.787 on 22 degrees of freedom

Multiple R-squared: 0.1177, Adjusted R-squared: 0.07764

F-statistic: 2.936 on 1 and 22 DF, p-value: 0.1007

#### Standardized residuals from lm()

You might notice lm() does not provide the standardized residuals. Those must be calculated separately.

```
```{r}
```

```
standardized = lm(scale(Mischief) ~ scale(Cloak), data=dataset)
```

```
summary(standardized)
```

```
```
```

Call:

```
lm(formula = scale(Mischief) ~ scale(Cloak), data = dataset)
```

Residuals:

| Min      | 1Q       | Median  | 3Q      | Max     |
|----------|----------|---------|---------|---------|
| -2.01544 | -0.53745 | 0.06718 | 0.67181 | 1.61235 |

Coefficients:

|              | Estimate  | Std. Error | t value | Pr(> t ) |
|--------------|-----------|------------|---------|----------|
| (Intercept)  | 7.110e-18 | 1.960e-01  | 0.000   | 1.000    |
| scale(Cloak) | 3.431e-01 | 2.003e-01  | 1.713   | 0.101    |

Residual standard error: 0.9604 on 22 degrees of freedom

Multiple R-squared: 0.1177, Adjusted R-squared: 0.07764

F-statistic: 2.936 on 1 and 22 DF, p-value: 0.1007

## function in Jamovi

Compare the output from the lm() function with the output from the function in the jmv package.

```
```{r}
```

```
jmv::ttestIS(  
  formula = Mischief ~ Cloak,  
  data = dataset,  
  vars = Mischief,  
  welchs = TRUE,  
)
```

```

mann = TRUE,
norm = TRUE,
qq = TRUE,
eqv = TRUE,
meanDiff = TRUE,
effectSize = TRUE,
desc = TRUE,
plots = TRUE)

```

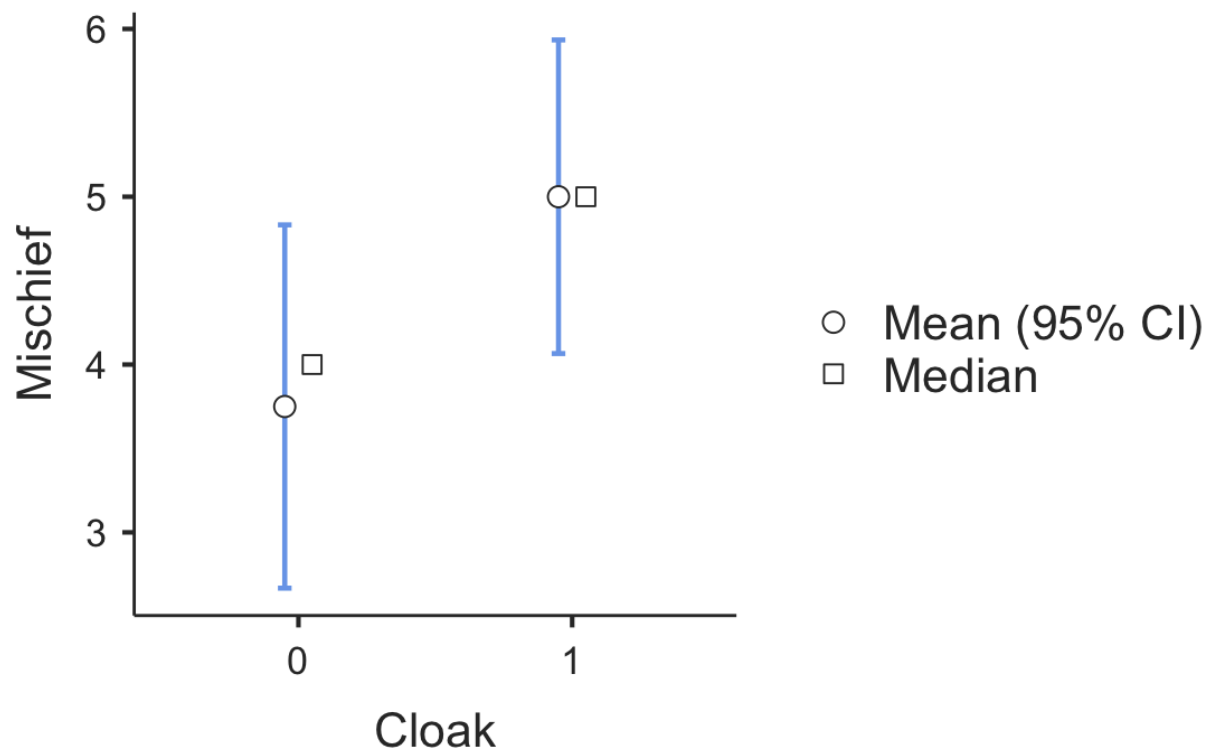
Homogeneity of Variances Test (Levene's)

	F	df	df2	p
Mischief	0.5448916	1	22	0.4682143

Note. A low p-value suggests a violation of the assumption of equal variances

Group Descriptives

Group	N	Mean	Median	SD	SE	
Mischief	0	12	3.750000	4.000000	1.912875	0.5521995



1 12 5.000000 5.000000 1.651446 0.4767313

