R Handout - Linear Models Foundation

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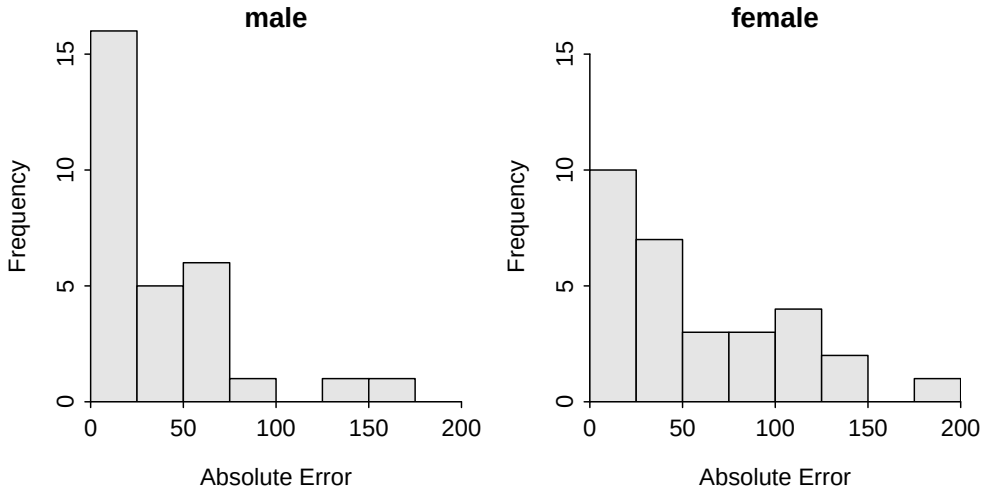
1 Initialization

```
> library(NCStats)
```

2 Two-Sample t-Test

```
> sdir <- read.csv("https://raw.githubusercontent.com/droglenc/NCData/master/SexDirection.csv")
> str(sdir)
'data.frame': 60 obs. of  2 variables:
 $ abserr: int  13 13 38 59 58 8 130 68 23 5 ...
 $ sex   : Factor w/ 2 levels "female","male": 2 2 2 2 2 2 2 2 2 2 ...
> sdir$fsex <- factor(sdir$sex,levels=c("male","female"))
> str(sdir)
'data.frame': 60 obs. of  3 variables:
 $ abserr: int  13 13 38 59 58 8 130 68 23 5 ...
 $ sex   : Factor w/ 2 levels "female","male": 2 2 2 2 2 2 2 2 2 2 ...
 $ fsex  : Factor w/ 2 levels "male","female": 1 1 1 1 1 1 1 1 1 1 ...
> hist(abserr~fsex,data=sdir,xlab="Absolute Error",breaks=seq(0,200,25),col="gray90")
```

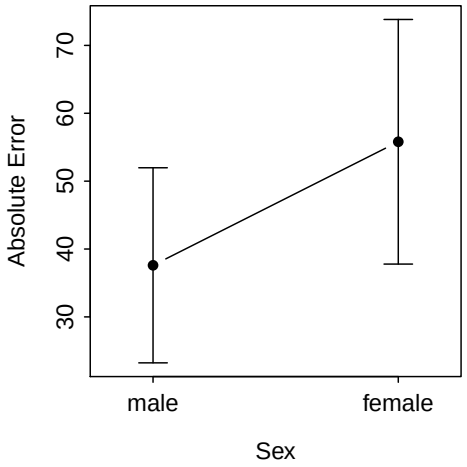



```
> Summarize(abserr~fsex,data=sdir,digits=2)
    fsex  n nvalid mean    sd min    Q1 median    Q3 max percZero
1   male 30     30 37.6 38.49   3 11.50   22.5 58.75 167        0
2 female 30     30 55.8 48.26   3 15.75   35.0 88.25 176        0
> leveneTest(abserr~fsex,data=sdir)
      Df F value Pr(>F)
group  1  2.1692 0.1462
      58
```

```
> t.test(abserr~fsex,data=sdir,var.equal=TRUE)

 Two Sample t-test with abserr by fsex
t = -1.6149, df = 58, p-value = 0.1118
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -40.758823   4.358823
sample estimates:
  mean in group male mean in group female
                37.6                 55.8

> t.test(abserr~sex,data=sdir,var.equal=TRUE)

 Two Sample t-test with abserr by sex
t = 1.6149, df = 58, p-value = 0.1118
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -4.358823 40.758823
sample estimates:
mean in group female   mean in group male
                55.8                 37.6
```

3 Two-Sample t-Test as a Linear Model

```
> lm1 <- lm(abserr~fsex,data=sdir)
> summary(lm1)

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   37.600      7.969   4.718 1.54e-05
fsexfemale    18.200     11.270   1.615    0.112

Residual standard error: 43.65 on 58 degrees of freedom
Multiple R-squared: 0.04303,Adjusted R-squared: 0.02653
F-statistic: 2.608 on 1 and 58 DF,  p-value: 0.1118

> confint(lm1)

                2.5 %   97.5 %
(Intercept) 21.648503 53.55150
fsexfemale  -4.358823 40.75882

> fitPlot(lm1,xlab="Sex",ylab="Absolute Error",main="")

Loading required namespace:  sciplot
```




```
> anova(lm1)

          Df Sum Sq Mean Sq F value Pr(>F)
fsex       1   4969  4968.6   2.608 0.1118
Residuals 58 110496  1905.1
Total     59 115465
```