

```

> wbw.mod1 <- aov(wtg ~ trt.f)
> summary(wbw.mod1)
      Df Sum Sq Mean Sq F value Pr(>F)
trt.f   3 403056 134352  15.56 2.89e-09 ***
Residuals 236 2038207  8636
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>
> wbw.glht <- glht(wbw.mod1, linfct = mcp(trt.f="Tukey"))
> summary(wbw.glht) # the summary of the tests

```

Simultaneous Tests for General Linear Hypotheses

Multiple Comparisons of Means: Tukey Contrasts
 Fit: aov(formula = wtg ~ trt.f)

Linear Hypotheses:

	Estimate	Std. Error	t value	Pr(> t)
2 - 1 == 0	4.34	16.97	0.256	0.9941
3 - 1 == 0	-40.33	16.97	-2.377	0.0843 .
4 - 1 == 0	73.67	16.97	4.342	<0.001 ***
3 - 2 == 0	-44.67	16.97	-2.633	0.0442 *
4 - 2 == 0	69.33	16.97	4.086	<0.001 ***
4 - 3 == 0	114.00	16.97	6.719	<0.001 ***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 (Adjusted p values reported -- single-step method)

```
> confint(wbw.glht)
```

Simultaneous Confidence Intervals

Multiple Comparisons of Means: Tukey Contrasts

Fit: aov(formula = wtg ~ trt.f)

Quantile = 2.5869
 95% family-wise confidence level

Linear Hypotheses:

	Estimate	lwr	upr
2 - 1 == 0	4.3397	-39.5528	48.2321
3 - 1 == 0	-40.3297	-84.2221	3.5628
4 - 1 == 0	73.6697	29.7772	117.5621

```
3 - 2 == 0 -44.6693 -88.5618 -0.7769
4 - 2 == 0 69.3300 25.4376 113.2224
4 - 3 == 0 113.9993 70.1069 157.8918
```

```
>
> windows(width=5,height=3,pointsize=10)
> plot(wbw.glht)
> title(sub="Whole Breast Weight Data",adj=0)
> mtext("Tukey Honest Significant Differences",side=3,line=0.5)
>
> ### Creating three orthogonal contrasts, testing each
> contr.ort1 <- rbind(
+ "Corn - Sorghum"=c(-1,-1,1,1),"Meth - NoMeth"=c(-1,1,-1,1),
+ "(C-S)M - (C-S)NM"=c(1,-1,-1,1))
>
> confint(glht(wbw.mod1,linfct=mcp(trt.f=contr.ort1)))
```

Simultaneous Confidence Intervals

Multiple Comparisons of Means: User-defined Contrasts

```
Fit: aov(formula = wtg ~ trt.f)
```

```
Quantile = 2.4044
```

```
95% family-wise confidence level
```

Linear Hypotheses:

	Estimate	lwr	upr
Corn - Sorghum == 0	29.0003	-28.6937	86.6944
Meth - NoMeth == 0	118.3390	60.6449	176.0331
(C-S)M - (C-S)NM == 0	109.6597	51.9656	167.3537

```
>
> ### Treating "BC" as a Control Treatment - Dunnett's Test
>
> levels(trt.f)
[1] "1" "2" "3" "4"
> trt.f1 <- relevel(trt.f, ref="3")
> levels(trt.f1)
[1] "3" "1" "2" "4"
>
> wbw.mod2 <- aov(wtg ~ trt.f1)
> summary(wbw.mod2)
      Df Sum Sq Mean Sq F value Pr(>F)
```

```

trt.f1    3 403056 134352 15.56 2.89e-09 ***
Residuals 236 2038207 8636
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>
>
> wbw.Dunnett <- glht(wbw.mod2, linfct=mcp(trt.f1="Dunnett"))
> summary(wbw.Dunnett)

```

Simultaneous Tests for General Linear Hypotheses

Multiple Comparisons of Means: Dunnett Contrasts

```
Fit: aov(formula = wtg ~ trt.f1)
```

Linear Hypotheses:

	Estimate	Std. Error	t value	Pr(> t)
1 - 3 == 0	40.33	16.97	2.377	0.0483 *
2 - 3 == 0	44.67	16.97	2.633	0.0248 *
4 - 3 == 0	114.00	16.97	6.719	<0.001 ***

```

---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)

```

```
> confint(wbw.Dunnett)
```

Simultaneous Confidence Intervals

Multiple Comparisons of Means: Dunnett Contrasts

```
Fit: aov(formula = wtg ~ trt.f1)
```

Quantile = 2.3644
95% family-wise confidence level

Linear Hypotheses:

	Estimate	lwr	upr
1 - 3 == 0	40.3297	0.2127	80.4466
2 - 3 == 0	44.6693	4.5524	84.7863
4 - 3 == 0	113.9993	73.8824	154.1163

```

>
>

```

```

>
> windows(width=5,height=3,pointsize=10)
> plot(wbw.Dunnett,sub="Whole Breast Weight Data")
> mtext("Dunnet's Method",side=3,line=0.5)
> ### Duncan's and SNK Test
>
> require(agricolae)
Loading required package: agricolae
Warning message:
package 'agricolae' was built under R version 3.1.3
>
> duncan.test(wbw.mod1,"trt.f",main="Whole Breast Weight",console=TRUE)

```

Study: Whole Breast Weight

Duncan's new multiple range test
for wtg

Mean Square Error: 8636.469

trt.f, means

	wtg	std r	Min	Max
1	606.3300	54.17975	60 491.08	724.69
2	610.6697	53.68048	60 491.35	736.35
3	566.0003	102.40992	60 301.85	799.07
4	679.9997	135.05940	60 349.95	920.66

alpha: 0.05 ; Df Error: 236

Critical Range

	2	3	4
	33.42631	35.18704	36.36233

Means with the same letter are not significantly different.

Groups, Treatments and means

a	4	680
b	2	610.7
b	1	606.3
c	3	566

```

> SNK.test(wbw.mod1,"trt.f",main="Whole Breast Weight",console=TRUE)

```

Study: Whole Breast Weight

Student Newman Keuls Test

for wtg

Mean Square Error: 8636.469

trt.f, means

	wtg	std	r	Min	Max
1	606.3300	54.17975	60	491.08	724.69
2	610.6697	53.68048	60	491.35	736.35
3	566.0003	102.40992	60	301.85	799.07
4	679.9997	135.05940	60	349.95	920.66

alpha: 0.05 ; Df Error: 236

Critical Range

	2	3	4
	33.42631	40.01854	43.90115

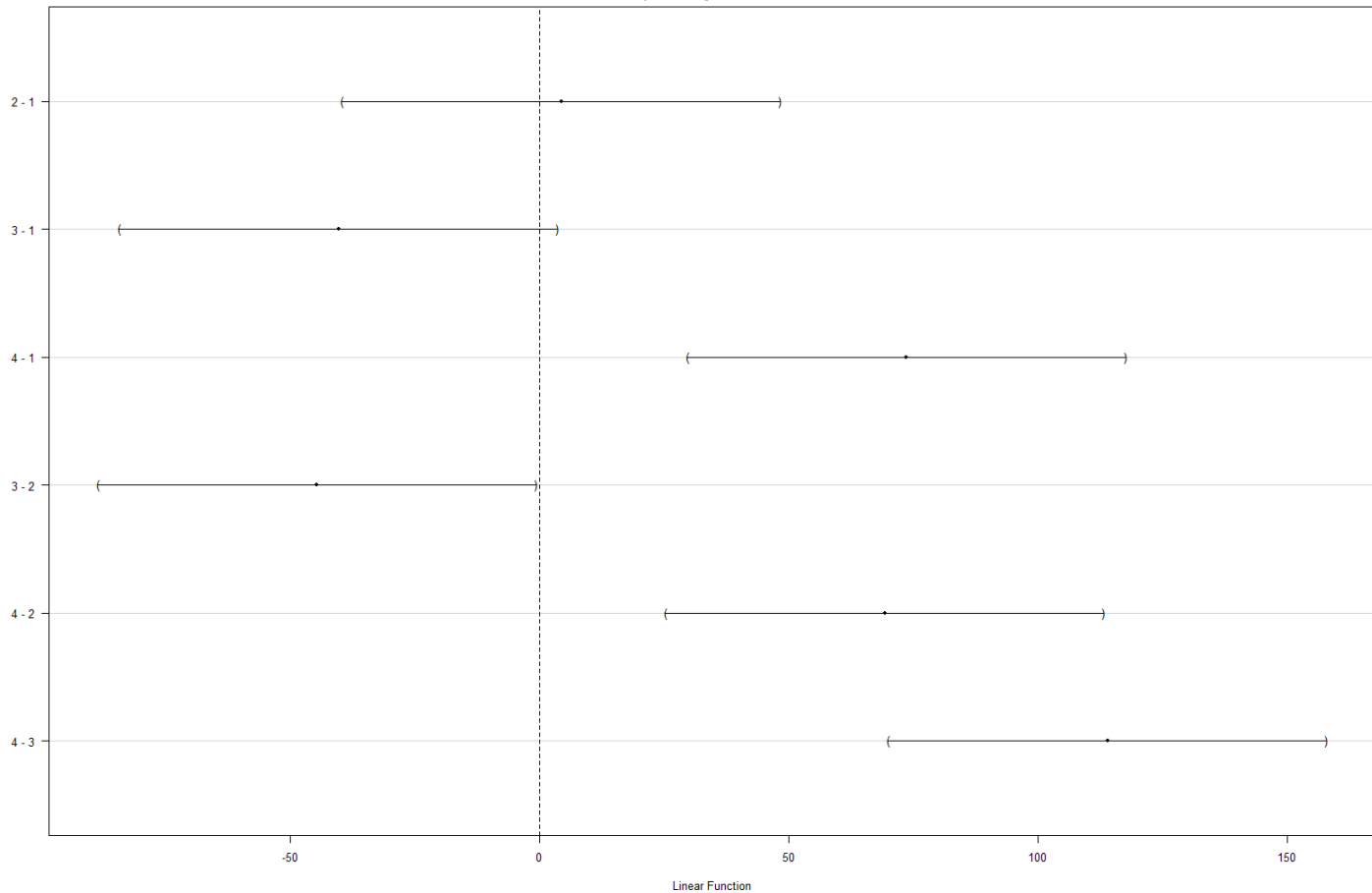
Means with the same letter are not significantly different.

Groups, Treatments and means

a	4	680
b	2	610.7
b	1	606.3
c	3	566
>		

95% family-wise confidence level

Tukey Honest Significant Differences



Whole Breast Weight Data

Linear Function

95% family-wise confidence level

Dunnett's Method

