

## Output from movies.R

```
> # movies.R
>
> library(lsmmeans)
> library(multcomp)
>
> # get the data
> mov <- read.table(file="movies.dat",header=T,
+ colClasses=c("factor","factor","factor","numeric"))
> head(mov)
  time day genre appeal
1    1   1     C     32
2    1   2     D     23
3    1   3     B     36
4    1   4     A     40
5    2   1     B     33
6    2   2     A     36
>
> m1 <- aov(appeal~genre+time+day,data=mov)
> summary(m1)

      Df Sum Sq Mean Sq F value    Pr(>F)
genre    3   735.7   245.23   59.151 7.56e-05 ***
time     3    18.7     6.23    1.503  0.3066
day      3    60.7    20.23    4.879  0.0475 *
Residuals 6    24.9     4.15
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>
> # get lsmeans for each combination and test pairwise contrasts using Tukey's
> # HSD method for multiple comparisons
> lsmeans(m1,pairwise~genre,adjust="tukey")
$`genre lsmeans`
  genre lsmean      SE df lower.CL upper.CL
    A  36.25 1.018066   6 33.75888 38.74112
    B  36.75 1.018066   6 34.25888 39.24112
    C  32.75 1.018066   6 30.25888 35.24112
    D  20.00 1.018066   6 17.50888 22.49112

$`genre pairwise differences`
      estimate      SE df  t.ratio p.value
A - B   -0.50 1.439763   6 -0.34728 0.98425
A - C    3.50 1.439763   6  2.43096 0.17079
A - D   16.25 1.439763   6 11.28658 0.00012
B - C    4.00 1.439763   6  2.77824 0.11228
B - D   16.75 1.439763   6 11.63386 0.00010
C - D   12.75 1.439763   6  8.85563 0.00048
  p values are adjusted using the tukey method for 4 means

>
> # both tests and confidence intervals with Tukey multiple comparison
> # adjustments can be obtained with the TukeyHSD() function (from the
> # multcomp package) as follows:
> (tuk <- TukeyHSD(m1,"genre"))
Tukey multiple comparisons of means
 95% family-wise confidence level
```

```
Fit: aov(formula = appeal ~ genre + time + day, data = mov)
```

```
$genre
```

	diff	lwr	upr	p adj
B-A	0.50	-4.484043	5.484043	0.9842498
C-A	-3.50	-8.484043	1.484043	0.1707921
D-A	-16.25	-21.234043	-11.265957	0.0001216
C-B	-4.00	-8.984043	0.984043	0.1122815
D-B	-16.75	-21.734043	-11.765957	0.0001022
D-C	-12.75	-17.734043	-7.765957	0.0004799

```
> plot(tuk)
```

### 95% family-wise confidence level

