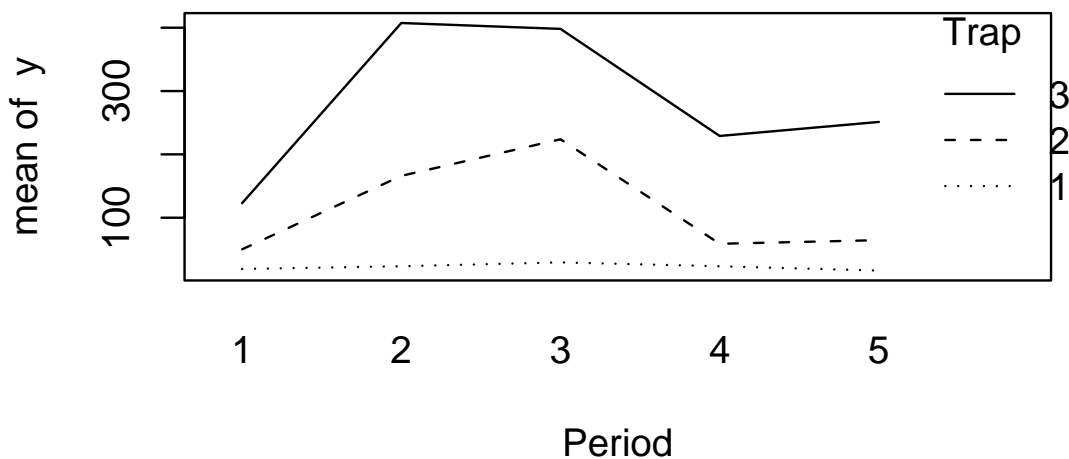


Tukey's test for nonadditivity, Stat 8311

R : Copyright 2005, The R Foundation for Statistical Computing
Version 2.2.0 alpha (2005-09-16 r35603)
ISBN 3-900051-07-0

```
> # Data from Snedecor and Cochran, 6th Ed, p. 333
> # Data are insect catches in five periods for three traps
> data <- data.frame(
+   y = c(19.1,23.4,29.5,23.4,16.6,50.1,166.1,223.9,58.9,64.6,
+         123.0,407.4,398.1,229.1,251.2),
+   Period = factor(rep(1:5,3),ordered=FALSE),
+   Trap = factor(rep(1:3,c(5,5,5)),ordered=FALSE))
> attach(data)
> postscript("sc333.eps",horizontal=FALSE,height=4,width=5)
> interaction.plot(Period,Trap,y)
> dev.off()
```



```
> array(y,c(5,3),dimnames=list(paste("Period",1:5),paste("Trap",1:3)))
```

```
      Trap 1 Trap 2 Trap 3
Period 1  19.1  50.1 123.0
Period 2  23.4 166.1 407.4
Period 3  29.5 223.9 398.1
Period 4  23.4  58.9 229.1
Period 5  16.6  64.6 251.2
```

```
> anova(m1 <- lm(y~Period+Trap))
```

Analysis of Variance Table

Response: y

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Period	4	52066	13016	3.4022	0.0661095 .
Trap	2	173333	86667	22.6528	0.0005073 ***
Residuals	8	30607	3826		

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> anova(m2 <- update(m1,~.+I(fitted(m1)^2)))
Analysis of Variance Table

```

Response: y

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Period	4	52066	13016	14.491	0.001693 **
Trap	2	173333	86667	96.482	8.026e-06 ***
I(fitted(m1)^2)	1	24319	24319	27.073	0.001249 **
Residuals	7	6288	898		

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> # Log scale
> m3 <- update(m1,log(y)~.)
> anova(m4 <- update(m3,~.+I(fitted(m3)^2)))
Analysis of Variance Table

```

Response: log(y)

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Period	4	2.2512	0.5628	7.503	0.01129 *
Trap	2	15.3320	7.6660	102.198	6.607e-06 ***
I(fitted(m3)^2)	1	0.2094	0.2094	2.791	0.13872
Residuals	7	0.5251	0.0750		

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> # alternative, based on the interaction plot
> # create a contrast for trap 1 vs. others:
> data$tcon <- kronecker(c(2,-1,-1),rep(1,5))
> data$pcon <- kronecker(c(1,1,1),c(-2,3,3,-2,-2))
> attach(data)
> anova(m4 <- lm(y~pcon+Period+tcon+Trap+pcon:tcon))
Analysis of Variance Table

```

Response: y

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
pcon	1	47757	47757	35.3941	0.0005705 ***
Period	3	4309	1436	1.0644	0.4231135
tcon	1	101897	101897	75.5181	5.354e-05 ***
Trap	1	71436	71436	52.9432	0.0001661 ***
pcon:tcon	1	21162	21162	15.6836	0.0054599 **
Residuals	7	9445	1349		

```

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

```