

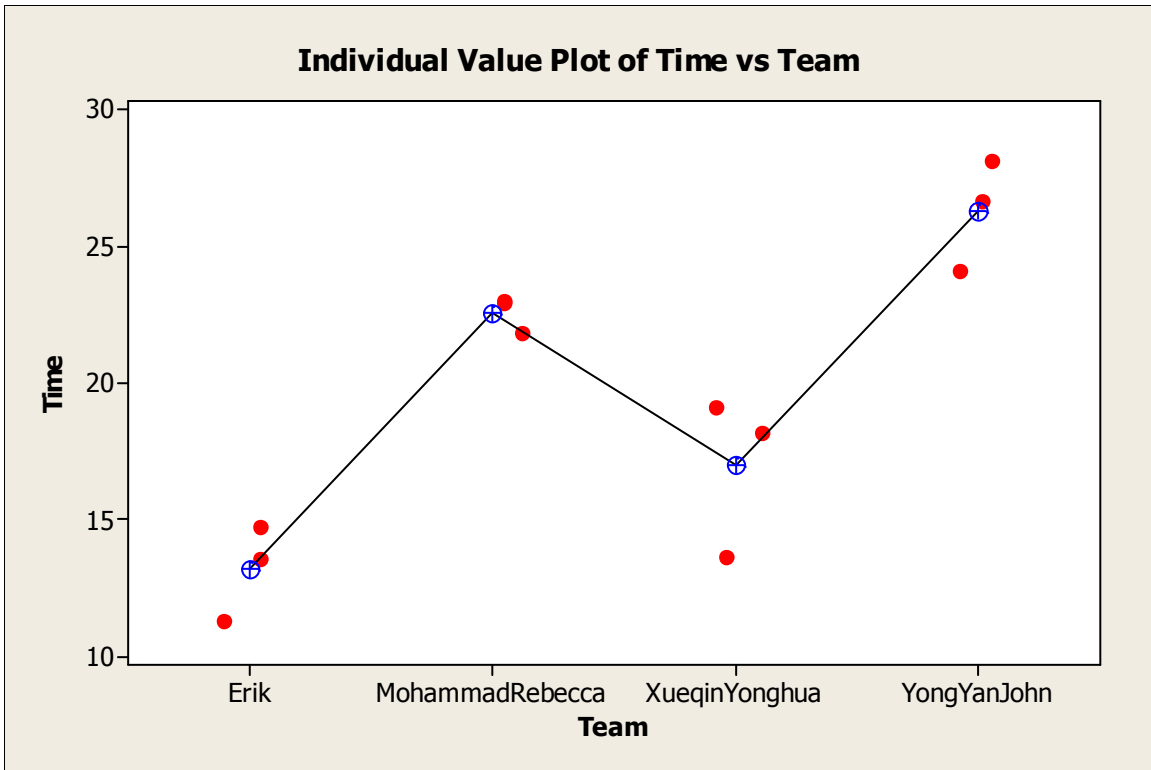
Response Surface Analysis Final project results
Prof. Erik Erhardt, Statistics
University of New Mexico
Fall 2011, 12/8/11
Stat 579.001

The culmination of our RSM class this semester was a contest for maximum flight time for paper helicopters that were improved over the semester. We decided on a stopping rule that we would continue to drop until one team had a statistically better flight time than all other teams using Fisher's LSD at 0.05 (so that we wouldn't be burdened by multiple comparisons and having to drop many, many times). Three drops was enough to determine the contest. Congratulations to all the teams, all of which substantially improved their original design, and all of which produced helicopters that beat the professor's.

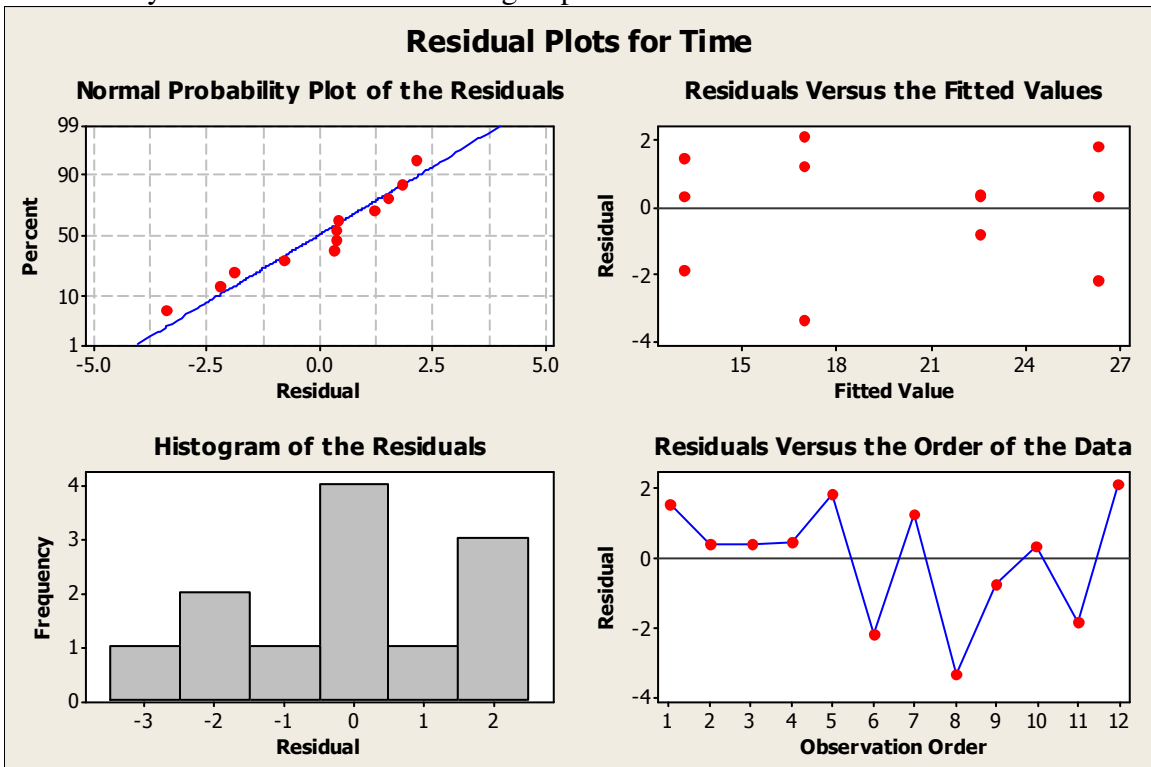
Data 12/8/11, 6:30pm, Dane Smith Hall, 3rd floor.

Team	rep	Time
Erik	1	14.70
Erik	2	13.55
Erik	3	11.30
MohammadRebecca	1	22.95
MohammadRebecca	2	23.00
MohammadRebecca	3	21.80
XueqinYonghua	1	18.20
XueqinYonghua	2	13.60
XueqinYonghua	3	19.10
YongYanJohn	1	28.15
YongYanJohn	2	24.10
YongYanJohn	3	26.65

The flight times within teams are rather consistent, YongYanJohn having the longest flight time, followed by MohammadRebecca, XueqinYonghua, and Prof. Erik (his helicopter from when he was a student in the class 9 years ago). The students have outdone the prof!



With only three observations per team, we have sufficient evidence to reject assumptions of normality or constant variance over groups.

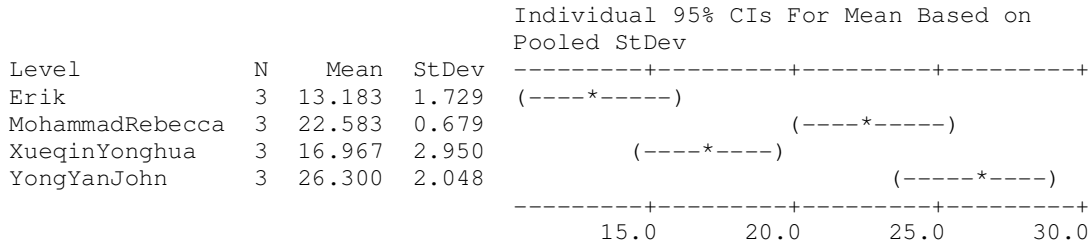


The analysis of variance table shows overwhelming evidence that not all mean flight times are equal.

One-way ANOVA: Time versus Team

Source	DF	SS	MS	F	P
Team	3	305.39	101.80	24.91	0.000
Error	8	32.70	4.09		
Total	11	338.09			

S = 2.022 R-Sq = 90.33% R-Sq(adj) = 86.70%



Pooled StDev = 2.022

After three drops, a Fisher 95% LSD summary shows two pairs that are not statistically different, yet the confidence intervals for the differences below are on the border (both less than 0.1 seconds) of showing a statistically significant difference. It is predicted that a forth drop would make these four means all statistically different from all others.

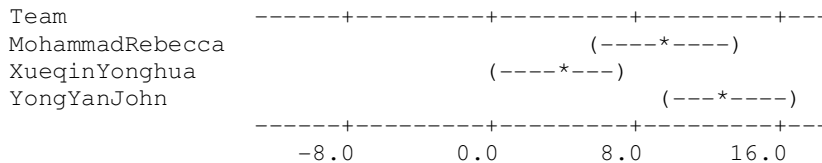
Erik XueqinYonghua MohammadRebecca YongYanJohn

Fisher 95% Individual Confidence Intervals
 All Pairwise Comparisons among Levels of Team

Simultaneous confidence level = 82.43%

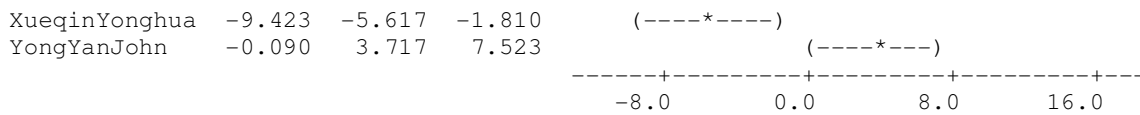
Team = Erik subtracted from:

Team	Lower	Center	Upper
MohammadRebecca	5.594	9.400	13.206
XueqinYonghua	-0.023	3.783	7.590
YongYanJohn	9.310	13.117	16.923



Team = MohammadRebecca subtracted from:

Team	Lower	Center	Upper
XueqinYonghua	-0.023	3.783	7.590
YongYanJohn	9.310	13.117	16.923



Team = XueqinYonghua subtracted from:

