Analysis of Todd Katz' peanut temperature data
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Given below is a scatterplot for temperature measurements taken at five levels of the experimental factor of power. The plot indicates that mean temperature is increasing in power, but not linearly. At each of the five power settings, about 50 observations were taken on each of 2 days, for a total of $N = 501$ measurements taken over a total of 10 days. Some analysis not included here indicates the presence of a day effect (nested in power) on mean temperature. The primary question of interest is to characterize the association between mean temperature and power, so averages were taken over observations within day. This results in an analysis based on $n = 10$ responses. A linear model was fit for these responses and an $F$-ratio for lack-of-fit was found to be significant ($p = 0.0210$), indicating the need for a nonlinear model. See output below:



| Obs | power | day | _TYPE_ | _FREQ_ | ymean | powerc |
|---|---|---|---|---|---|---|
| 1 | 803.16 | 0 | 3 | 55 | 86.756 | 803.16 |
| 2 | 803.16 | 1 | 3 | 65 | 83.348 | 803.16 |
| 3 | 900.00 | 0 | 3 | 55 | 91.523 | 900.00 |
| 4 | 900.00 | 1 | 3 | 65 | 93.044 | 900.00 |
| 5 | 1185.98 | 0 | 3 | 55 | 100.966 | 1185.98 |
| 6 | 1185.98 | 1 | 3 | 65 | 96.734 | 1185.98 |
| 7 | 1247.47 | 0 | 3 | 55 | 106.364 | 1247.47 |
| 8 | 1247.47 | 1 | 3 | 65 | 110.555 | 1247.47 |
| 9 | 1626.92 | 0 | 3 | 55 | 110.988 | 1626.92 |
| 10 | 1626.92 | 1 | 3 | 65 | 108.757 | 1626.92 |



The GLM Procedure

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 4 | 894.6441251 | 223.6610313 | 41.12 | 0.0005 |
| Error | 5 | 27.1940240 | 5.4388048 | | |
| Corrected Total | 9 | 921.8381491 | | | |

| Source | DF | Type I SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| power | 1 | 756.5881672 | 756.5881672 | 139.11 | <.0001 |
| powerc | 3 | 138.0559579 | 46.0186526 | 8.46 | 0.0210 |

| Source | DF | Type III SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| power | 0 | 0.0000000 | . | . | . |
| powerc | 3 | 138.0559579 | 46.0186526 | 8.46 | 0.0210 |