**Driving Reaction Time Under Distractive Conditions**

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EPSY 887

Dependent Sample Assignment

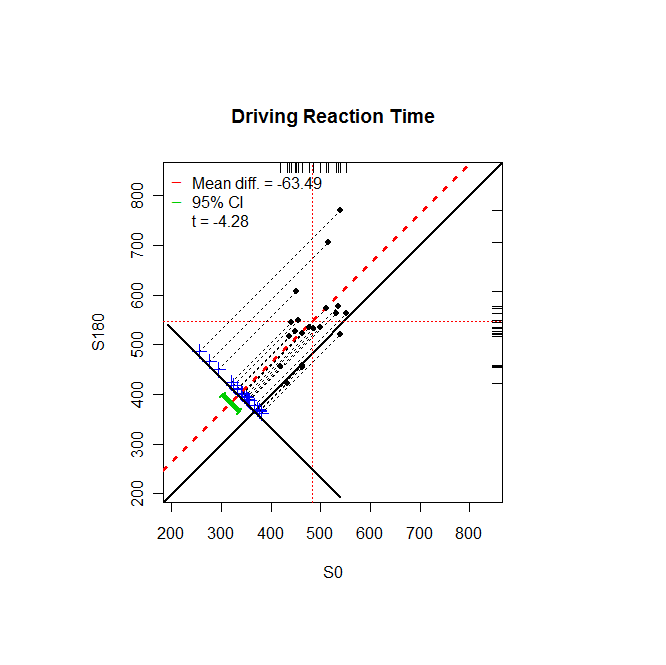
13 February, 2011

Reaction times for breaking a car in a simulator, in milliseconds, were recorded for 20 subjects. In one case, reaction times were recorded while subjects were engaged in conversations with 3 other people in the car. A sudden appearance of a person in the road was interjected and subject breaking time was recorded. Reaction times of the same subjects were then measured with the addition of loud music in the car, where the subject and the other three people had to talk very loud to carry on a conversation. The research question was: Did the addition of the loud music have any effect on the reaction time?

There was a significant effect of adding the loud music (Figure 1). The dot plot shows a shift in the data toward the loud music data. The 95% CI shows this effect, and confirms the effect to be significant. The raw data is shown in Appendix A. The summary statistics are shown in Appendix B. This summary shows a mean difference of about 63.5, with a fairly large effect size (.956). This means the effect of adding noise over the conversation in the car has a large effect on reaction time required to stop the car. Thus, the t statistic is significant: t(19)=4.275, p<.001. The CI also shows significance as it does not pass through zero.

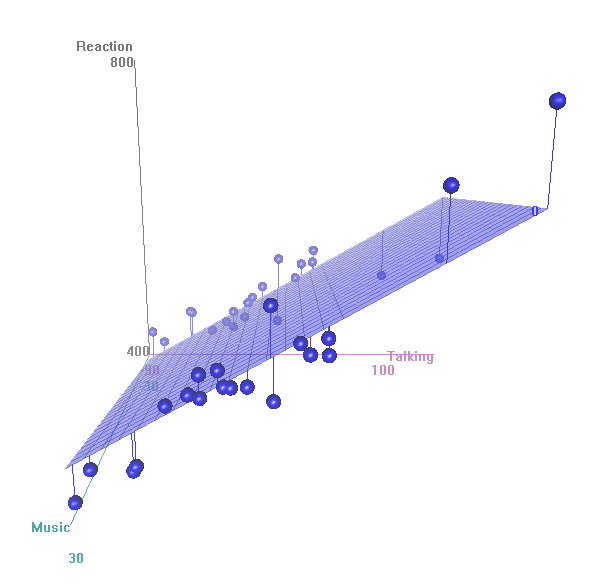
The additive plot is shown in Figure 2. The data was fit to the additive model. In order to show any interaction in the data, it was plotted using a quadratic function. This is shown in Figure 3. This Figure shows that there is an interaction between the two measurements as the graph loses its planarity.

Appendix C shows the graphic summary. This confirms that there is an interaction, although the interaction, albeit significant, appears to be small (-31.7 – 31.7).



**Figure 1.** Plot of reaction time measured with conversation in the car

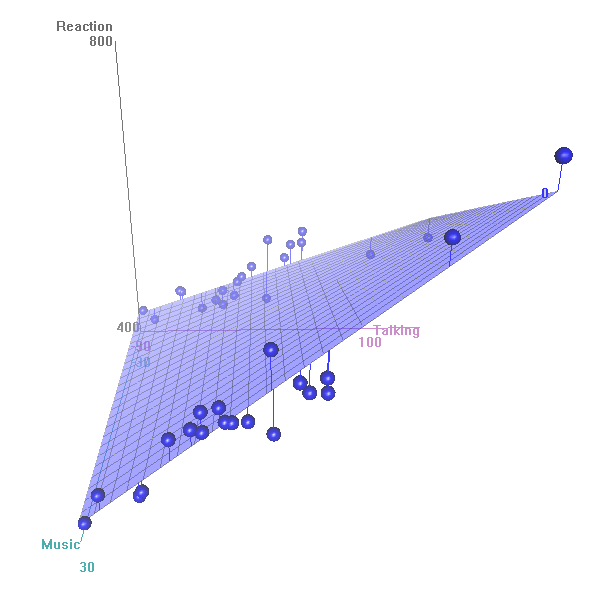
(x-axis) vs. measurements with loud music added (y-axis).



**Figure 2.** Additive 3D plot using the same data as in Figure 1.

Here, the model is plotted in three dimensions according to the

fit of the data to the additive model.



**Figure 3.** Reaction time data plotted with a quadratic function

to illustrate interaction between the paired measurements.

**Appendix A: Raw Data**

**RT+3 People RT+Noise**

|  |  |
| --- | --- |
| 455.6000061 | 549 |
| 419.0400085 | 455.4599915 |
| 448.7200012 | 526.3800049 |
| 539.8200073 | 770.7999878 |
| 463.7399902 | 454.2399902 |
| 433.6900024 | 422.8399963 |
| 512.289978 | 572.9899902 |
| 538.9899902 | 520.1900024 |
| 436.25 | 516.1400146 |
| 534.6699829 | 577.5200195 |
| 484.3599854 | 532.9400024 |
| 450.6099854 | 606.2000122 |
| 515.4799805 | 705.7399902 |
| 441.3800049 | 544.7999878 |
| 550.9099731 | 562.2000122 |
| 463.519989 | 523.2399902 |
| 476.5499878 | 533.6400146 |
| 499.7000122 | 533.7399902 |
| 532.0100098 | 562.8099976 |
| 462.3200073 | 458.6000061 |

**Appendix B: Summary Statistics**

Summary Stats

n 20.000

mean(x) 482.982

mean(y) 546.474

mean(D=x-y) -63.491

SD(D) 66.417

ES(D) -0.956

r(x,y) 0.574

r(x+y,d) -0.658

LL 95%CI -94.575

UL 95%CI -32.407

t(D-bar) -4.275

df.t 19.000

pval.t 0.000

**Appendix C: Graphic Summary**

[1] Reaction ~ Talking \* Music

$Talking.effects

6 2 5 20 9 3 14 16 1 17 11

-86.50 -77.50 -55.70 -54.30 -38.50 -27.20 -21.60 -21.30 -12.40 -9.63 -6.08

18 12 8 7 19 10 15 13 4

1.99 13.70 14.90 27.90 32.70 41.40 41.80 95.90 141.00

$Music.effects

1 2

-31.7 31.7

$CellCounts.Reordered

Music

Talking 1 2

6 1 1

2 1 1

5 1 1

20 1 1

9 1 1

3 1 1

14 1 1

16 1 1

1 1 1

17 1 1

11 1 1

18 1 1

12 1 1

8 1 1

7 1 1

19 1 1

10 1 1

15 1 1

13 1 1

4 1 1

$CellMeans.Reordered

Music

Talking 1 2

6 434 423

2 419 455

5 464 454

20 462 459

9 436 516

3 449 526

14 441 545

16 464 523

1 456 549

17 477 534

11 484 533

18 500 534

12 451 606

8 539 520

7 512 573

19 532 563

10 535 578

15 551 562

13 515 706

4 540 771

$aov.summary

Df Sum Sq Mean Sq

Talking 19 115277 6067

Music 1 40311 40311

Talking:Music 19 41906 2206