

**Ch6 - Ex 1 - Child aggression (aggr) as a function of mother's education (educ) and authoritarian parenting style (auth).**

See formula sheet for some of my scribbles!

```

(*25 Days of frost by elevation and latitude)
data list free / elev lat frost.
begin data
2375 39.27 73.0 1586 38.63 29.0 1459 39.00 28.0 680 39.17 25.0
604 38.35 11.5 1298 39.47 32.5 3242 37.58 64.0 1426 37.37 13.0
550 39.38 23.0 2250 37.80 37.0 675 38.05 26.0 2135 38.23 73.0
635 39.65 24.7 1649 39.10 41.0 2727 38.66 56.0 1053 39.48 34.0
2424 37.97 37.0 789 38.80 16.0 659 40.10 41.0 673 37.67 12.0
end data.
CORR frost elev lat /STAT = DESCR.
    
```

|       | Mean       | Std. Deviation | N  |
|-------|------------|----------------|----|
| frost | 34.83500   | 18.777149      | 20 |
| elev  | 1444.45000 | 828.574138     | 20 |
| lat   | 38.68650   | .778928        | 20 |

|      | frost | elev  |
|------|-------|-------|
| elev | .760  |       |
|      | .000  |       |
| lat  | .058  | -.402 |
|      | .809  | .079  |

$b_1 =$   
 $b_2 =$   
 $b_0 =$

$\hat{y} = b_0 + b_1 X + b_2 E$

```

FORMAT elev (F5.0) lat (F5.2) frost (F2.0).
REGRESS /STAT = DEFAU ZPP CHANGE / DEP = frost
/ENTER elev /ENTER lat /SAVE PRED(prd) RESI(res).
    
```

$1 - R^2 =$

| Model | R    | R Square | Change Statistics |          |     | Sig. F Change |      |
|-------|------|----------|-------------------|----------|-----|---------------|------|
|       |      |          | R Square Change   | F Change | df1 |               | df2  |
| 1     | .760 | .577     | .577              | 24.556   | 1   | 18            | .000 |
| 2     | .857 | .734     | .157              | 10.064   | 1   | 17            | .006 |

| Model |            | Sum of Squares | df | Mean Square | F      | Sig. |
|-------|------------|----------------|----|-------------|--------|------|
| 1     | Regression | 3865.508       | 1  | 3865.508    | 24.556 | .000 |
|       | Residual   | 2833.537       | 18 | 157.419     |        |      |
|       | Total      | 6699.045       | 19 |             |        |      |
| 2     | Regression | 4919.201       | 2  | 2459.600    | 23.493 | .000 |
|       | Residual   | 1779.845       | 17 | 104.697     |        |      |
|       | Total      | 6699.046       | 19 |             |        |      |

$SS_{CH} = 4919.201 - 3865.508 = 1053.693$   
 $F_{CH} = \frac{SS_{CH}}{MSE} = \frac{1053.693}{104.697} = 10.064$   
 $F_{CH} = 10.064 > F_{(1,17)}(0.05) = 1.734$   
 Rej  $H_0: \beta_2 = 0$



$SS_Y = SS_{\hat{Y}} + SS_{\hat{Y}(a-1)} + SS_{\hat{Y}}$

$MS_{res} = \frac{SS_{res}}{df}$

$P(F = 23.493 \text{ if } H_0 \text{ true}) < .001$

$$\hat{Y} = b_0 + b_1 \text{Lat} + b_2 \text{Elev}$$

| Model |                 | Unstandardized Coefficients |                | Standardized Coefficients | t      | Sig. | Correlations |          |      |
|-------|-----------------|-----------------------------|----------------|---------------------------|--------|------|--------------|----------|------|
|       |                 | B                           | Std. Error     | Beta                      |        |      | Zero-order   | Parti al | Part |
| 1     | (Constant)      | 9.969                       | 5.749          |                           | 1.734  | .100 |              |          |      |
|       | elev            | .017                        | .003           | .760                      | 4.955  | .000 | .760         | .76      | .760 |
| 2     | (Constant)      | -399.658                    | 129.207        |                           | -3.093 | .007 |              |          |      |
|       | elev            | .021                        | .003           | .934                      | 6.839  | .000 | .760         | .86      | .855 |
|       | lat             | 10.441                      | 3.291          | .433                      | 3.172  | .006 | .058         | .61      | .397 |
|       |                 | Mean                        | Std. Deviation | N                         |        |      |              |          |      |
|       | Predicted Value | 34.83                       | 16.091         | 20                        |        |      |              |          |      |
|       | Residual        | .000                        | 9.679          | 20                        |        |      |              |          |      |

$b_e = \dots$   
 $b_L = \dots$   
 $b_0 = \dots$

$$\sqrt{\frac{SS_{\text{crit}}}{SS_{\text{res}}}}$$

MSE

$$\sqrt{SS_{(1-r^2)}}$$

$$\frac{b_1}{SE} = F_{\text{crit}}$$

$$SS_Y = (n-1)S_Y^2$$

$$SS_{Y-\hat{Y}} = (n-1)S_{Y-\hat{Y}}^2$$

$$\sqrt{.157}$$

```

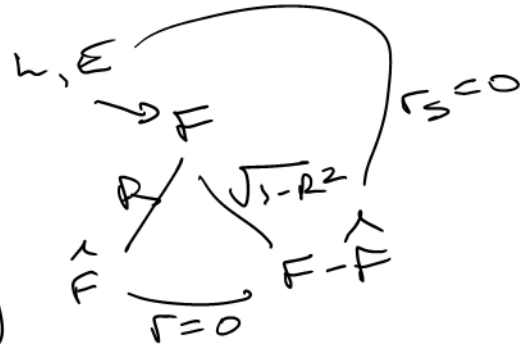
VARIABLE LABELS prd 'res' .
LIST.
elev lat frost prd res
2375 39.27 73 60.61759 12.38241
1586 38.63 29 37.24024 -8.24024
1459 39.00 28 38.41615 -10.41615
...

```

$$\hat{Y} = b_0 + b_1 \times 39.27 + b_2 \times 2375$$

```
CORR frost elev lat prd res /STAT.
```

|     | frost | elev | lat  | prd  |
|-----|-------|------|------|------|
| prd | .857  |      |      |      |
| res | .515  | .000 | .000 | .000 |

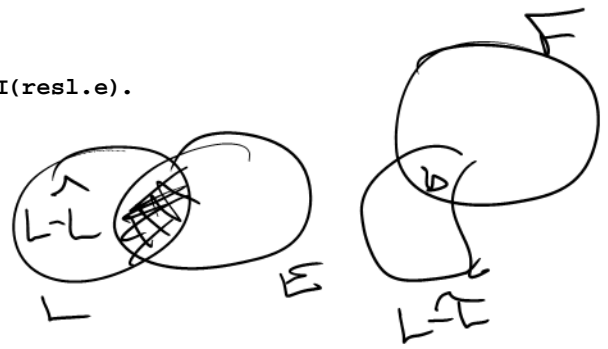


```
REGRESS /STAT = R /DEP = lat /ENTER elev /SAVE RESI(res1.e).
```

| Model | R    | R Square |
|-------|------|----------|
| 1     | .402 | .162     |

|                 | Mean    | Std. Deviation | N  |
|-----------------|---------|----------------|----|
| Predicted Value | 38.6865 | .31308         | 20 |
| Residual        | .00000  | .71324         | 20 |



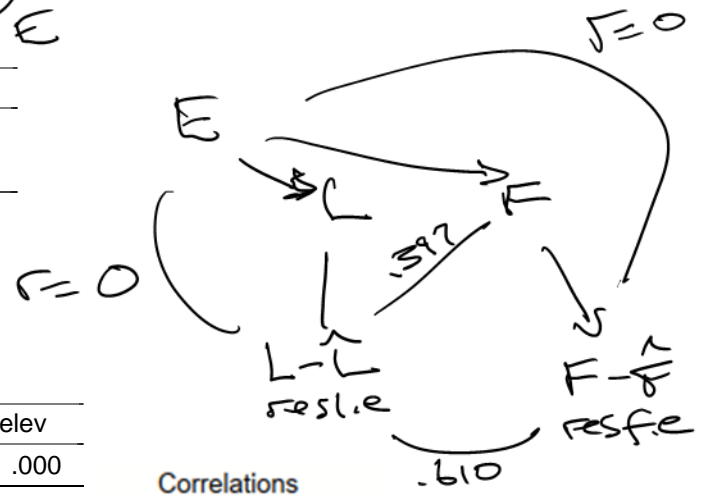


REGRESS /STAT = R /DEP = frost /ENTER elev /SAVE RESI(resf.e).

| Model | R    | R Square |
|-------|------|----------|
| 1     | .760 | .577     |

|                 | Mean  | Std. Deviation | N  |
|-----------------|-------|----------------|----|
| Predicted Value | 34.84 | 14.264         | 20 |
| Residual        | .000  | 12.212         | 20 |



VARI LABEL res1.e ' resf.e ' .  
CORR res1.e WITH frost resf.e elev.

|        |                     | frost | resf.e | elev |
|--------|---------------------|-------|--------|------|
| res1.e | Pearson Correlation | .397  | .610   | .000 |

Correlations

| Zero-order | Parti | Part |
|------------|-------|------|
| .760       | .76   | .760 |

ZPP  
earlier

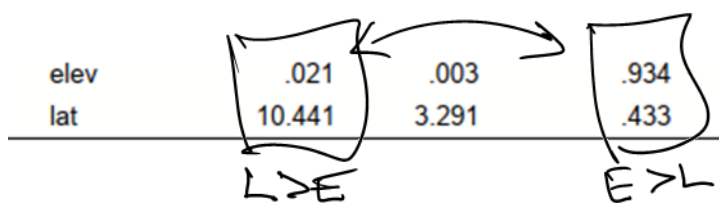
COMP z frost = (frost-34.835000)/18.7771495.  
COMP z lat = (lat-38.686500)/.7789282.  
COMP zelev = (elev-1444.450000)/828.5741383.  
REGRESS /DESCR /DEP = z frost /ENTER zlat zelev.

$z=0$   $S_{z=1}$

|         | Mean   | Std. Deviation | N  |
|---------|--------|----------------|----|
| z frost | .00000 | 1.000000       | 20 |
| z lat   | .00000 | 1.000000       | 20 |
| zelev   | .00000 | 1.000000       | 20 |

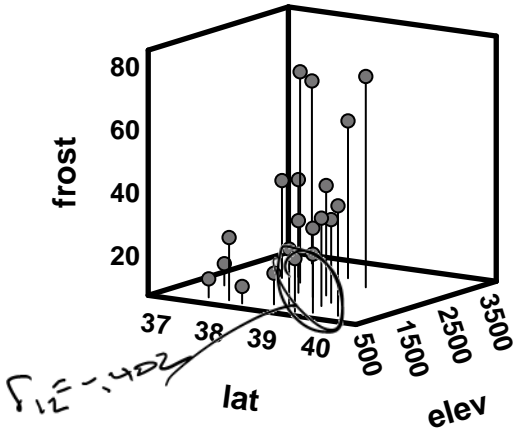
|      |     |      |   |
|------|-----|------|---|
| .760 | .86 | .855 | E |
| .058 | .61 | .397 | L |

| Model |            | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig.  |
|-------|------------|-----------------------------|------------|---------------------------|-------|-------|
|       |            | B                           | Std. Error | Beta                      |       |       |
| 1     | (Constant) | 1.580E-15                   | .122       |                           | .000  | 1.000 |
|       | zlat       | .433                        | .137       | .433                      | 3.172 | .006  |
|       | zelev      | .934                        | .137       | .934                      | 6.839 | .000  |



See SDs  
for E & L

GRAPH /SCATTERPLOT(XYZ)=elev WITH frost WITH lat.

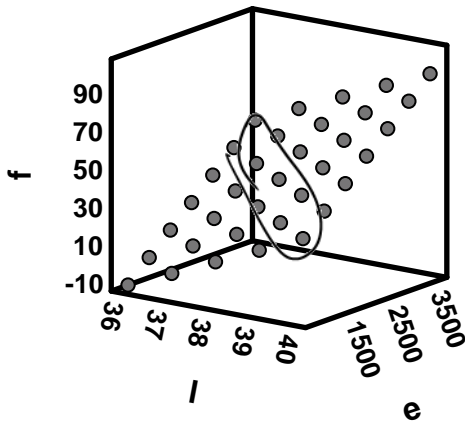


```

INPUT PROGRAM.
LOOP e = 500 TO 3500 BY 500
LEAVE e.
LOOP l = 36 TO 40 BY 1.
END CASE.
END LOOP.
END LOOP.
END FILE.
END INPUT PROGRAM.
COMPUTE f = -399.658 + .021*e + 10.441*l.
GRAPH /SCATTERPLOT(XYZ)=e WITH f WITH l.

```

Equation



As  $L \uparrow, E \downarrow$  ( $r = -.402$ )  
 $\downarrow$   $\downarrow$   
 $F \uparrow$   $F \downarrow$   
 $\sqrt{F.L}$  lowered/masked (...)

