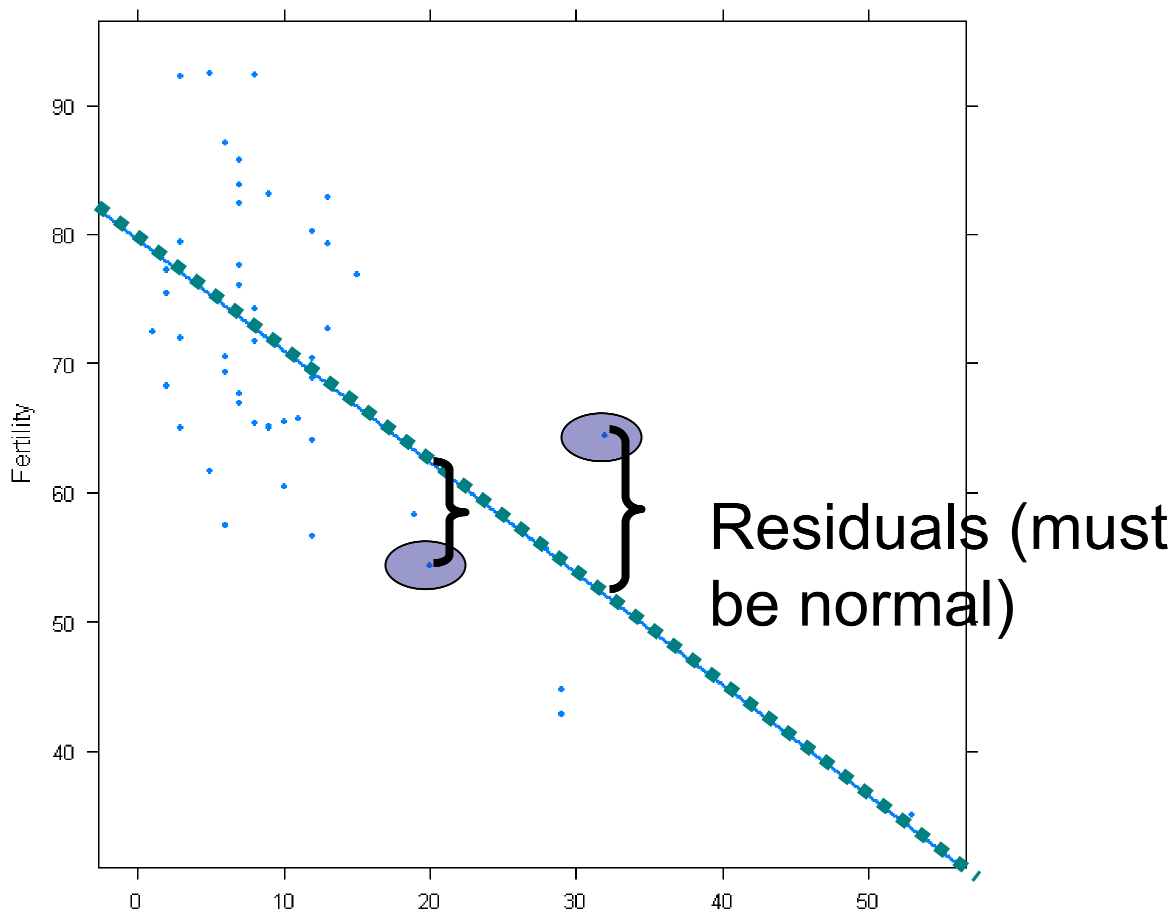
```
> swiss[1:6,c(1,4)]
             Fertility Education
Courtelary        80.2        12
Delemont          83.1         9
Franches-Mnt      92.5         5
Moutier           85.8         7
Neuveville        76.9        15
Porrentruy        76.1         7
```

```
data(swiss)
m0<-lm(Fertility ~ Education, swiss)
summary(m0)
...
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 79.6101      2.1041  37.836  < 2e-16 ***
Education   -0.8624      0.1448  -5.954 3.66e-07 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1
Residual standard error: 9.446 on 45 degrees of freedom
```

$$y = \alpha + \beta x + \epsilon$$

$$y = 79.6101 + (-0.8624)x \pm 9.446$$

```
library(lattice)
xyplot(Fertility ~ Education, swiss,
type = c("p", "r"), lwd = 2, pch = 20
)
```




$$y = 79.6101 + (-0.8624)x \pm 9.446$$

# Residuals (must be normal)

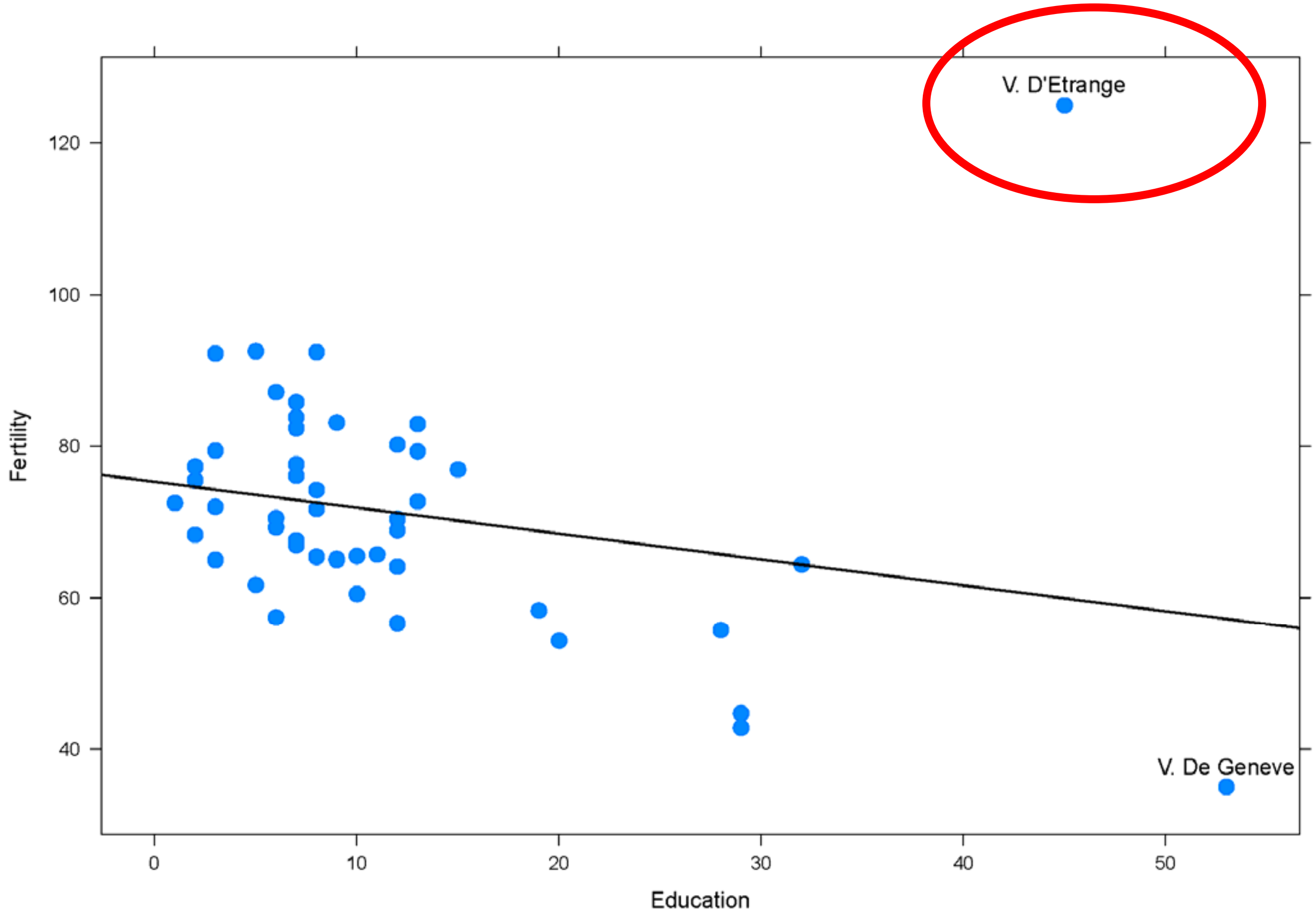
```
> swiss[1:6,c(1,4)]
             Fertility Education
Courtelary        80.2        12
Delemont          83.1         9
Franches-Mnt      92.5         5
Moutier           85.8         7
Neuveville        76.9        15
Porrentruy        76.1         7
```

$$\overset{y}{\begin{bmatrix} 80.2 \\ 83.1 \\ 92.5 \\ 85.8 \\ 76.9 \\ 76.1 \end{bmatrix}} - \overset{\hat{y}}{\begin{bmatrix} 69.2613 \\ 71.8485 \\ 75.2981 \\ 73.5733 \\ 66.6741 \\ 73.5733 \end{bmatrix}} = \overset{\epsilon}{\begin{bmatrix} 10.9387 \\ 11.2515 \\ 17.2019 \\ 12.2267 \\ 10.2259 \\ 2.5267 \end{bmatrix}}$$

$\sigma_{(\text{whole set})}$ == residual standard deviation

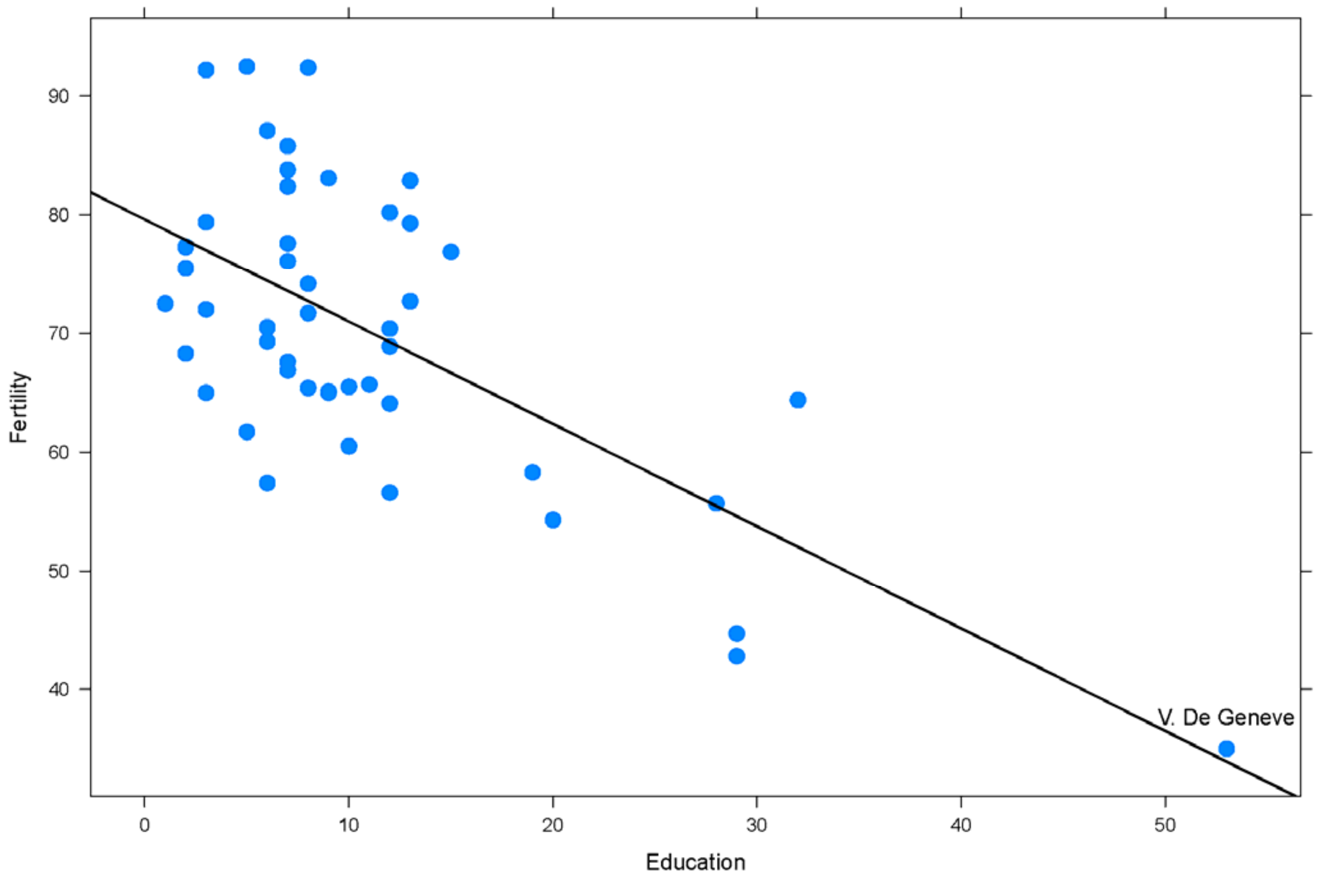
- (see R script for calculating and plotting residuals)

# “Leverage”



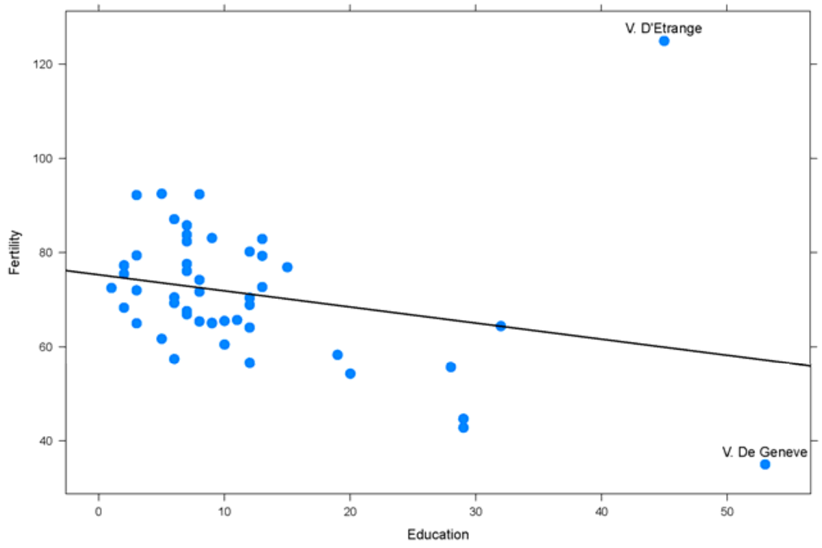
V. D'Etrange
V. De Geneve
120
100
80
60
40
Fertility
0
10
20
30
40
50
Education

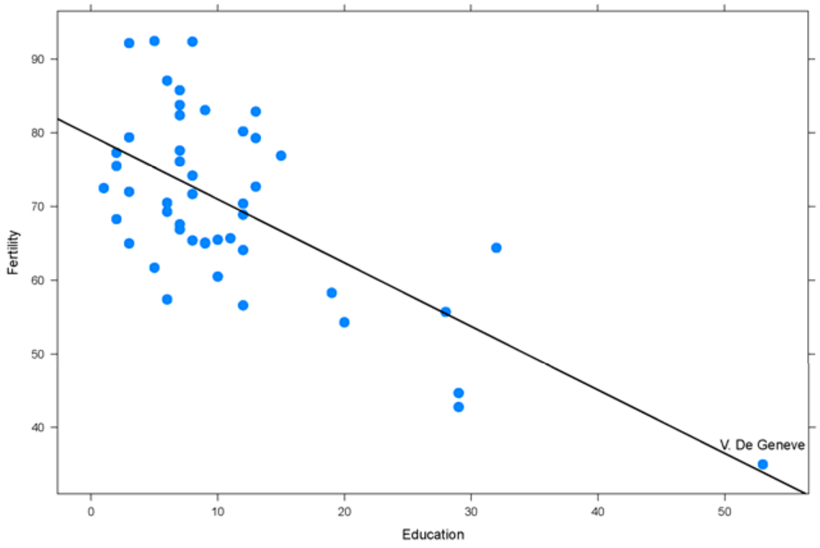
# “Leverage”



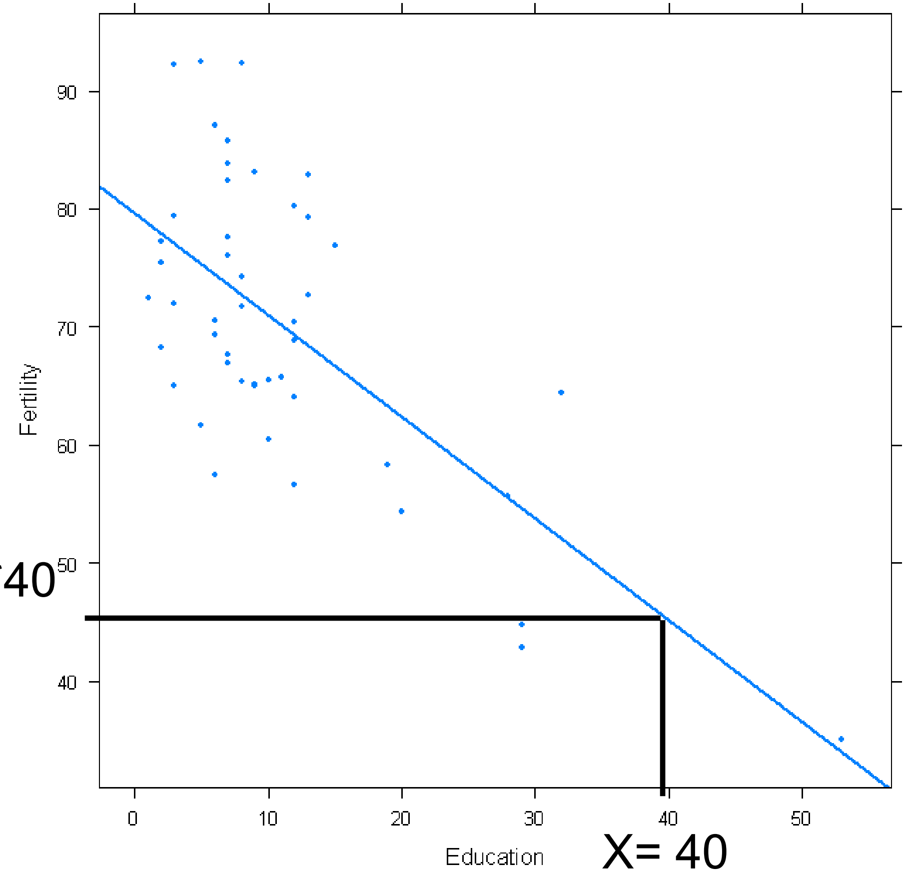
90
80
70
60
50
40
0
10
20
30
40
50
Fertility
Education
V. De Geneve

# “Leverage”


V. D'Etrange
V. De Geneve
Fertility
Education
120
100
80
60
40
0
10
20
30
40
50


V. De Geneve
Fertility
Education
90
80
70
60
50
40
0
10
20
30
40
50

# New (“fitted”) Values




Y=79.6101 - 0.8624*40

Y = 45.1141

X= 40

$$y = 79.6101 + (-0.8624)x \pm 9.446$$