stats-101a-project-markdown

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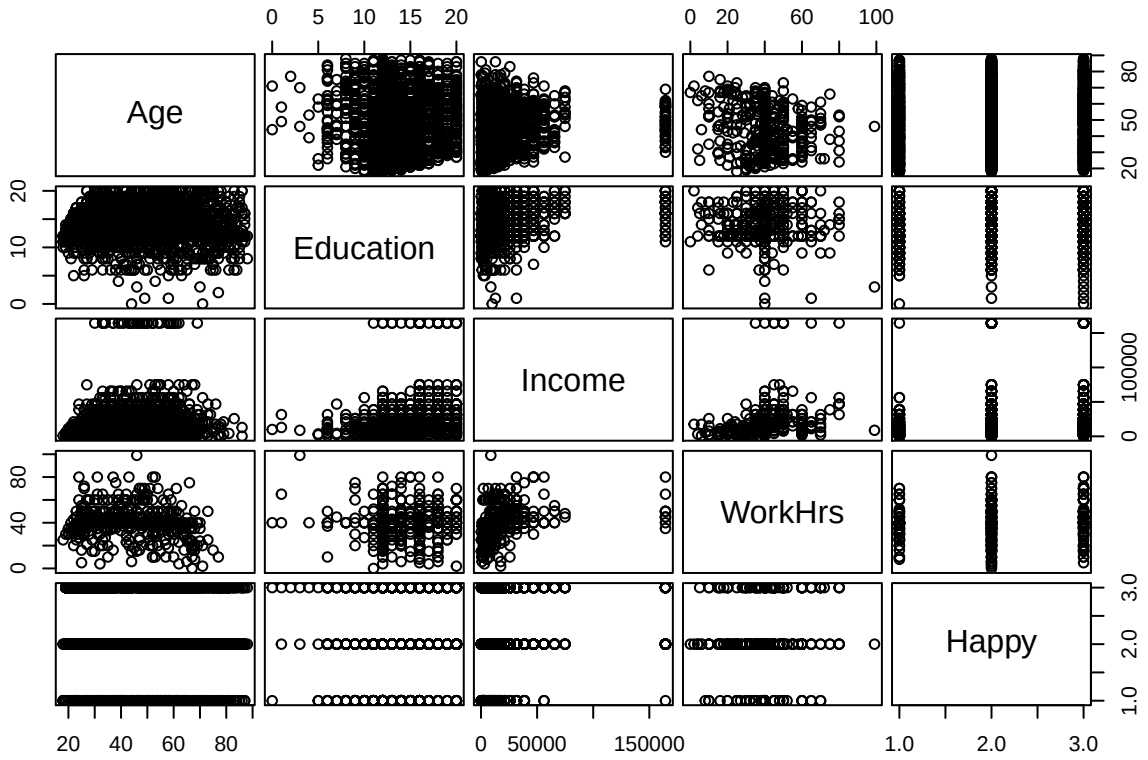
```
#data cleanup
happiness_data <- read.table("Happiness.txt", header = TRUE)
head(happiness_data)
```

```
##   Household Health OwnHome Instagram Marital Sex Age Children Education
## 3         2      2       0         2       1   1  72        2        16
## 4         4      2       1         0       1   2  43        4        12
## 5         3      1       0         1       1   2  55        2        18
## 6         2      0       1         1       1   2  53        2        14
## 7         3      4       1         0       1   1  50        2        14
## 8         2      2       0         1       1   2  23        3        11
##   JobSat Income WorkHrs Happy
## 3      0      0      -1     1
## 4      0   5265      -1     2
## 5      3    936      15     1
## 6      0      0      -1     1
## 7      0 164382      -1     2
## 8      2   7605      30     1
```

```
happiness_data$Household[happiness_data$Household == 8 | happiness_data$Household == 9] <- NA

happiness_data$Health[happiness_data$Health == 8 | happiness_data$Health == 9 |  happiness_data$Health =
happiness_data$Health[happiness_data$Health == 1] <- 400
happiness_data$Health[happiness_data$Health == 2] <- 300
happiness_data$Health[happiness_data$Health == 3] <- 2
happiness_data$Health[happiness_data$Health == 4] <- 1
happiness_data$Health[happiness_data$Health == 400] <- 4
happiness_data$Health[happiness_data$Health == 300] <- 3

happiness_data$OwnHome[happiness_data$OwnHome == 0 | happiness_data$OwnHome == 8 | happiness_data$OwnHo

happiness_data$Instagram[happiness_data$Instagram == 0 | happiness_data$Instagram == 8 | happiness_data

happiness_data$Marital[happiness_data$Marital == 9] <- NA

happiness_data$Age[happiness_data$Age == 89 | happiness_data$Age == 98 | happiness_data$Age == 99] <- N

happiness_data$Children[happiness_data$Children == 8 | happiness_data$Children == 9] <- NA

happiness_data$Education[happiness_data$Education == 97 | happiness_data$Education == 98 | happiness_da

happiness_data$JobSat[happiness_data$JobSat == 0 | happiness_data$JobSat == 8 | happiness_data$JobSat =

happiness_data$Income[happiness_data$Income == 0 | happiness_data$Income == 999998 | happiness_data$Inc

happiness_data$WorkHrs[happiness_data$WorkHrs == -1 | happiness_data$WorkHrs == 998 | happiness_data$Wo

happiness_data$Happy[happiness_data$Happy == 0 | happiness_data$Happy == 8 | happiness_data$Happy == 9]
```

```r
happiness_data$Happy[happiness_data$Happy == 1] <- 100
happiness_data$Happy[happiness_data$Happy == 3] <- 1
happiness_data$Happy[happiness_data$Happy == 100] <- 3
```

```r
#exploring data
pairs(happiness_data[, -c(1,2,3,4,5,6,8,10)], gap=0.4,cex.labels=1.5)
```

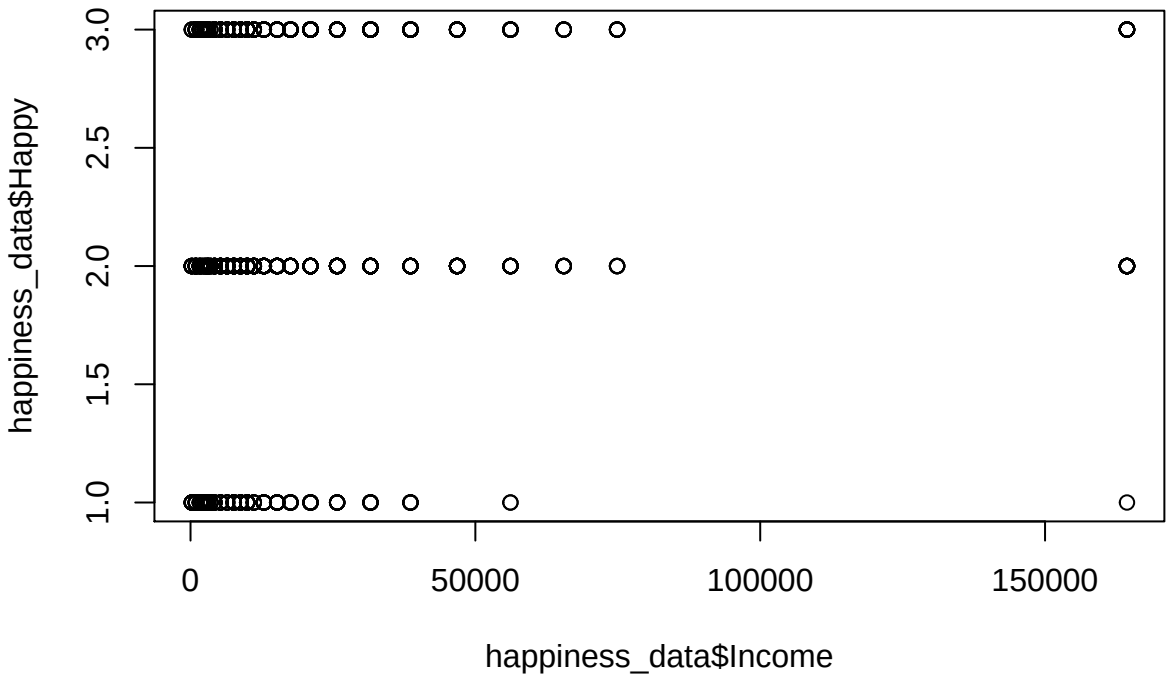



```r
m1 <- lm(happiness_data$Happy ~ happiness_data$Age + happiness_data$Education + happiness_data$Income +

summary(m1)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ happiness_data$Age + happiness_data$Education +
##     happiness_data$Income + happiness_data$WorkHrs)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.5164 -0.2267 -0.1453  0.7486  0.9651
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 1.915e+00  2.240e-01   8.546 3.04e-16 ***
## happiness_data$Age          2.136e-03  2.470e-03   0.865    0.388
## happiness_data$Education -2.974e-03  1.052e-02  -0.283    0.778
## happiness_data$Income       1.950e-06  1.412e-06   1.381    0.168
## happiness_data$WorkHrs      4.098e-03  2.552e-03   1.606    0.109
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 0.6347 on 384 degrees of freedom
##   (1978 observations deleted due to missingness)
## Multiple R-squared:  0.01724,    Adjusted R-squared:  0.007001
## F-statistic: 1.684 on 4 and 384 DF,  p-value: 0.1529
```

```
m2 <- lm(happiness_data$Happy ~ happiness_data$Income)
plot(happiness_data$Happy ~ happiness_data$Income)
```




```
summary(m2)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ happiness_data$Income)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.6110 -0.1944 -0.1302  0.7579  0.9039
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)             2.095e+00  2.170e-02   96.57  < 2e-16 ***
## happiness_data$Income 3.137e-06  5.852e-07    5.36 9.78e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6137 on 1326 degrees of freedom
##   (1039 observations deleted due to missingness)
## Multiple R-squared:  0.02121,    Adjusted R-squared:  0.02047
## F-statistic: 28.73 on 1 and 1326 DF,  p-value: 9.783e-08
```

```
#adding factors/levels
HappyCat <- factor(happiness_data$Happy)
levels(HappyCat)
```

```
## [1] "1" "2" "3"
```

```
#m4 <- lm(HappyCat ~ happiness_data$Income)
#summary(m4)
#plot(HappyCat ~ happiness_data$Income)

#m5 <- lm(happiness_data$Income ~ HappyCat)
#summary(m5)
#plot(happiness_data$Income ~ HappyCat)

#transforming linear income
mean_income <- mean(happiness_data$Income, na.rm=TRUE)
tIncome <- happiness_data$Income/mean_income
m6 <- lm(happiness_data$Happy ~ tIncome)
summary(m6)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ tIncome)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.6110 -0.1944 -0.1302  0.7579  0.9039
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.09534    0.02170   96.57  < 2e-16 ***
## tIncome      0.07334    0.01368    5.36 9.78e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6137 on 1326 degrees of freedom
##   (1039 observations deleted due to missingness)
## Multiple R-squared:  0.02121,    Adjusted R-squared:  0.02047
## F-statistic: 28.73 on 1 and 1326 DF,  p-value: 9.783e-08
```

```
#transforming inverse income
inverse_income <- 1/(happiness_data$Income)
m7 <- lm(happiness_data$Happy ~ inverse_income)
summary(m7)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ inverse_income)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.1918 -0.1889 -0.1821  0.8099  1.3017
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       2.19252    0.01796 122.051  < 2e-16 ***
## inverse_income -115.64146   29.23653  -3.955 8.05e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.6167 on 1326 degrees of freedom
##   (1039 observations deleted due to missingness)
## Multiple R-squared:  0.01166,    Adjusted R-squared:  0.01092
## F-statistic: 15.64 on 1 and 1326 DF,  p-value: 8.046e-05
```

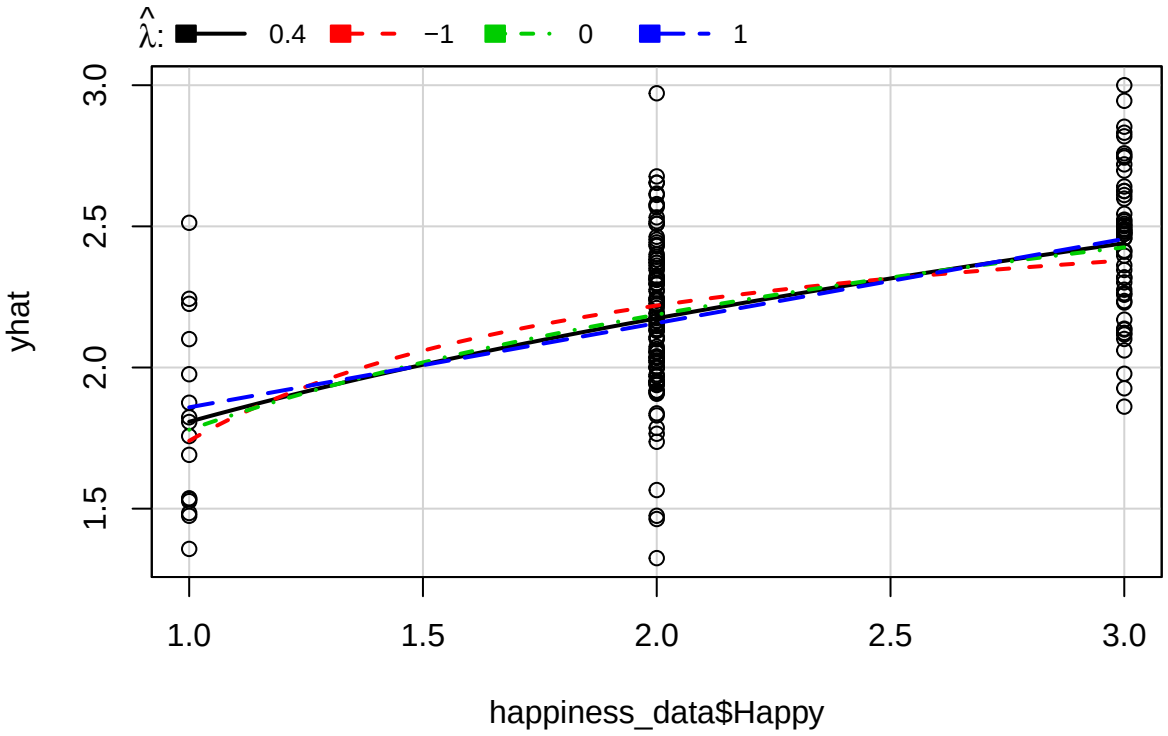
```
#simran's model using invserse response plot
library(alr3)
```

```
## Loading required package: car
```

```
## Warning: package 'car' was built under R version 3.4.3
```

```
m1 <- lm(happiness_data$Happy ~ factor(happiness_data$Household) + factor(happiness_data$OwnHome) + happ
inverse.response.plot(m1,key=TRUE)
```

```
## Warning: 'inverse.response.plot' is deprecated.
## Use 'inverseResponsePlot' instead.
## See help("Deprecated") and help("alr3-deprecated").
```




```
##      lambda      RSS
## 1  0.396029 12.62671
## 2 -1.000000 13.09307
## 3  0.000000 12.66673
## 4  1.000000 12.70891
```

```
m2 <- lm((happiness_data$Happy)^0.396 ~ factor(happiness_data$Household) + factor(happiness_data$OwnHome
summary(m2)
```

```
##
## Call:
## lm(formula = (happiness_data$Happy)^0.396 ~ factor(happiness_data$Household) +
##     factor(happiness_data$OwnHome) + happiness_data$Instagram +
##     factor(happiness_data$Marital) + happiness_data$Children +
```

```
##     happiness_data$Education + factor(happiness_data$JobSat) +
##     happiness_data$Income)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.42922 -0.07632 -0.00066  0.10275  0.28342
##
## Coefficients:
##                                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)                        1.437e+00  1.015e-01  14.154  < 2e-16
## factor(happiness_data$Household)2 -4.743e-02  3.287e-02  -1.443 0.151175
## factor(happiness_data$Household)3 -1.058e-02  4.249e-02  -0.249 0.803668
## factor(happiness_data$Household)4 -1.954e-01  8.817e-02  -2.216 0.028286
## factor(happiness_data$Household)5 -8.682e-02  1.472e-01  -0.590 0.556135
## factor(happiness_data$Household)6 -1.814e-01  1.059e-01  -1.712 0.088974
## factor(happiness_data$OwnHome)2    3.689e-02  2.654e-02   1.390 0.166594
## factor(happiness_data$OwnHome)3    8.115e-02  1.483e-01   0.547 0.585169
## happiness_data$Instagram          -2.169e-02  2.714e-02  -0.799 0.425376
## factor(happiness_data$Marital)2   -2.232e-01  5.854e-02  -3.812 0.000204
## factor(happiness_data$Marital)3   -9.841e-02  3.802e-02  -2.588 0.010638
## factor(happiness_data$Marital)4   -1.541e-01  8.703e-02  -1.771 0.078747
## factor(happiness_data$Marital)5   -9.380e-02  3.764e-02  -2.492 0.013842
## happiness_data$Children           -2.539e-03  9.523e-03  -0.267 0.790147
## happiness_data$Education           5.854e-03  4.913e-03   1.191 0.235436
## factor(happiness_data$JobSat)2    -2.026e-02  3.402e-02  -0.596 0.552445
## factor(happiness_data$JobSat)3    -7.703e-02  3.610e-02  -2.134 0.034568
## factor(happiness_data$JobSat)4    -6.828e-02  6.801e-02  -1.004 0.317088
## factor(happiness_data$JobSat)5    -1.423e-01  5.366e-02  -2.652 0.008917
## factor(happiness_data$JobSat)6    -2.960e-01  7.744e-02  -3.822 0.000197
## factor(happiness_data$JobSat)7    -7.765e-02  1.470e-01  -0.528 0.598234
## happiness_data$Income              6.106e-07  4.021e-07   1.519 0.131076
##
## (Intercept)                       ***
## factor(happiness_data$Household)2
## factor(happiness_data$Household)3
## factor(happiness_data$Household)4 *
## factor(happiness_data$Household)5
## factor(happiness_data$Household)6 .
## factor(happiness_data$OwnHome)2
## factor(happiness_data$OwnHome)3
## happiness_data$Instagram
## factor(happiness_data$Marital)2   ***
## factor(happiness_data$Marital)3   *
## factor(happiness_data$Marital)4   .
## factor(happiness_data$Marital)5   *
## happiness_data$Children
## happiness_data$Education
## factor(happiness_data$JobSat)2
## factor(happiness_data$JobSat)3    *
## factor(happiness_data$JobSat)4
## factor(happiness_data$JobSat)5    **
## factor(happiness_data$JobSat)6    ***
## factor(happiness_data$JobSat)7
## happiness_data$Income
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1406 on 143 degrees of freedom
##   (2202 observations deleted due to missingness)
## Multiple R-squared:  0.3064, Adjusted R-squared:  0.2045
## F-statistic: 3.008 on 21 and 143 DF,  p-value: 5.709e-05
```

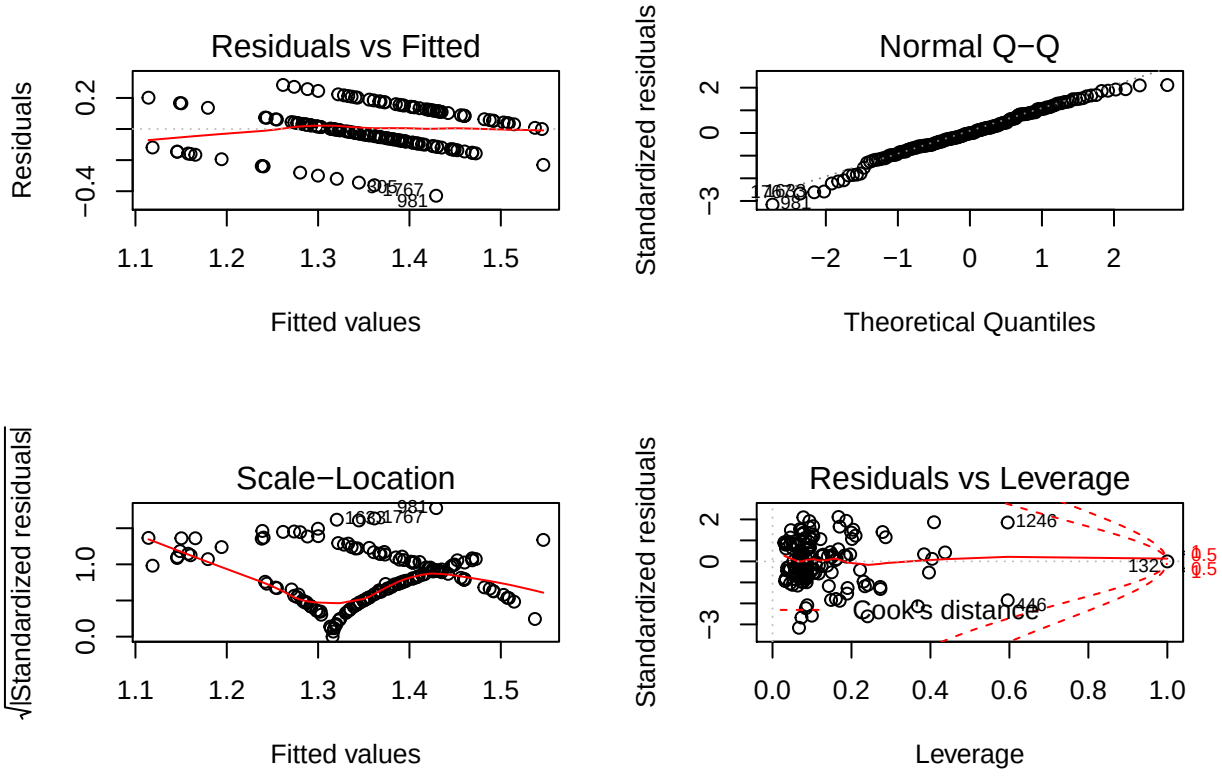
```
par(mfrow=c(2,2))
plot(m2)
```

```
## Warning: not plotting observations with leverage one:
##   31, 74
```

```
## Warning: not plotting observations with leverage one:
##   31, 74
```

```
## Warning in sqrt(crit * p * (1 - hh)/hh): NaNs produced
```

```
## Warning in sqrt(crit * p * (1 - hh)/hh): NaNs produced
```

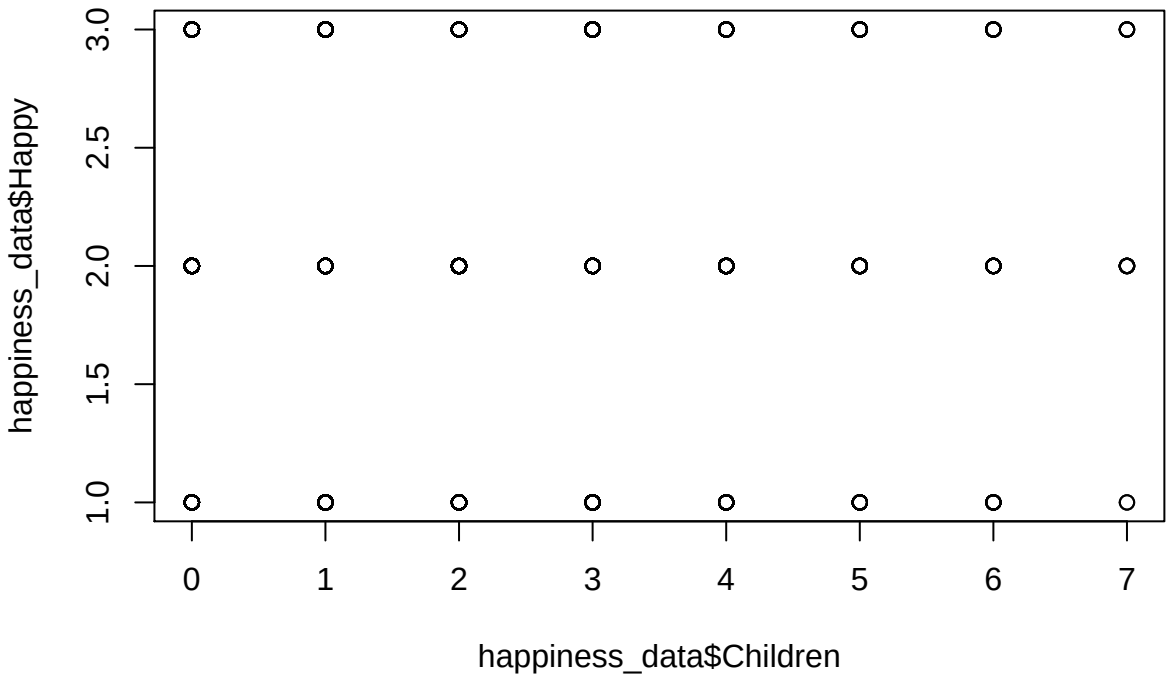



```
anova(m2)
```

```
## Analysis of Variance Table
##
## Response: (happiness_data$Happy)^0.396
##                                  Df  Sum Sq  Mean Sq F value    Pr(>F)
## factor(happiness_data$Household)   5 0.21752 0.043503  2.2008 0.0574183
## factor(happiness_data$OwnHome)     2 0.04163 0.020814  1.0530 0.3515920
## happiness_data$Instagram           1 0.00023 0.000226  0.0114 0.9149618
## factor(happiness_data$Marital)     4 0.39408 0.098520  4.9840 0.0008635
## happiness_data$Children            1 0.00501 0.005008  0.2534 0.6154957
```

```
## happiness_data$Education           1 0.01888 0.018883  0.9552 0.3300382
## factor(happiness_data$JobSat)      6 0.52554 0.087591  4.4311 0.0003849
## happiness_data$Income              1 0.04559 0.045585  2.3061 0.1310760
## Residuals                        143 2.82673 0.019767
##
## factor(happiness_data$Household) .
## factor(happiness_data$OwnHome)
## happiness_data$Instagram
## factor(happiness_data$Marital)   ***
## happiness_data$Children
## happiness_data$Education
## factor(happiness_data$JobSat)    ***
## happiness_data$Income
## Residuals
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#naren
#testing the significance of Children predictor variable
plot(happiness_data$Happy ~ happiness_data$Children)
```




```
m8 <- lm(happiness_data$Happy ~ happiness_data$Children)
summary(m8)
```

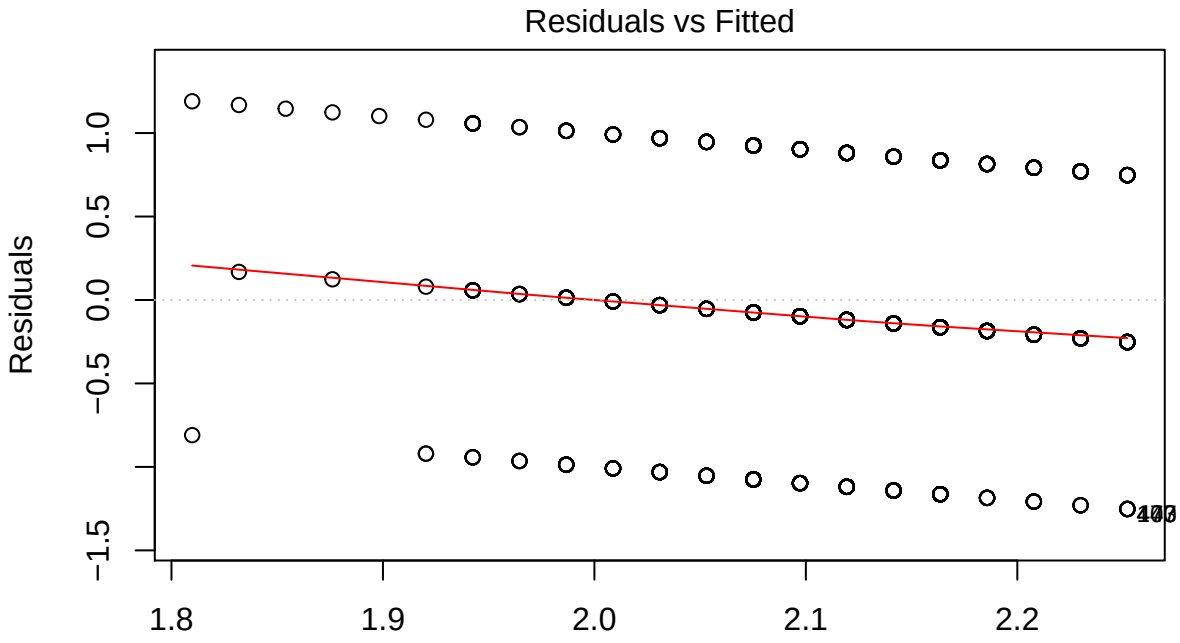
```
##
## Call:
## lm(formula = happiness_data$Happy ~ happiness_data$Children)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.1282 -0.1191 -0.1146  0.8786  0.8877
##
## Coefficients:
```

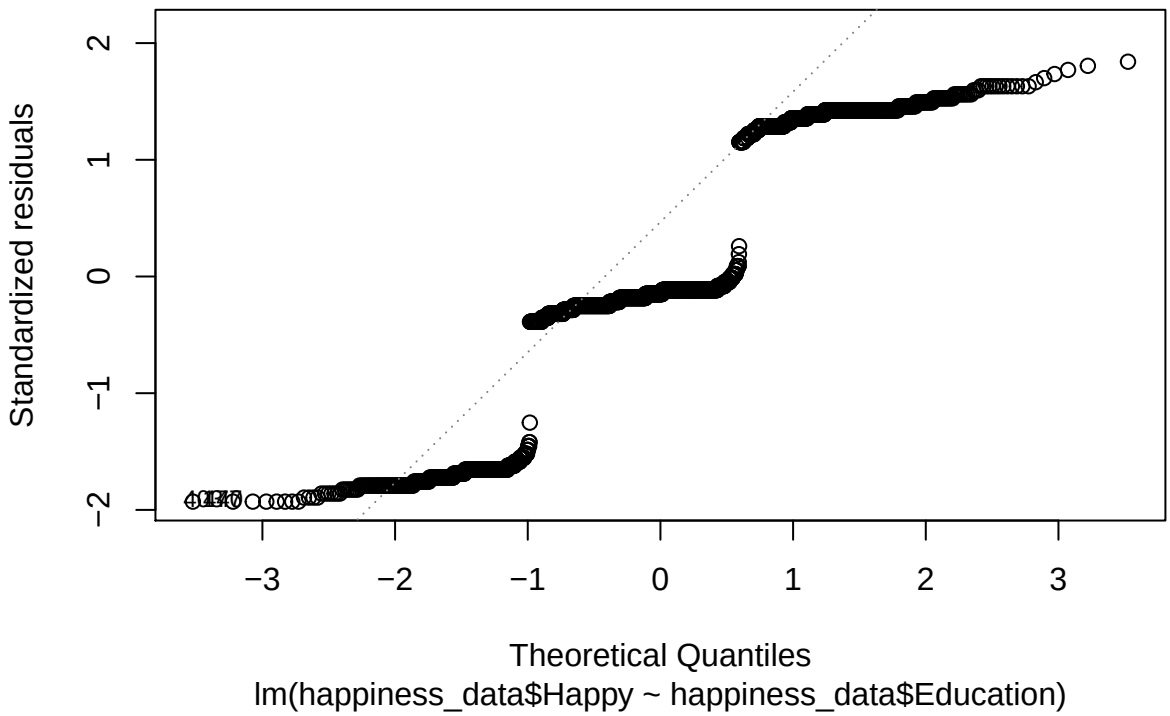
```
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)              2.112312   0.020326 103.922   <2e-16 ***
## happiness_data$Children 0.002274   0.008496   0.268    0.789
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6506 on 2335 degrees of freedom
##   (30 observations deleted due to missingness)
## Multiple R-squared:  3.067e-05,  Adjusted R-squared:  -0.0003976
## F-statistic: 0.07162 on 1 and 2335 DF,  p-value: 0.789
```

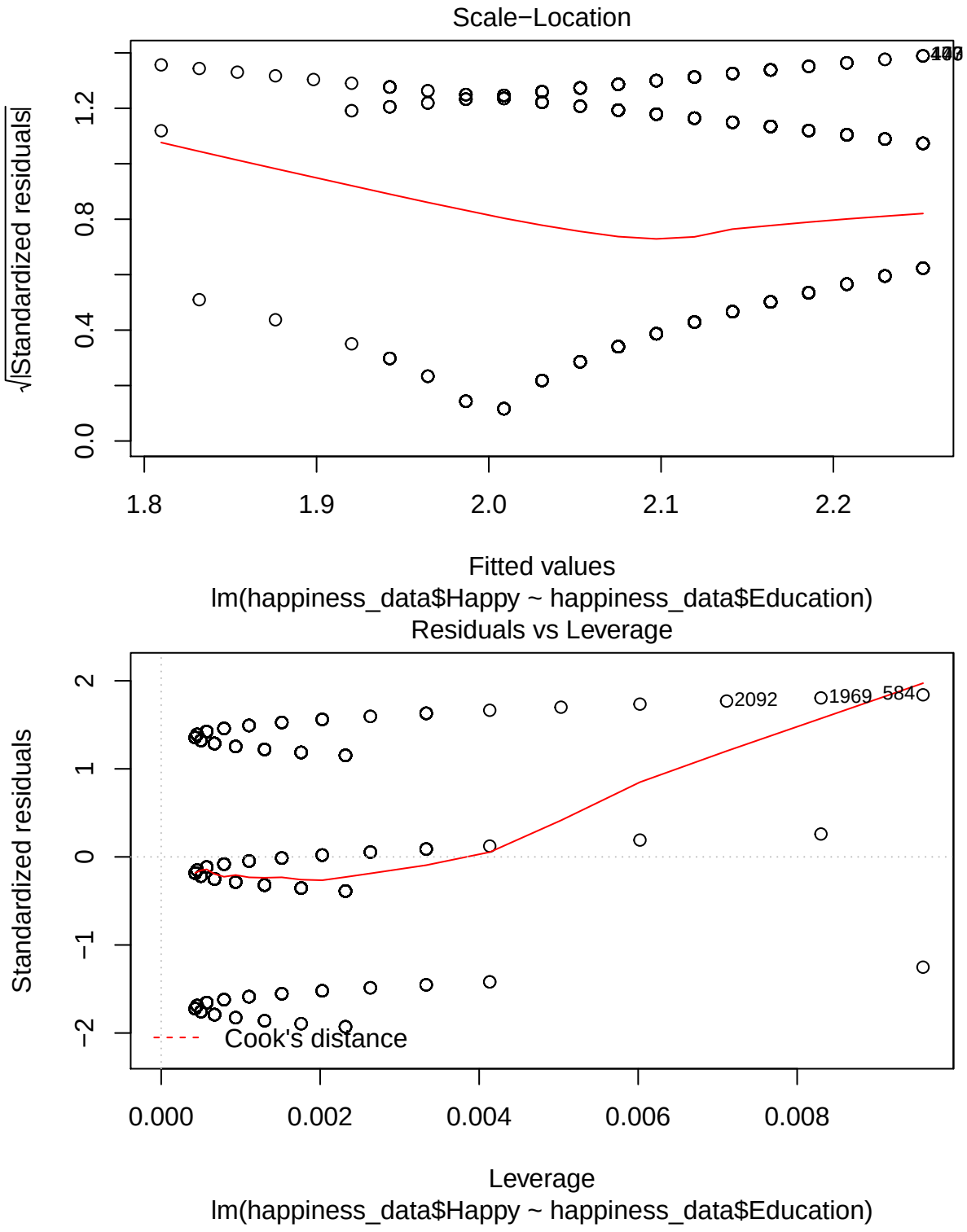
```
#it seems children and happiness have almost no correlation. we might be able to remove this one

#testing the significance of Education predictor variable
m9 <- lm(happiness_data$Happy ~ happiness_data$Education)
summary(m9)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ happiness_data$Education)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.25203 -0.18569 -0.09725  0.79219  1.19021
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)               1.809793   0.063607  28.453  < 2e-16 ***
## happiness_data$Education 0.022112   0.004523   4.889 1.08e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6498 on 2353 degrees of freedom
##   (12 observations deleted due to missingness)
## Multiple R-squared:  0.01006,    Adjusted R-squared:  0.009635
## F-statistic:  23.9 on 1 and 2353 DF,  p-value: 1.082e-06
```

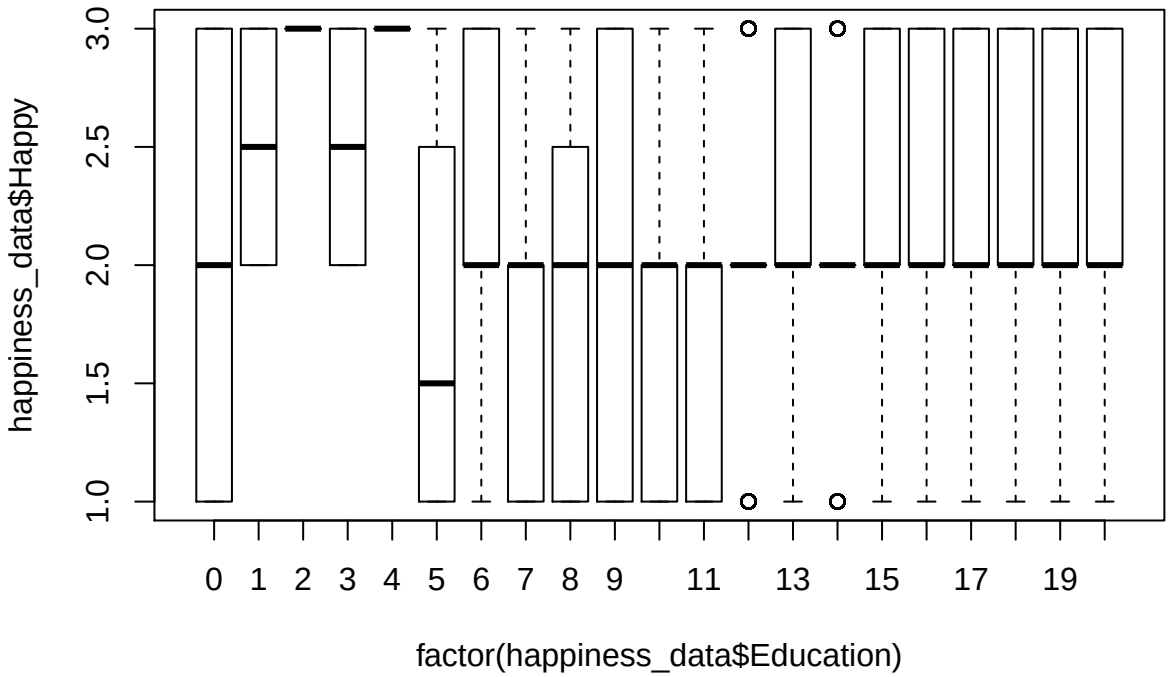
```
plot(m9)
```


Residuals vs Fitted
Residuals
1.0
0.5
0.0
−0.5
−1.5
1.8
1.9
2.0
2.1
2.2
Fitted values
lm(happiness_data$Happy ~ happiness_data$Education)


Normal Q−Q
Standardized residuals
2
1
0
−1
−2
−3
−2
−1
0
1
2
3
Theoretical Quantiles
lm(happiness_data$Happy ~ happiness_data$Education)




```
plot(happiness_data$Happy ~ factor(happiness_data$Education))
```




```
#judging from the linearity of the residuals plot, it does not seem education needs a transformation

#ignore below
  # inverseEducation <- 1/(happiness_data$Education)
  # inverseEducation[which(is.nan(inverseEducation))] = NA
  # inverseEducation[which(inverseEducation==Inf)] = NA
  # m9 <- lm(happiness_data$Happy ~ inverseEducation)
  # summary(m9)

  # inverseLogEducation <- (happiness_data$Education)^0.25
  # inverseLogEducation[which(is.nan(inverseLogEducation))] = NA
  # inverseLogEducation[which(inverseLogEducation==Inf)] = NA
  # m10 <- lm(happiness_data$Happy ~ inverseLogEducation)
  # summary(m10)
  # plot(m10)
```

```
#naren exploring full model with individual changes to variables and subsequent new models
m10 <- lm(happiness_data$Happy ~ factor(happiness_data$Household) + factor(happiness_data$OwnHome) + ha
summary(m10)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ factor(happiness_data$Household) +
##     factor(happiness_data$OwnHome) + happiness_data$Instagram +
##     factor(happiness_data$Marital) + happiness_data$Children +
##     happiness_data$Education + factor(happiness_data$JobSat) +
##     happiness_data$Income)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.51266 -0.35169 -0.02475  0.43407  1.13860
##
## Coefficients:
```

```
##                                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)                        2.517e+00  3.940e-01   6.389 2.21e-09
## factor(happiness_data$Household)2 -1.455e-01  1.276e-01  -1.141 0.255867
## factor(happiness_data$Household)3  5.965e-03  1.649e-01   0.036 0.971200
## factor(happiness_data$Household)4 -7.244e-01  3.422e-01  -2.117 0.036012
## factor(happiness_data$Household)5 -3.411e-01  5.712e-01  -0.597 0.551366
## factor(happiness_data$Household)6 -6.199e-01  4.111e-01  -1.508 0.133751
## factor(happiness_data$OwnHome)2    1.546e-01  1.030e-01   1.501 0.135625
## factor(happiness_data$OwnHome)3    3.602e-01  5.758e-01   0.626 0.532623
## happiness_data$Instagram          -8.144e-02  1.053e-01  -0.773 0.440705
## factor(happiness_data$Marital)2   -7.691e-01  2.272e-01  -3.385 0.000920
## factor(happiness_data$Marital)3   -3.490e-01  1.476e-01  -2.365 0.019365
## factor(happiness_data$Marital)4   -6.308e-01  3.378e-01  -1.867 0.063886
## factor(happiness_data$Marital)5   -3.797e-01  1.461e-01  -2.599 0.010329
## happiness_data$Children           -1.489e-02  3.696e-02  -0.403 0.687636
## happiness_data$Education           2.080e-02  1.907e-02   1.091 0.277180
## factor(happiness_data$JobSat)2    -7.695e-02  1.320e-01  -0.583 0.560928
## factor(happiness_data$JobSat)3    -3.222e-01  1.401e-01  -2.300 0.022920
## factor(happiness_data$JobSat)4    -2.524e-01  2.640e-01  -0.956 0.340594
## factor(happiness_data$JobSat)5    -5.397e-01  2.083e-01  -2.591 0.010556
## factor(happiness_data$JobSat)6    -1.076e+00  3.006e-01  -3.579 0.000472
## factor(happiness_data$JobSat)7    -3.610e-01  5.707e-01  -0.633 0.527999
## happiness_data$Income              2.544e-06  1.561e-06   1.630 0.105302
##
## (Intercept)                       ***
## factor(happiness_data$Household)2
## factor(happiness_data$Household)3
## factor(happiness_data$Household)4 *
## factor(happiness_data$Household)5
## factor(happiness_data$Household)6
## factor(happiness_data$OwnHome)2
## factor(happiness_data$OwnHome)3
## happiness_data$Instagram
## factor(happiness_data$Marital)2   ***
## factor(happiness_data$Marital)3   *
## factor(happiness_data$Marital)4   .
## factor(happiness_data$Marital)5   *
## happiness_data$Children
## happiness_data$Education
## factor(happiness_data$JobSat)2
## factor(happiness_data$JobSat)3    *
## factor(happiness_data$JobSat)4
## factor(happiness_data$JobSat)5    *
## factor(happiness_data$JobSat)6    ***
## factor(happiness_data$JobSat)7
## happiness_data$Income
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5457 on 143 degrees of freedom
##   (2202 observations deleted due to missingness)
## Multiple R-squared:  0.2984, Adjusted R-squared:  0.1954
## F-statistic: 2.896 on 21 and 143 DF,  p-value: 0.0001019
```

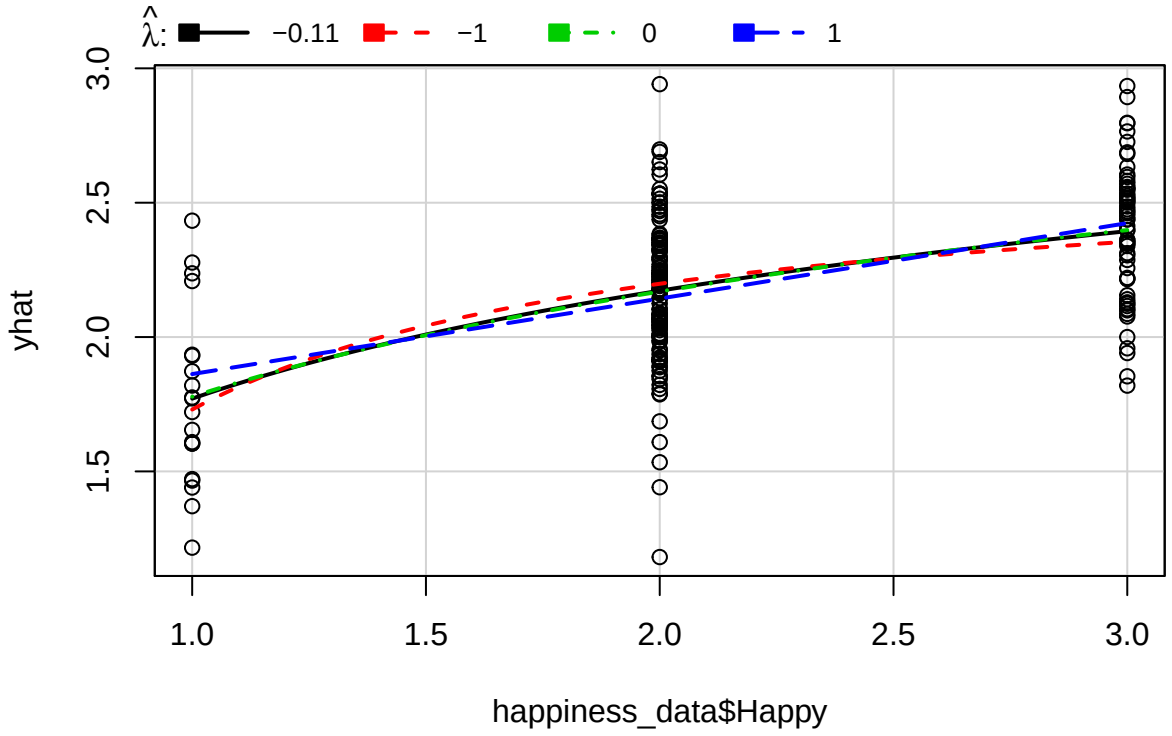
```r
m11 <- lm(happiness_data$Happy ~ factor(happiness_data$Household) + factor(happiness_data$OwnHome) + fa
summary(m11)
```

```
##
## Call:
## lm(formula = happiness_data$Happy ~ factor(happiness_data$Household) +
##     factor(happiness_data$OwnHome) + factor(happiness_data$Marital) +
##     happiness_data$Education + factor(happiness_data$JobSat) +
##     happiness_data$Income)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.43310 -0.34283 -0.06623  0.42702  1.18067
##
## Coefficients:
##                                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)                        2.254e+00  2.687e-01   8.387 1.22e-14
## factor(happiness_data$Household)2 -1.115e-01  1.118e-01  -0.997 0.319873
## factor(happiness_data$Household)3  6.856e-02  1.417e-01   0.484 0.629148
## factor(happiness_data$Household)4 -7.344e-01  2.257e-01  -3.254 0.001351
## factor(happiness_data$Household)5 -4.174e-01  4.021e-01  -1.038 0.300674
## factor(happiness_data$Household)6 -6.228e-01  3.909e-01  -1.594 0.112737
## factor(happiness_data$OwnHome)2    9.495e-02  8.502e-02   1.117 0.265573
## factor(happiness_data$OwnHome)3    2.788e-01  3.983e-01   0.700 0.484779
## factor(happiness_data$Marital)2   -6.690e-01  2.140e-01  -3.126 0.002056
## factor(happiness_data$Marital)3   -2.372e-01  1.280e-01  -1.853 0.065435
## factor(happiness_data$Marital)4   -2.979e-01  2.548e-01  -1.169 0.243806
## factor(happiness_data$Marital)5   -3.231e-01  1.155e-01  -2.797 0.005701
## happiness_data$Education           2.398e-02  1.532e-02   1.565 0.119373
## factor(happiness_data$JobSat)2    -9.733e-02  1.120e-01  -0.869 0.385798
## factor(happiness_data$JobSat)3    -3.390e-01  1.201e-01  -2.822 0.005289
## factor(happiness_data$JobSat)4    -1.820e-01  1.990e-01  -0.914 0.361691
## factor(happiness_data$JobSat)5    -6.127e-01  1.764e-01  -3.473 0.000639
## factor(happiness_data$JobSat)6    -8.864e-01  2.609e-01  -3.398 0.000831
## factor(happiness_data$JobSat)7    -3.442e-01  5.494e-01  -0.626 0.531815
## happiness_data$Income              2.236e-06  1.439e-06   1.554 0.121865
##
## (Intercept)                       ***
## factor(happiness_data$Household)2
## factor(happiness_data$Household)3
## factor(happiness_data$Household)4 **
## factor(happiness_data$Household)5
## factor(happiness_data$Household)6
## factor(happiness_data$OwnHome)2
## factor(happiness_data$OwnHome)3
## factor(happiness_data$Marital)2   **
## factor(happiness_data$Marital)3   .
## factor(happiness_data$Marital)4
## factor(happiness_data$Marital)5   **
## happiness_data$Education
## factor(happiness_data$JobSat)2
## factor(happiness_data$JobSat)3    **
## factor(happiness_data$JobSat)4
## factor(happiness_data$JobSat)5    ***
```

```
## factor(happiness_data$JobSat)6    ***
## factor(happiness_data$JobSat)7
## happiness_data$Income
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5307 on 186 degrees of freedom
##   (2161 observations deleted due to missingness)
## Multiple R-squared:  0.2809, Adjusted R-squared:  0.2074
## F-statistic: 3.823 on 19 and 186 DF,  p-value: 8.789e-07
```

```
inverse.response.plot(m11,key=TRUE)
```

```
## Warning: 'inverse.response.plot' is deprecated.
## Use 'inverseResponsePlot' instead.
## See help("Deprecated") and help("alr3-deprecated").
```




```
##       lambda      RSS
## 1 -0.1058152 14.38278
## 2 -1.0000000 14.59566
## 3  0.0000000 14.38608
## 4  1.0000000 14.71196
```

```
m12 <- lm((happiness_data$Happy)^-0.1058152 ~ factor(happiness_data$Household) + factor(happiness_data$
summary(m12)
```

```
##
## Call:
## lm(formula = (happiness_data$Happy)^-0.1058152 ~ factor(happiness_data$Household) +
##     factor(happiness_data$OwnHome) + factor(happiness_data$Marital) +
##     happiness_data$Education + factor(happiness_data$JobSat) +
##     log(happiness_data$Income))
```

```
##
## Residuals:
##       Min        1Q    Median        3Q       Max
## -0.056243 -0.017590  0.001085  0.013363  0.084174
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       0.9414772  0.0218585  43.071  < 2e-16
## factor(happiness_data$Household)2  0.0080534  0.0055692   1.446 0.149842
## factor(happiness_data$Household)3 -0.0016481  0.0072911  -0.226 0.821421
## factor(happiness_data$Household)4  0.0451018  0.0113490   3.974 0.000101
## factor(happiness_data$Household)5  0.0190414  0.0200233   0.951 0.342856
## factor(happiness_data$Household)6  0.0394986  0.0194762   2.028 0.043982
## factor(happiness_data$OwnHome)2   -0.0048556  0.0042731  -1.136 0.257284
## factor(happiness_data$OwnHome)3   -0.0137503  0.0198644  -0.692 0.489672
## factor(happiness_data$Marital)2    0.0422698  0.0106622   3.964 0.000105
## factor(happiness_data$Marital)3    0.0140035  0.0063688   2.199 0.029128
## factor(happiness_data$Marital)4    0.0127756  0.0127522   1.002 0.317722
## factor(happiness_data$Marital)5    0.0145775  0.0057633   2.529 0.012258
## happiness_data$Education          -0.0011625  0.0007549  -1.540 0.125284
## factor(happiness_data$JobSat)2     0.0058932  0.0055823   1.056 0.292476
## factor(happiness_data$JobSat)3     0.0159793  0.0059007   2.708 0.007400
## factor(happiness_data$JobSat)4     0.0098927  0.0098756   1.002 0.317775
## factor(happiness_data$JobSat)5     0.0341226  0.0087291   3.909 0.000130
## factor(happiness_data$JobSat)6     0.0507489  0.0129932   3.906 0.000131
## factor(happiness_data$JobSat)7     0.0148959  0.0274326   0.543 0.587780
## log(happiness_data$Income)        -0.0026476  0.0018950  -1.397 0.164023
##
## (Intercept)                       ***
## factor(happiness_data$Household)2
## factor(happiness_data$Household)3
## factor(happiness_data$Household)4 ***
## factor(happiness_data$Household)5
## factor(happiness_data$Household)6 *
## factor(happiness_data$OwnHome)2
## factor(happiness_data$OwnHome)3
## factor(happiness_data$Marital)2   ***
## factor(happiness_data$Marital)3   *
## factor(happiness_data$Marital)4
## factor(happiness_data$Marital)5   *
## happiness_data$Education
## factor(happiness_data$JobSat)2
## factor(happiness_data$JobSat)3    **
## factor(happiness_data$JobSat)4
## factor(happiness_data$JobSat)5    ***
## factor(happiness_data$JobSat)6    ***
## factor(happiness_data$JobSat)7
## log(happiness_data$Income)
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.02645 on 186 degrees of freedom
##   (2161 observations deleted due to missingness)
## Multiple R-squared:  0.3093, Adjusted R-squared:  0.2387
```

```
## F-statistic: 4.384 on 19 and 186 DF,  p-value: 4.523e-08
```