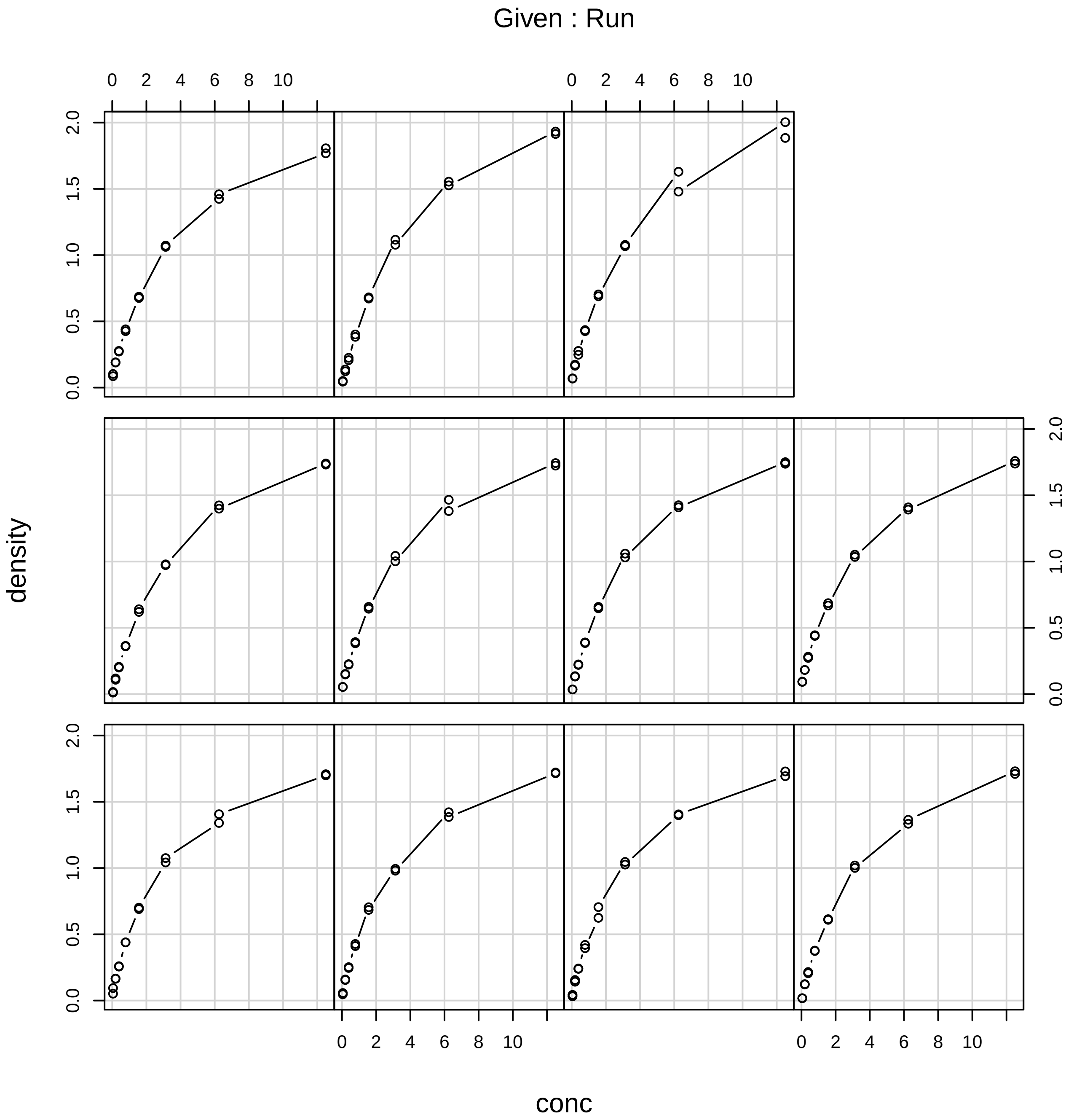
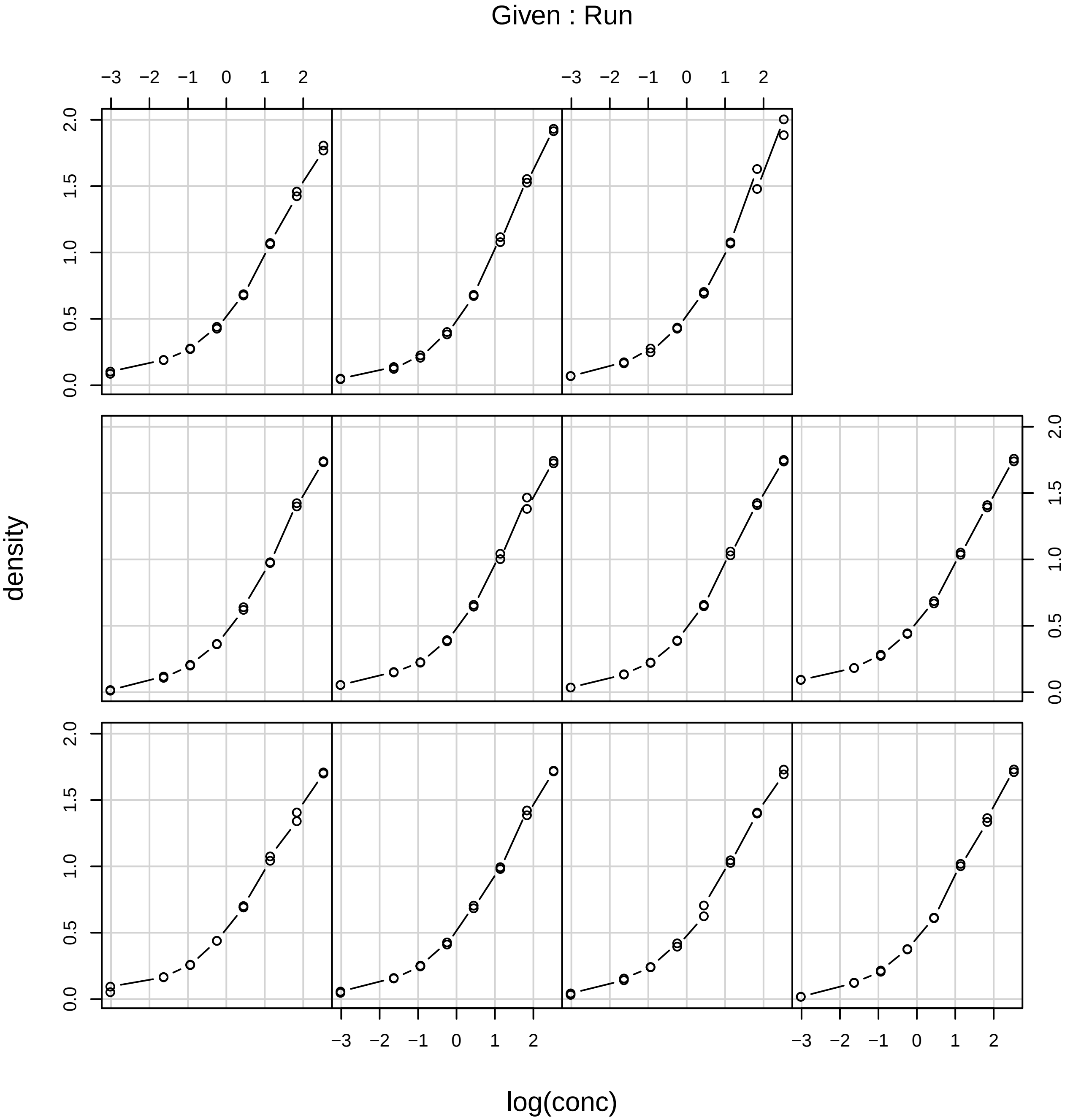
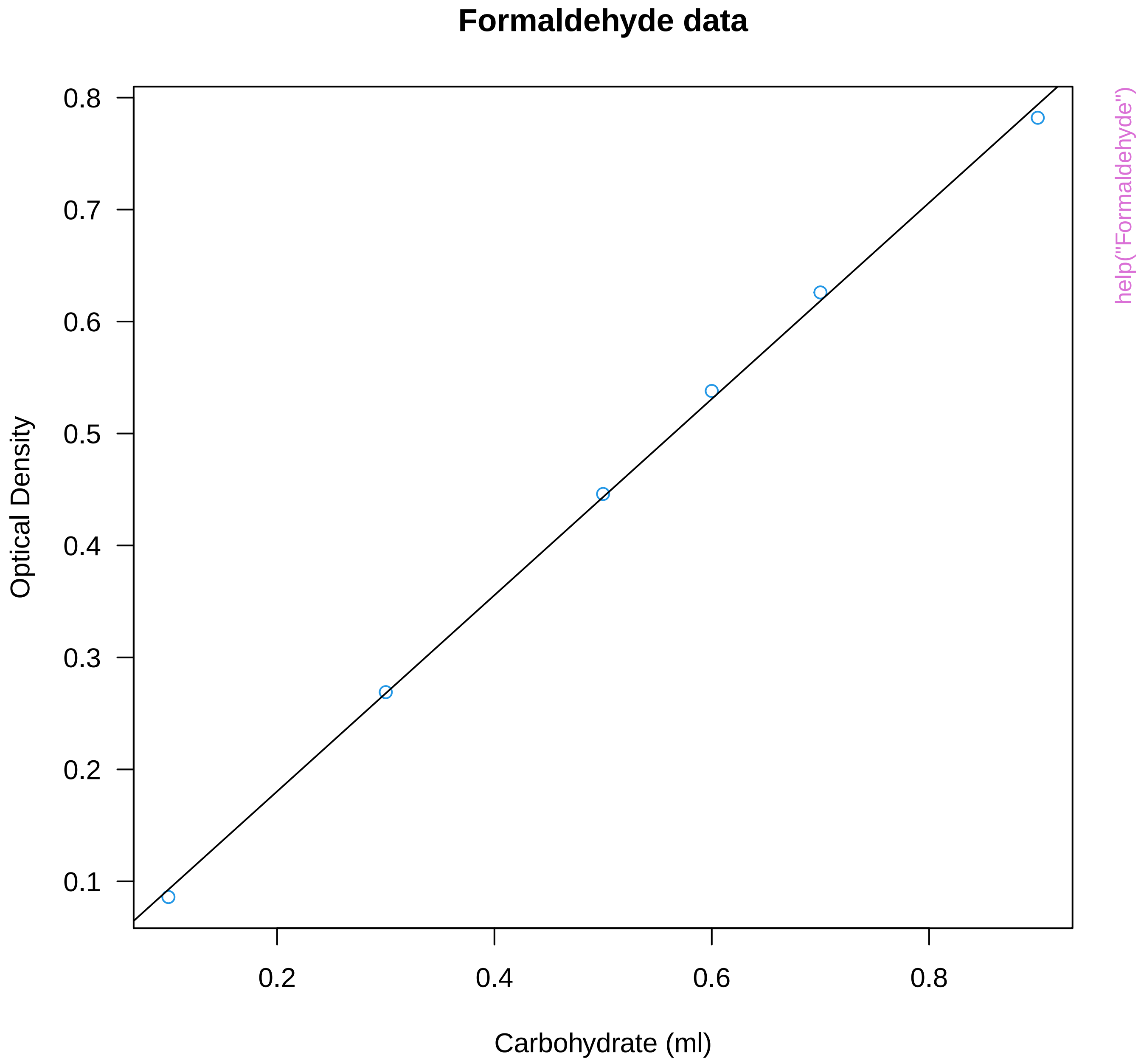
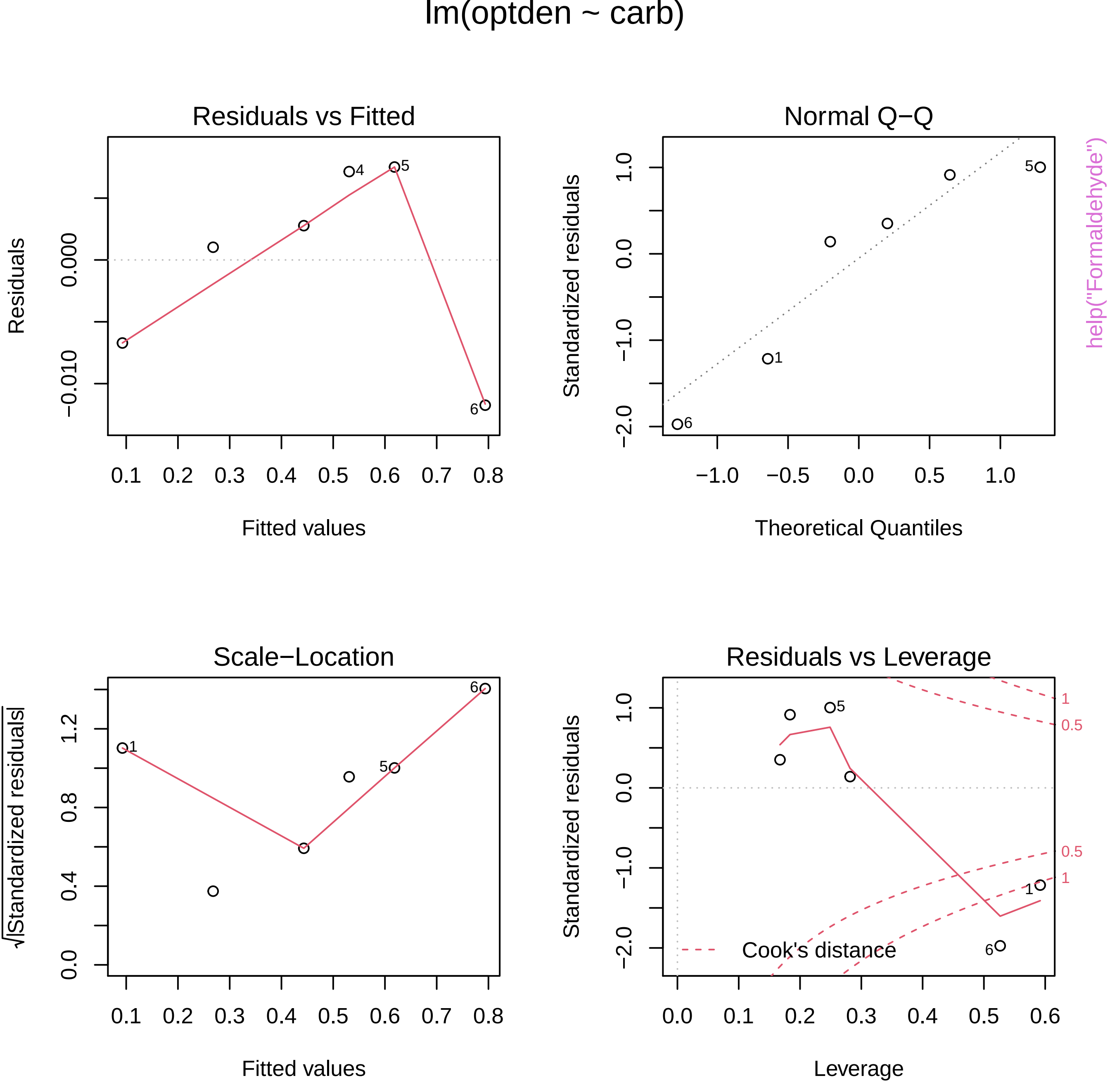
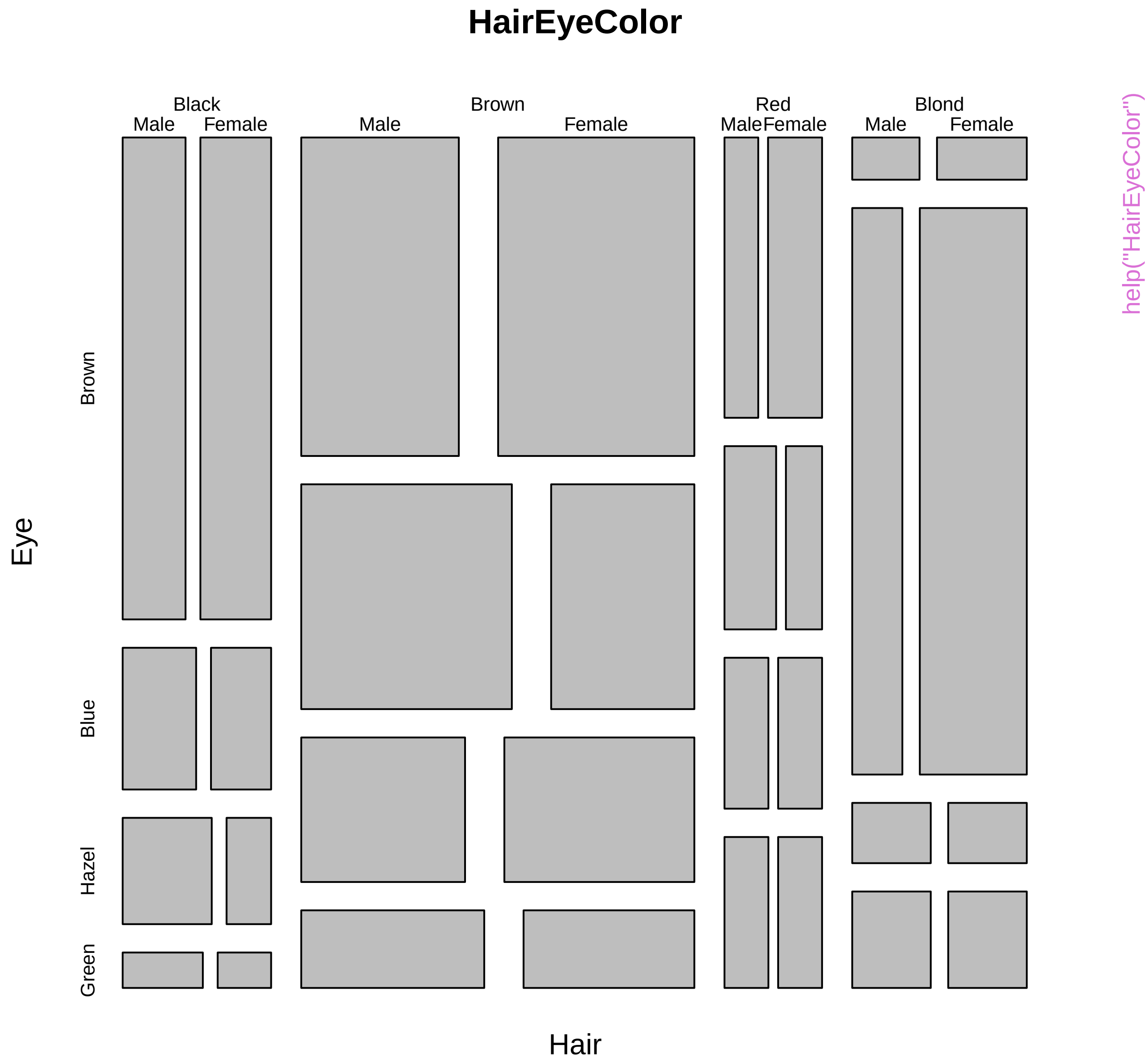
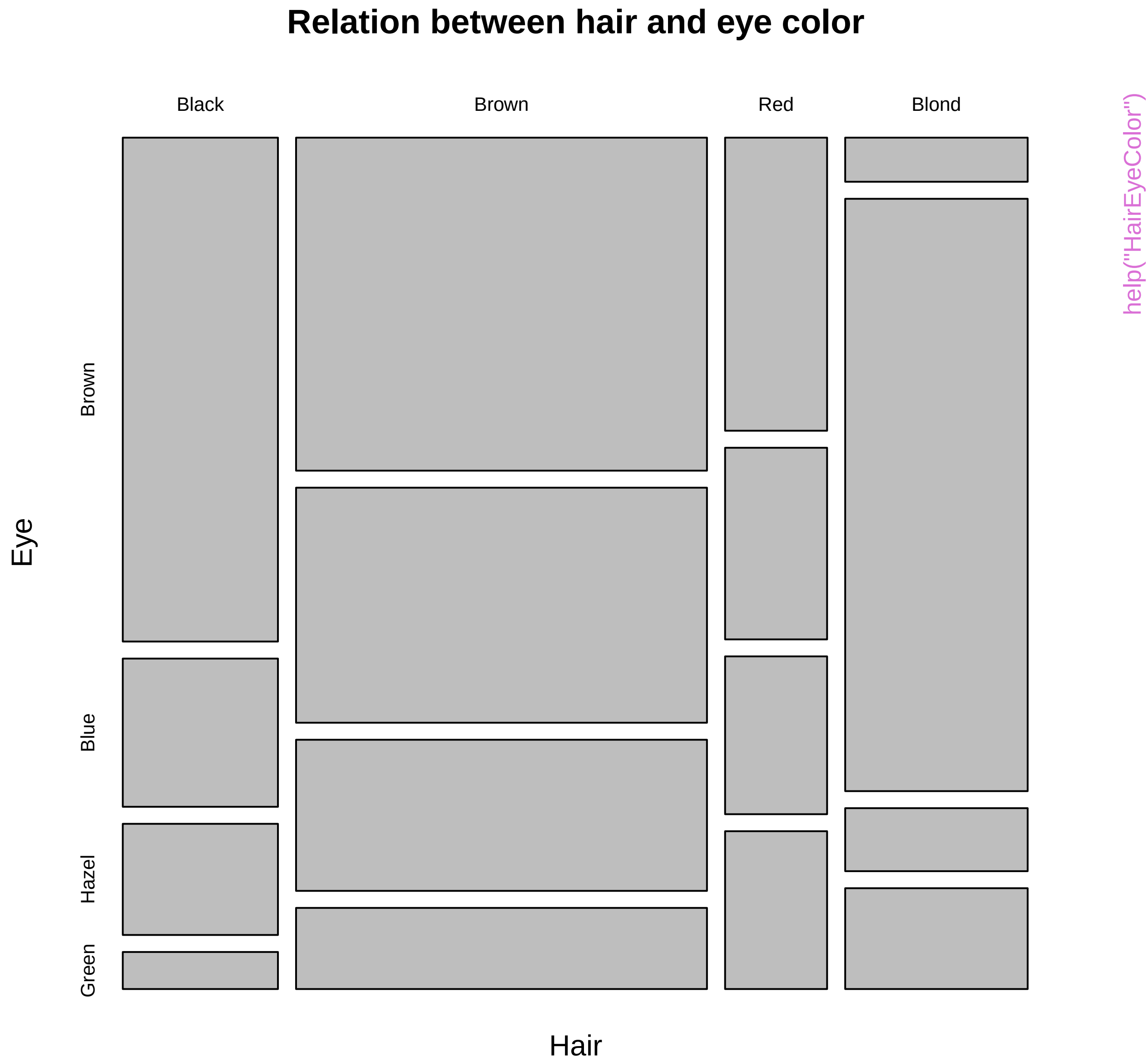

Given : Run
0
2
4
6
8
10
2.0
1.5
1.0
0.5
0.0
density
conc

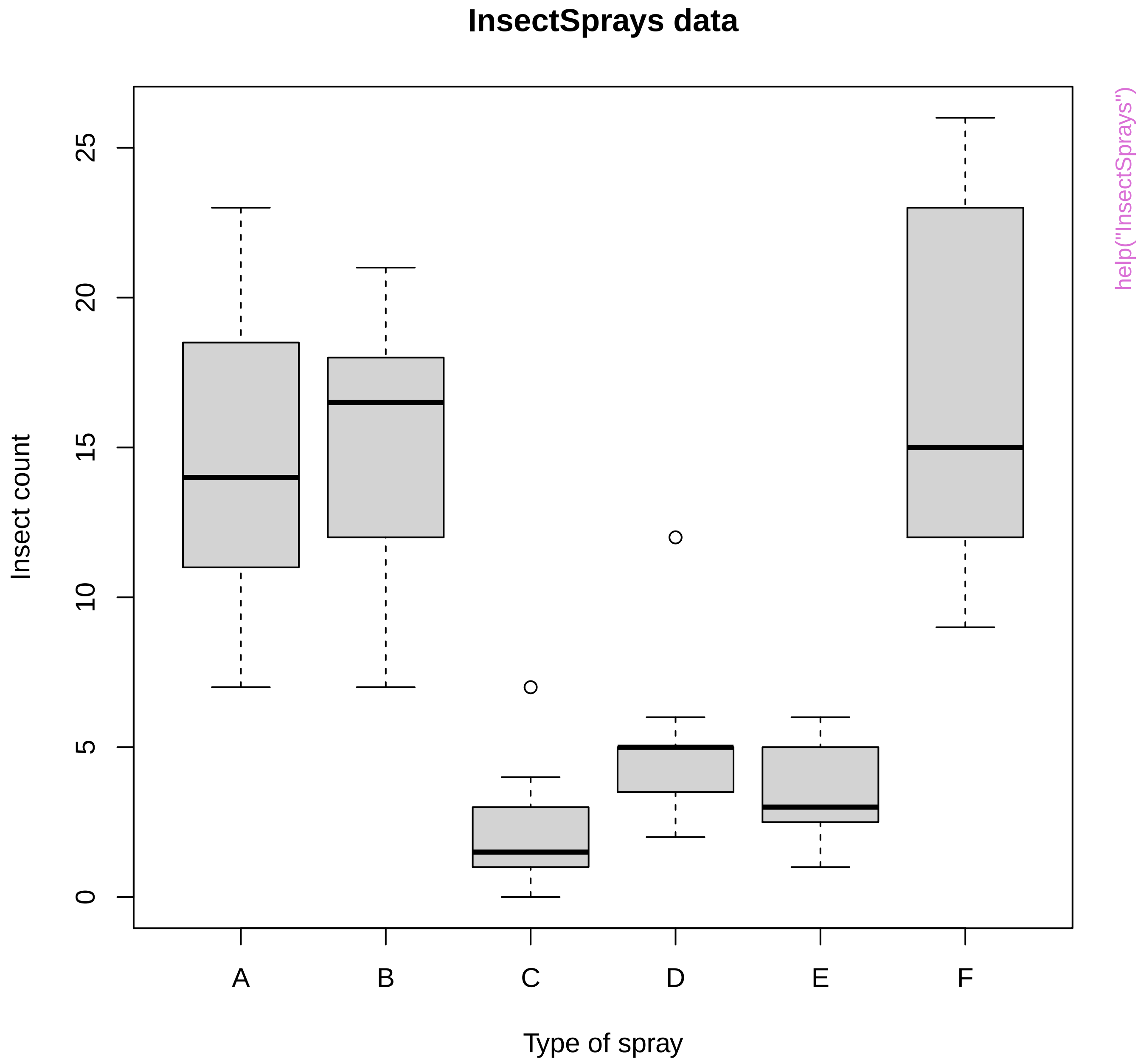

Given : Run
−3 −2 −1 0 1 2
density
0.0 0.5 1.0 1.5 2.0
log(conc)

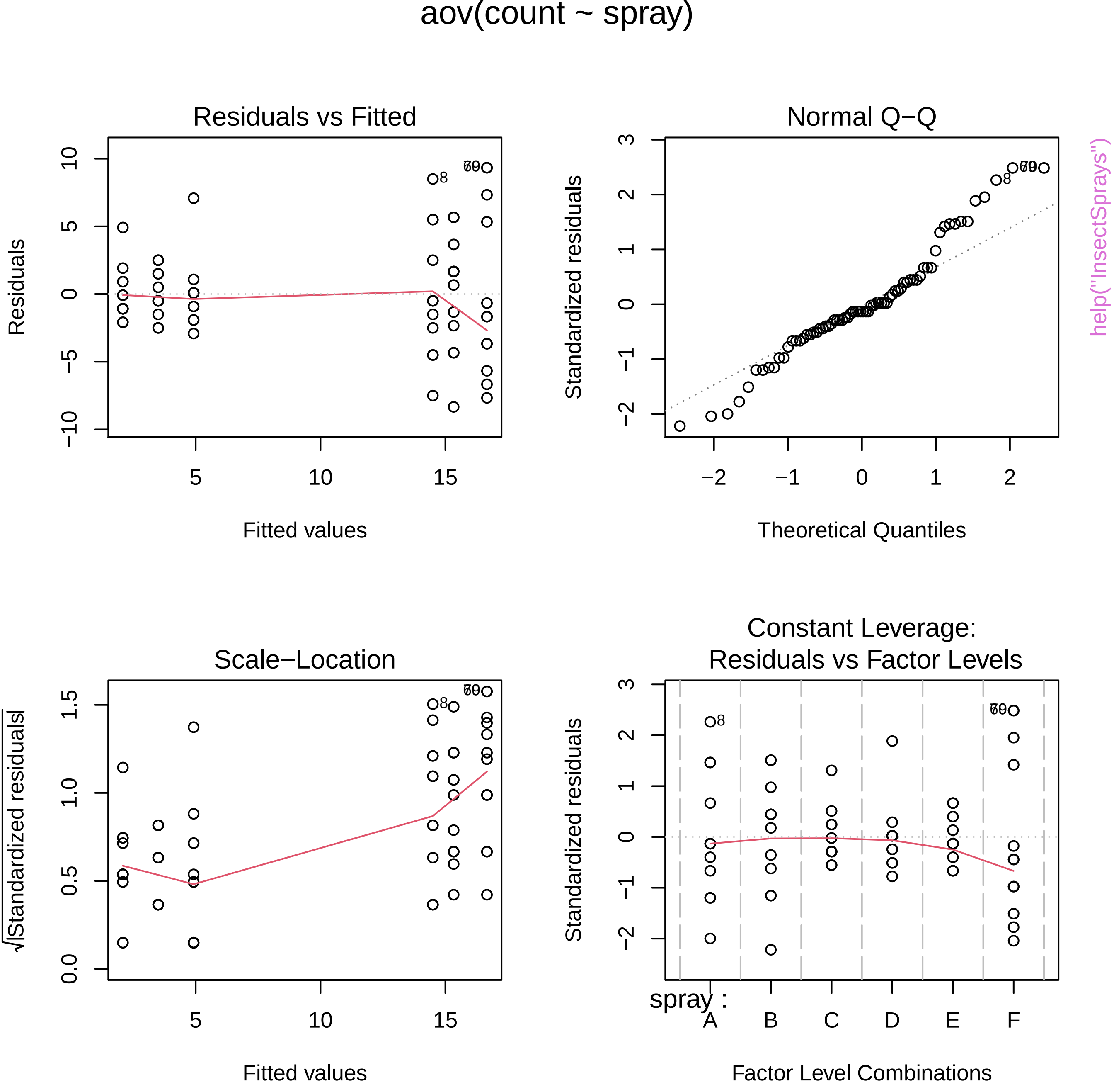

Formaldehyde data
Optical Density
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.2
0.4
0.6
0.8
Carbohydrate (ml)
help("Formaldehyde")

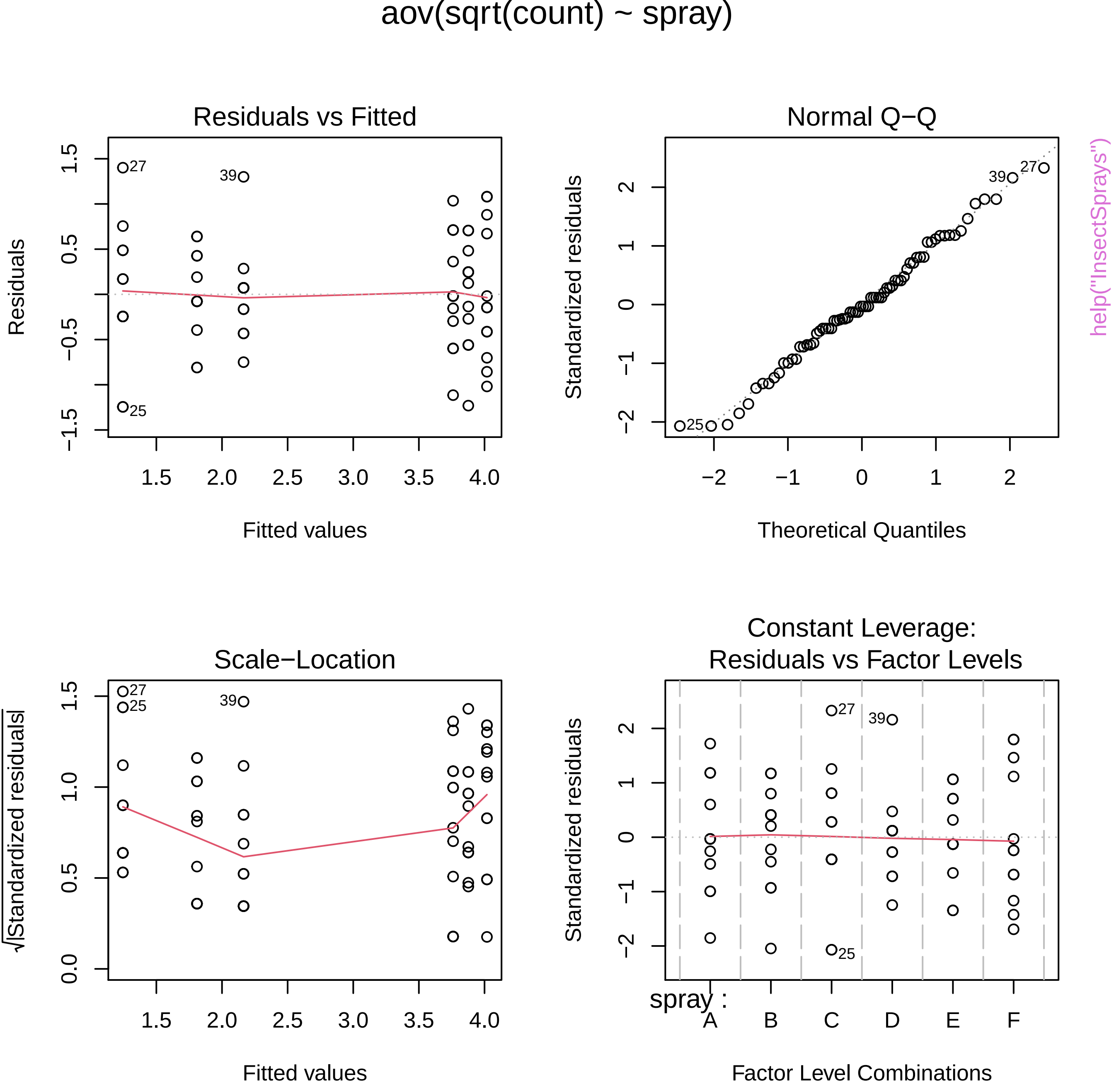

lm(optden ~ carb)
Residuals vs Fitted
Residuals
Fitted values
0.000
−0.010
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
4
5
6
Normal Q−Q
Standardized residuals
Theoretical Quantiles
1.0
0.0
−1.0
−2.0
−1.0
−0.5
0.0
0.5
1.0
5
1
6
help("Formaldehyde")
Scale−Location
√|Standardized residuals|
Fitted values
0.0
0.4
0.8
1.2
1
5
6
Residuals vs Leverage
Standardized residuals
Leverage
1.0
0.0
−1.0
−2.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
5
1
6
1
0.5
0.5
1
Cook's distance


HairEyeColor
Black
Male
Female
Brown
Male
Female
Red
Male
Female
Blond
Male
Female
help("HairEyeColor")
Eye
Brown
Blue
Hazel
Green
Hair

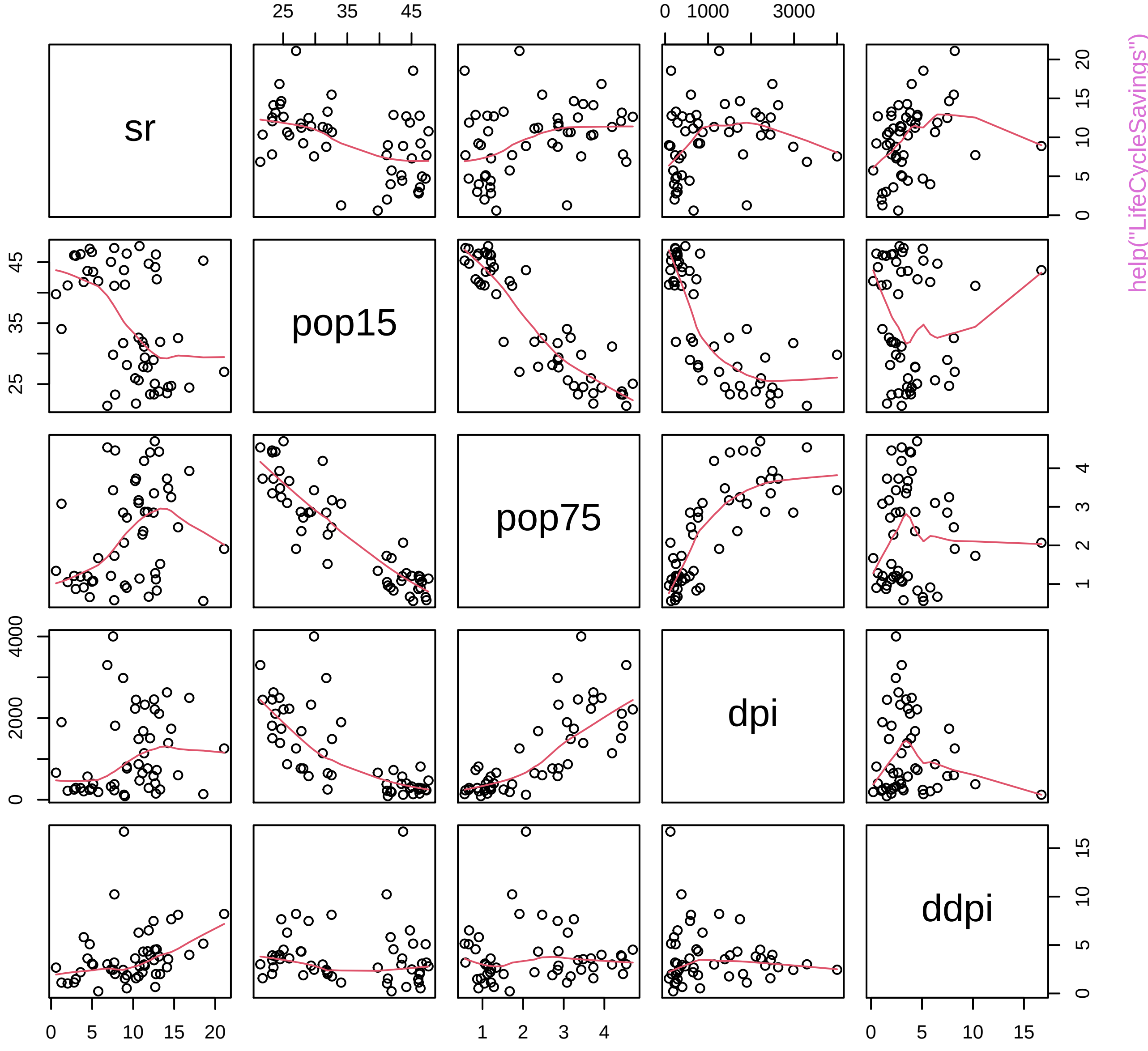

Relation between hair and eye color
Black
Brown
Red
Blond
Brown
Blue
Hazel
Green
Eye
Hair
help("HairEyeColor")

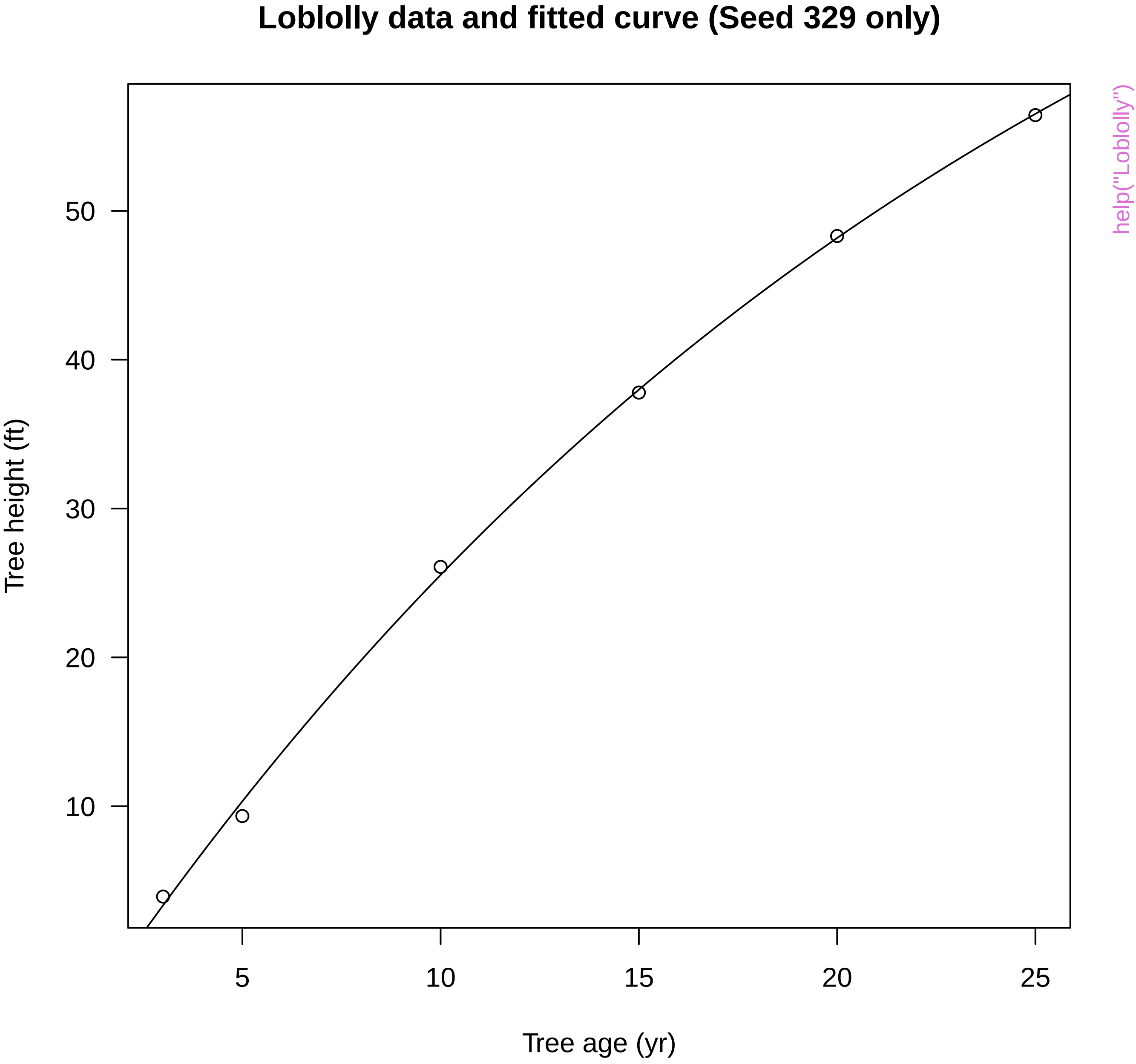

InsectSprays data
Insect count
0
5
10
15
20
25
A
B
C
D
E
F
Type of spray
help("InsectSprays")

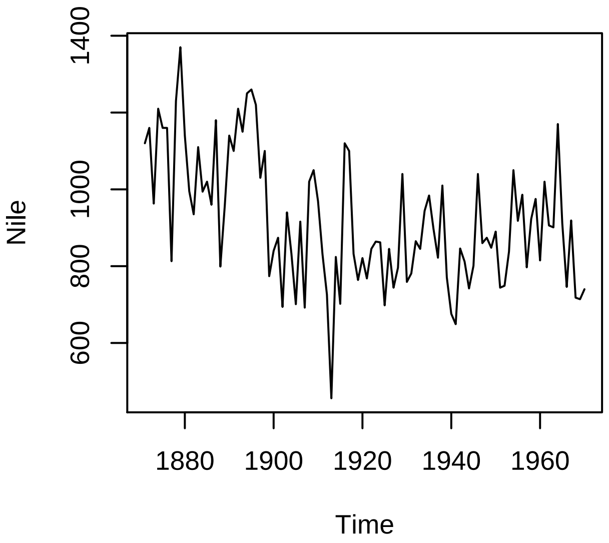

aov(count ~ spray)
Residuals vs Fitted
Residuals
10
5
0
−5
−10
5
10
15
Fitted values
8
70
69
Normal Q−Q
Standardized residuals
3
2
1
0
−1
−2
Theoretical Quantiles
8
70
69
Scale−Location
√|Standardized residuals|
1.5
1.0
0.5
0.0
5
10
15
Fitted values
8
70
69
Constant Leverage:
Residuals vs Factor Levels
Standardized residuals
3
2
1
0
−1
−2
spray :
A
B
C
D
E
F
Factor Level Combinations
8
70
69
help("InsectSprays")


aov(sqrt(count) ~ spray)
Residuals vs Fitted
Residuals
Fitted values
1.5
0.5
−0.5
−1.5
1.5
2.0
2.5
3.0
3.5
4.0
27
39
25
Normal Q−Q
Standardized residuals
Theoretical Quantiles
2
1
0
−1
−2
39
27
25
help("InsectSprays")
Scale−Location
√|Standardized residuals|
Fitted values
1.5
1.0
0.5
0.0
27
25
39
Constant Leverage:
Residuals vs Factor Levels
Standardized residuals
spray :
A
B
C
D
E
F
Factor Level Combinations
27
39
25

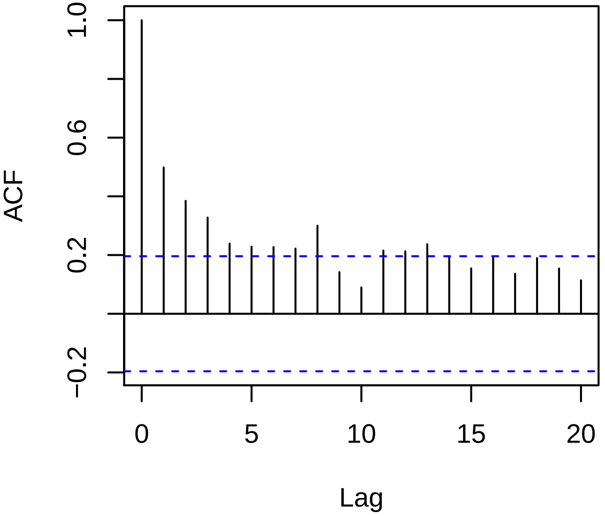
LifeCycleSavings data




Loblolly data and fitted curve (Seed 329 only)
Tree height (ft)
10
20
30
40
50
5
10
15
20
25
Tree age (yr)
help("Loblolly")

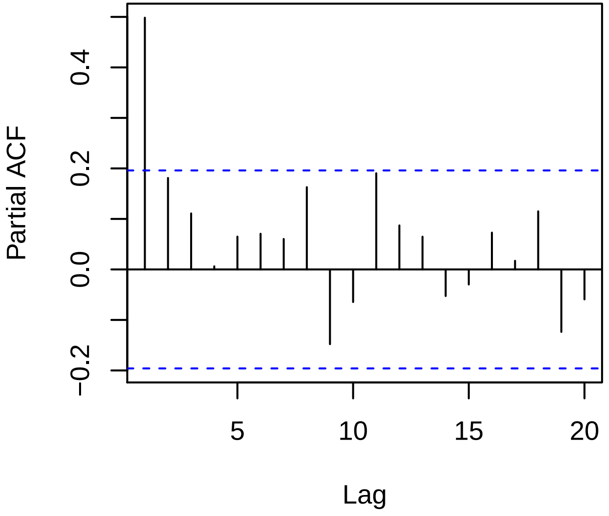


Series Nile

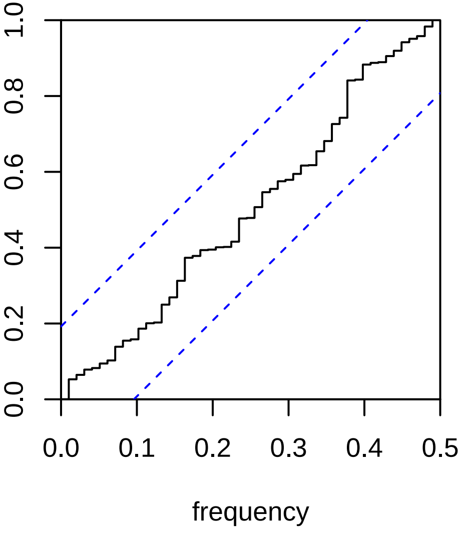


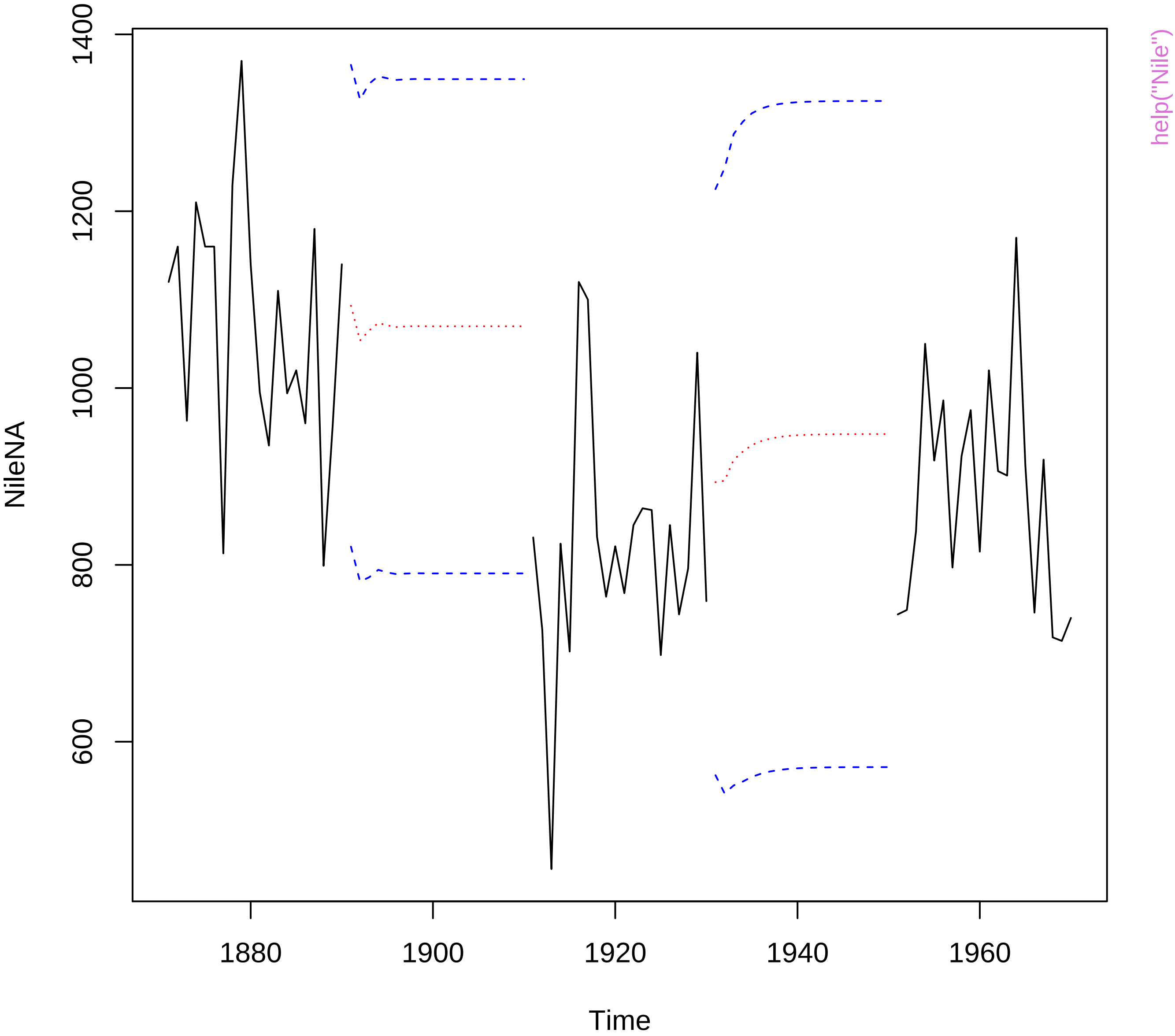
help("Nile")

Series Nile

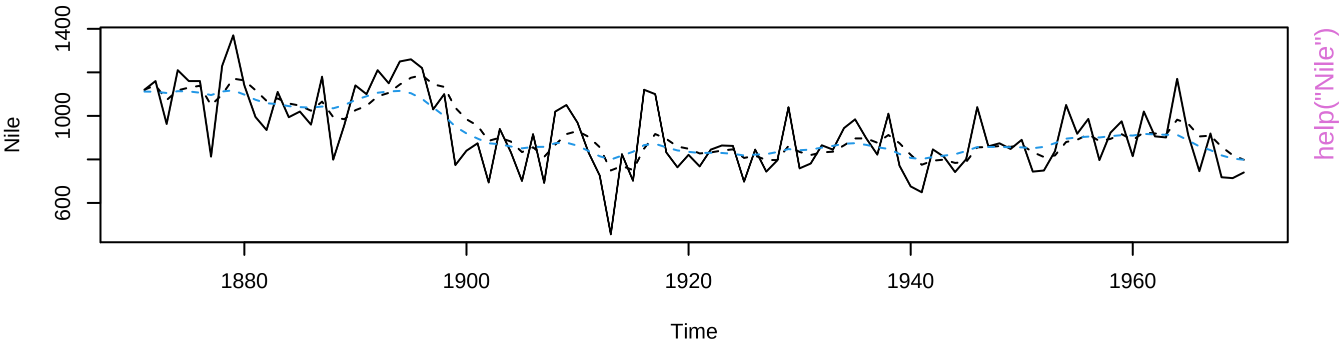


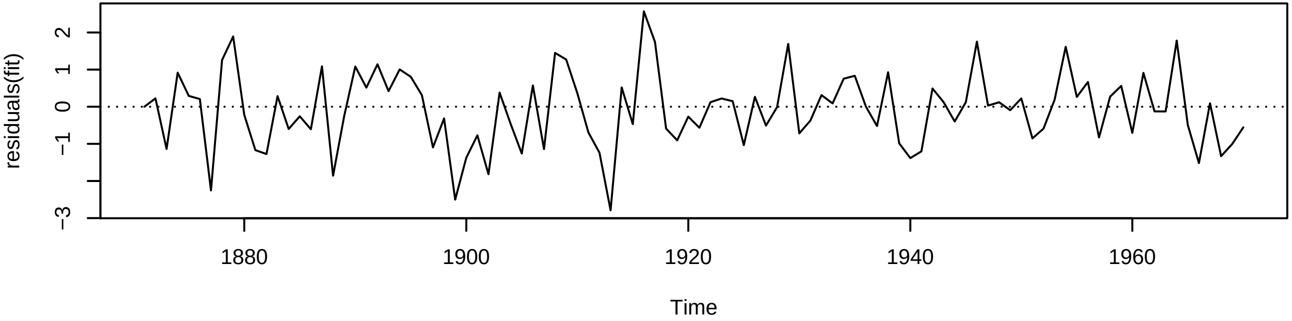
Series: ar(Nile)$resid

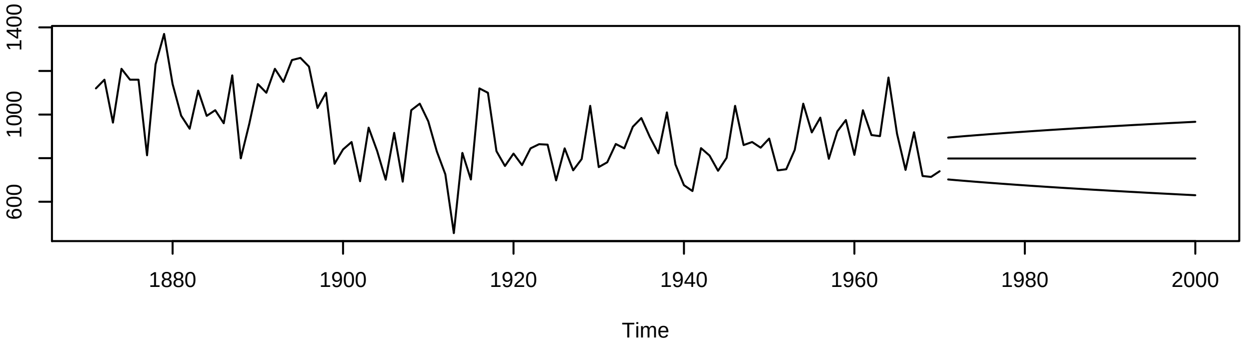


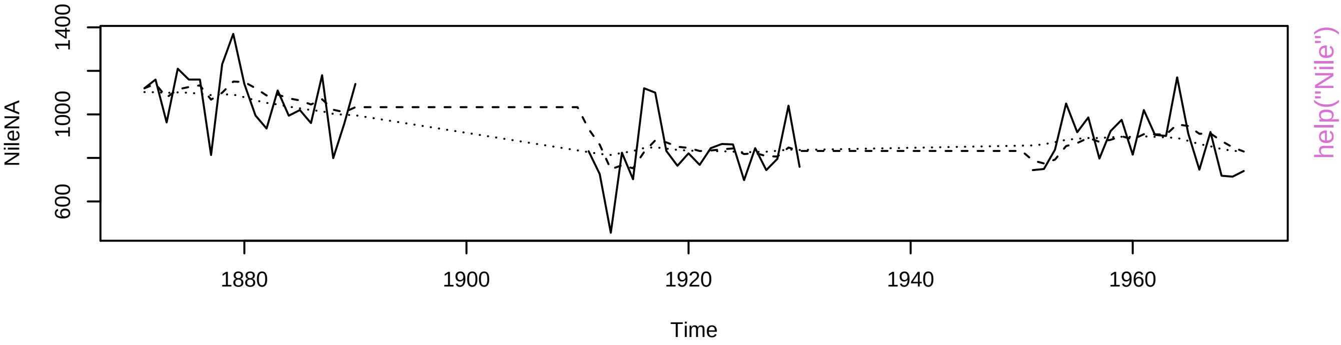


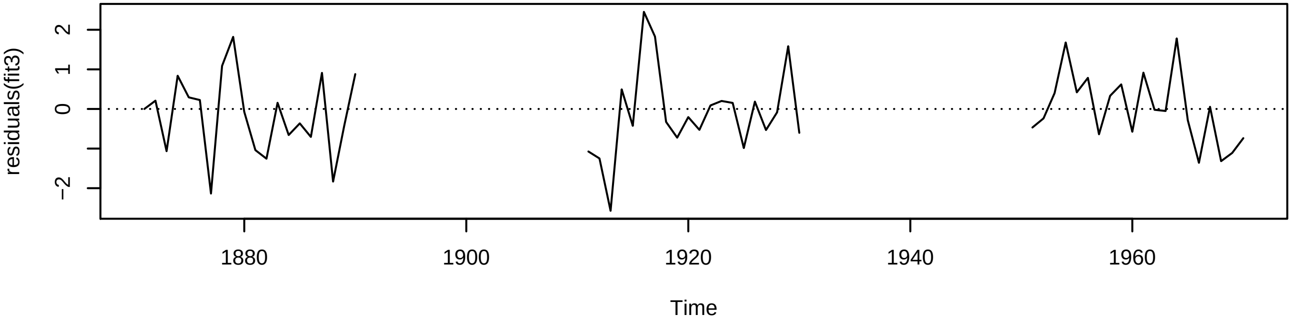
1400
1200
1000
800
600
NileNA
1880
1900
1920
1940
1960
Time
help("Nile")

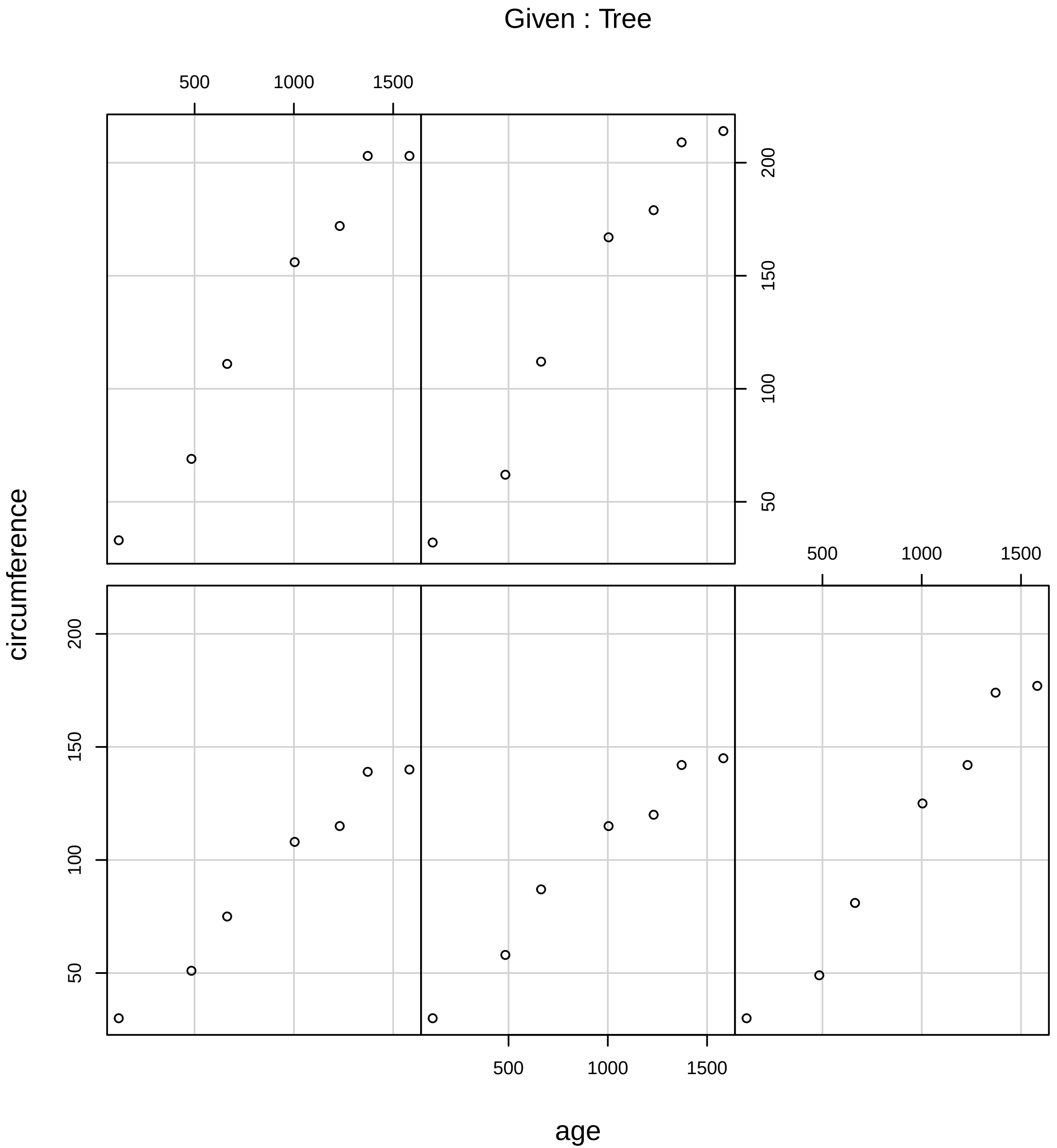

Nile
600
1000
1400
1880
1900
1920
1940
1960
Time
help("Nile")

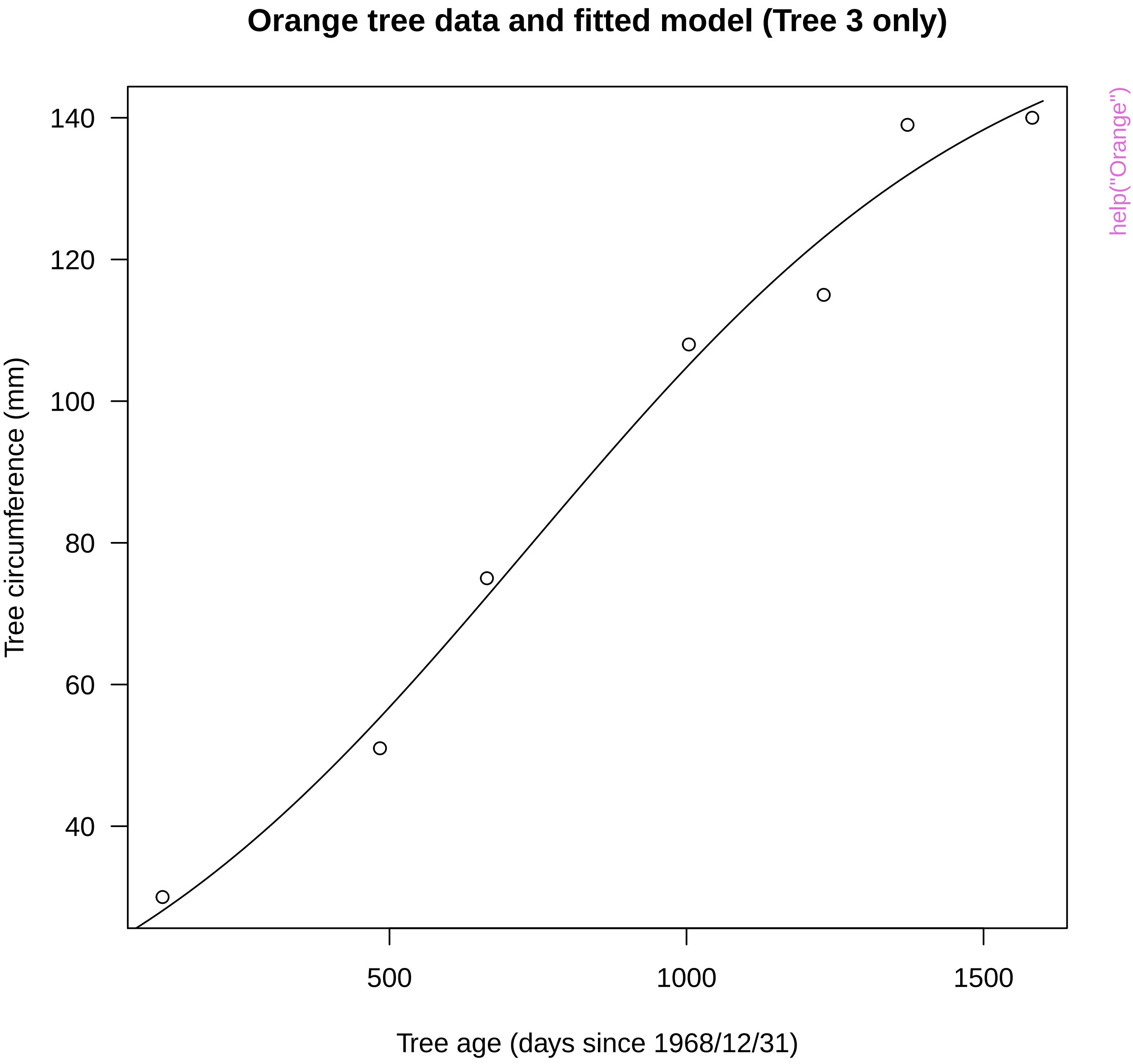

residuals(fit)
−3
−1
0
1
2
1880
1900
1920
1940
1960
Time


600
1000
1400
1880
1900
1920
1940
1960
1980
2000
Time

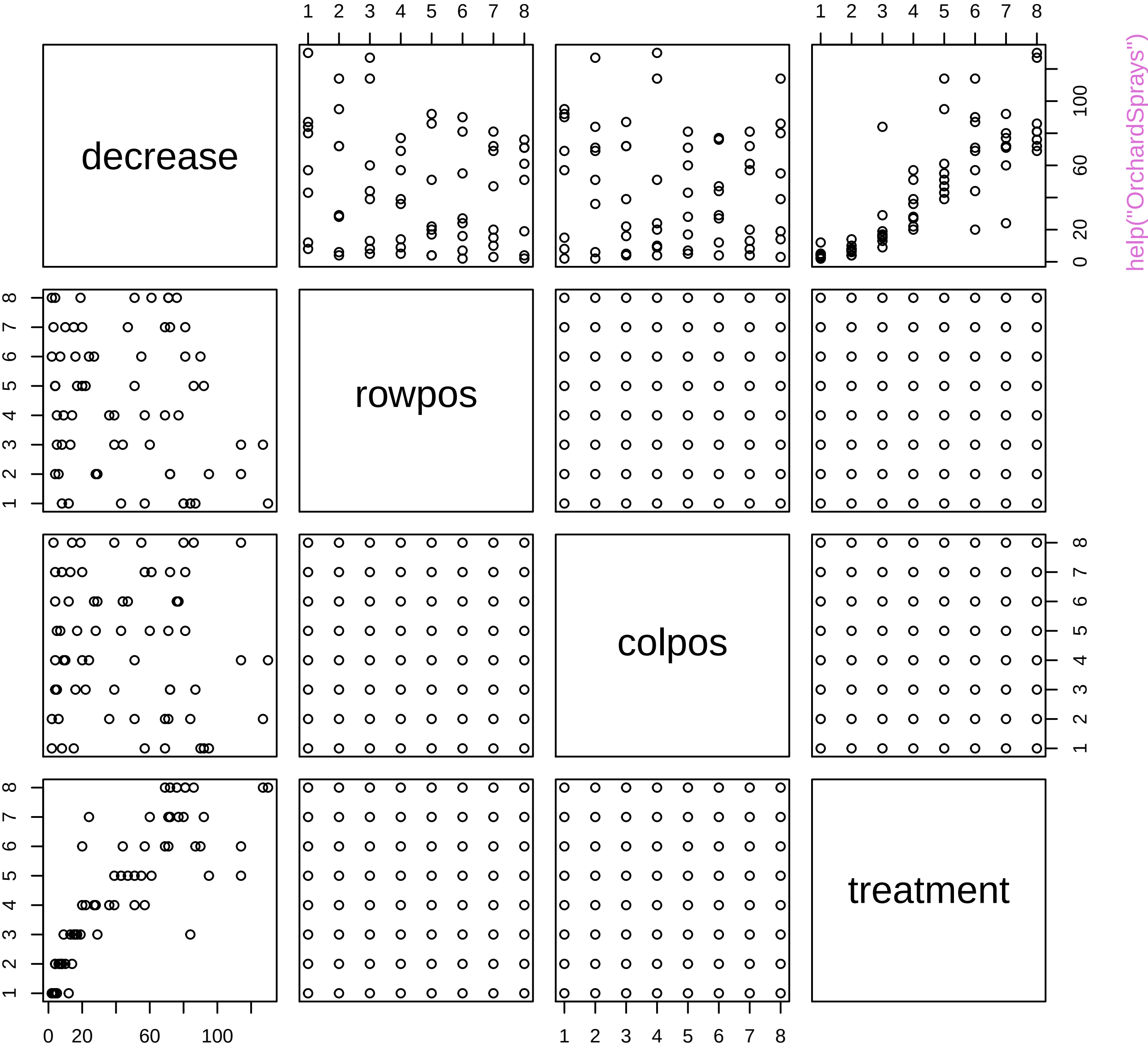

NileNA
600
1000
1400
1880
1900
1920
1940
1960
Time
help("Nile")

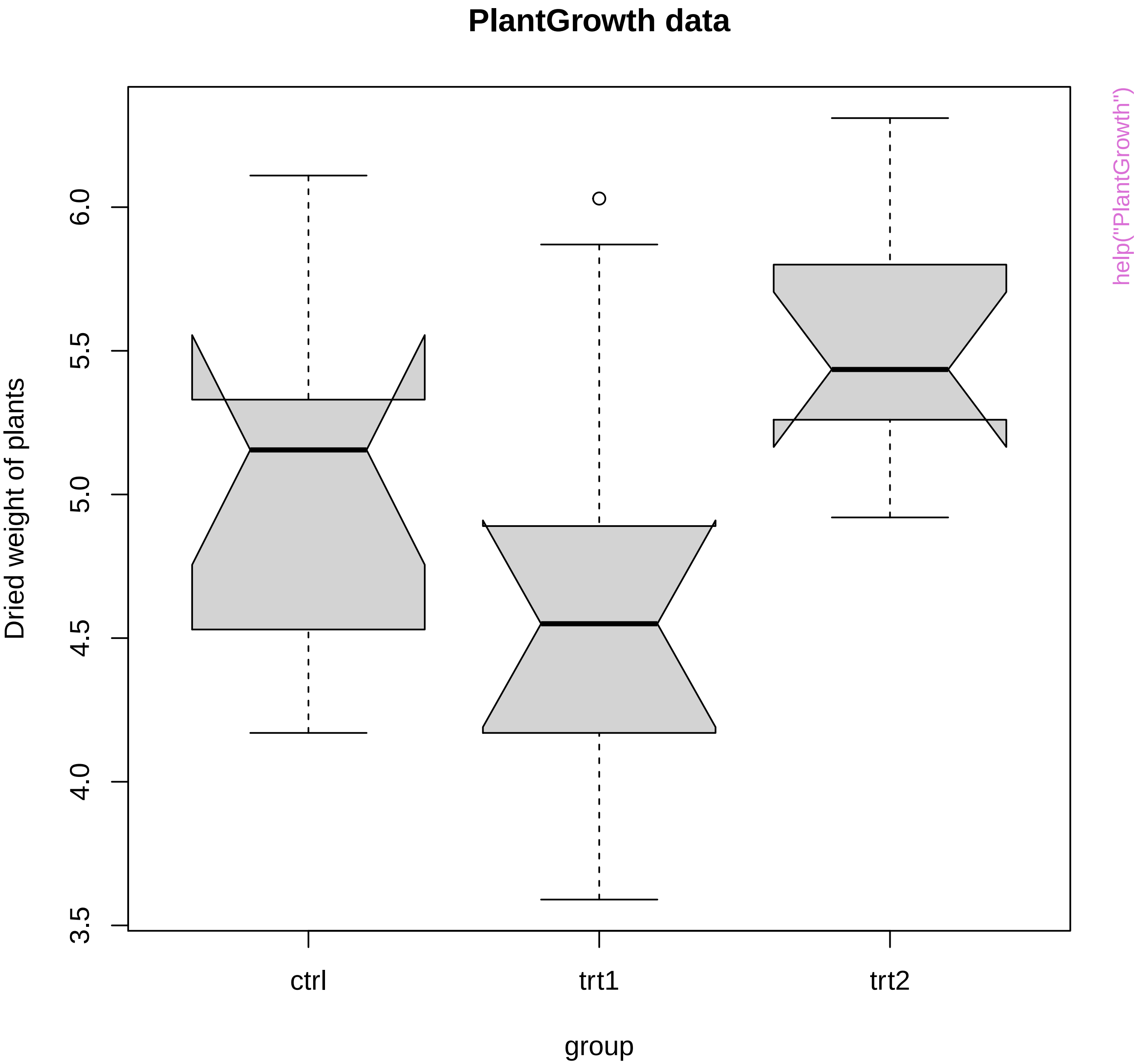

residuals(fit3)
−2
0
1
2
1880
1900
1920
1940
1960
Time


Given : Tree
500
1000
1500
200
150
100
50
circumference
age

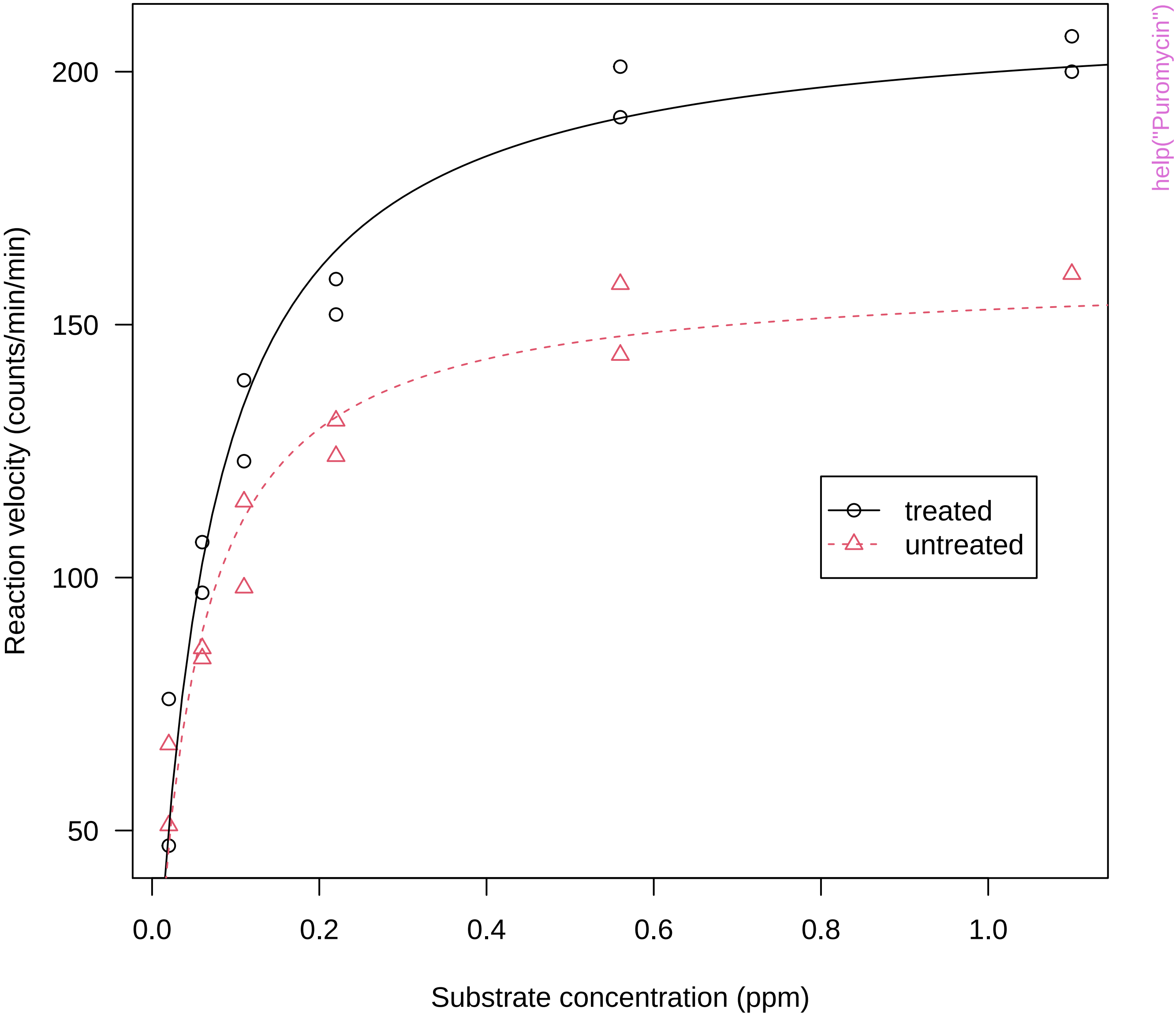

Orange tree data and fitted model (Tree 3 only)

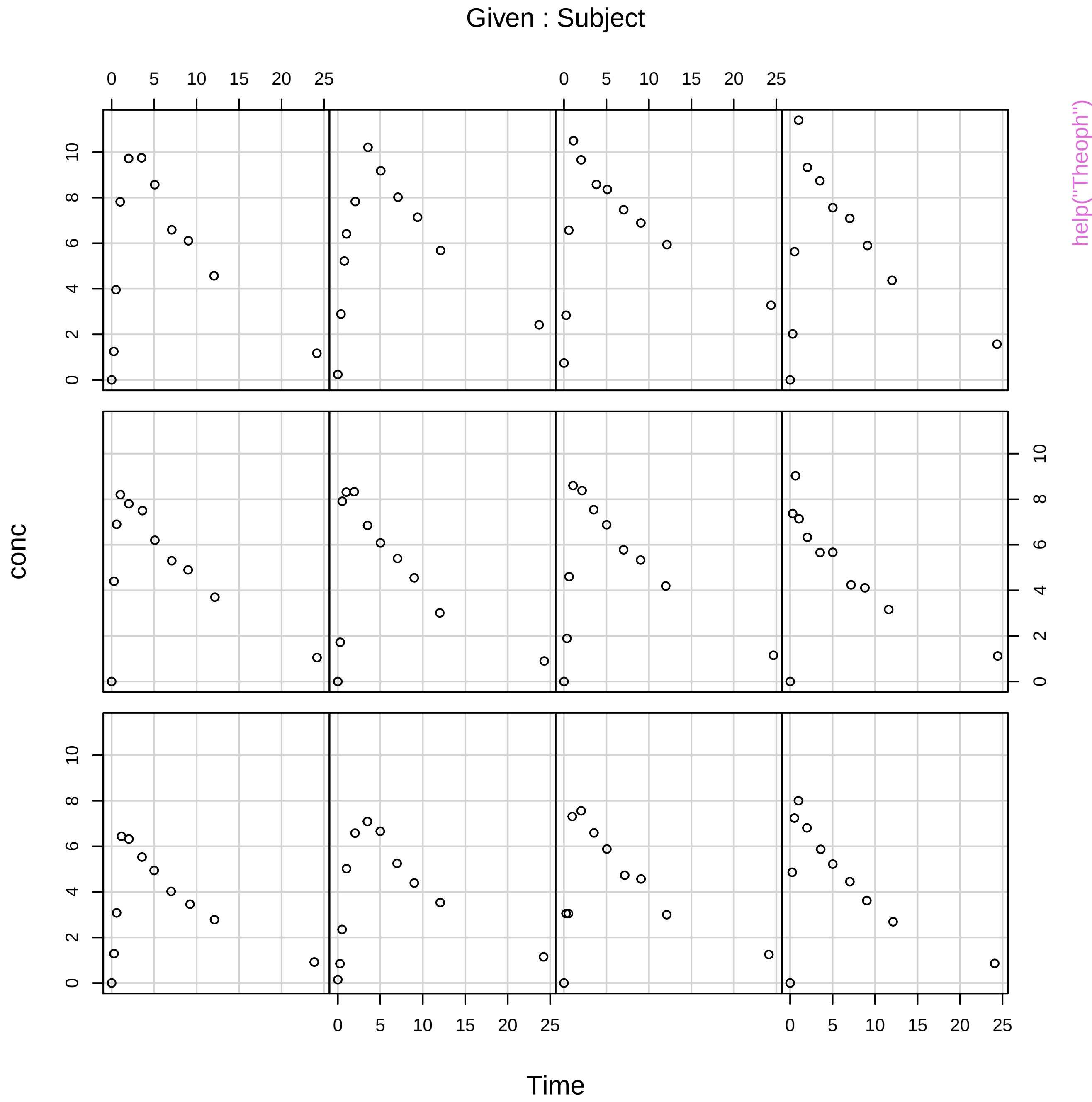
OrchardSprays data

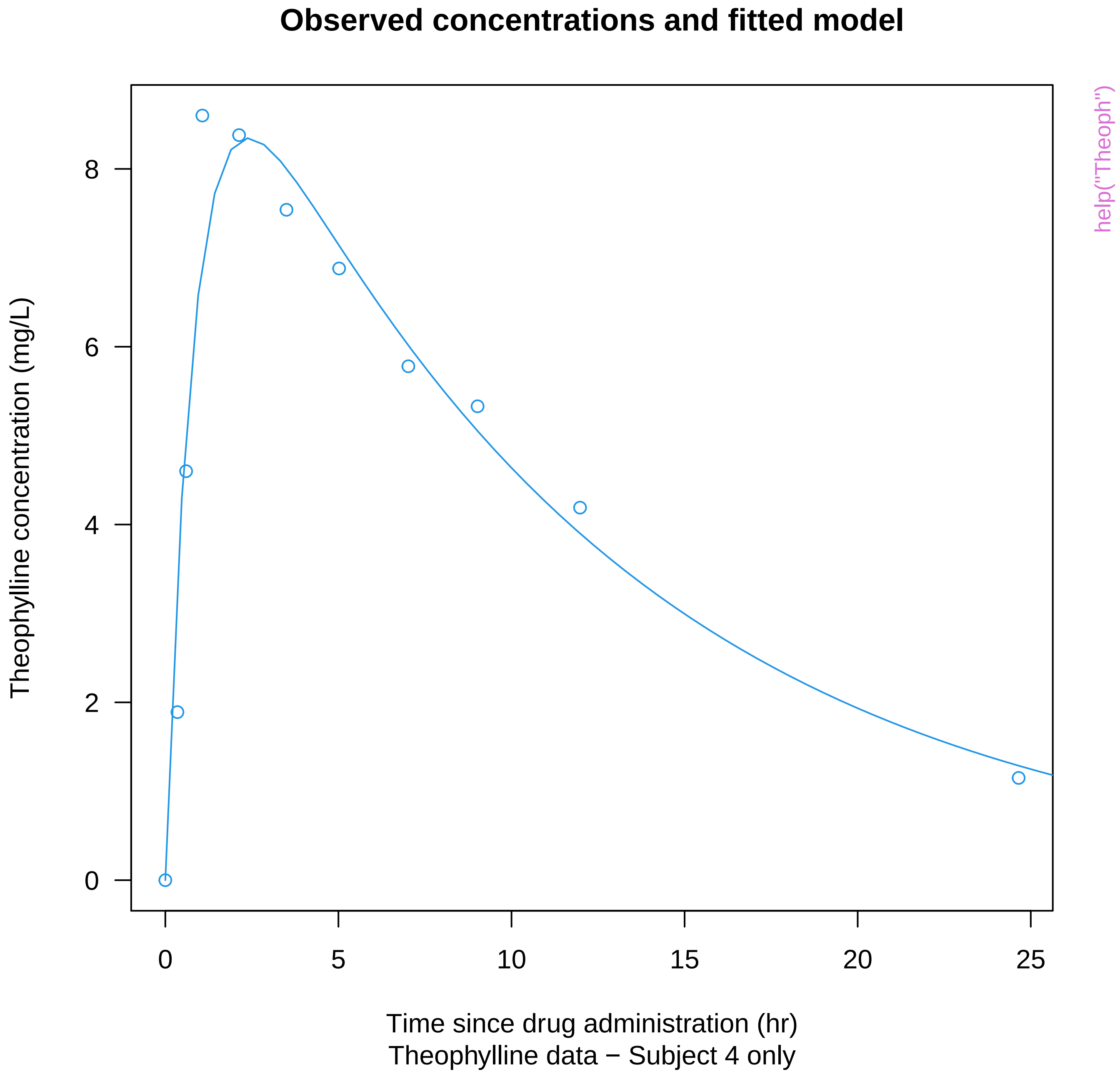


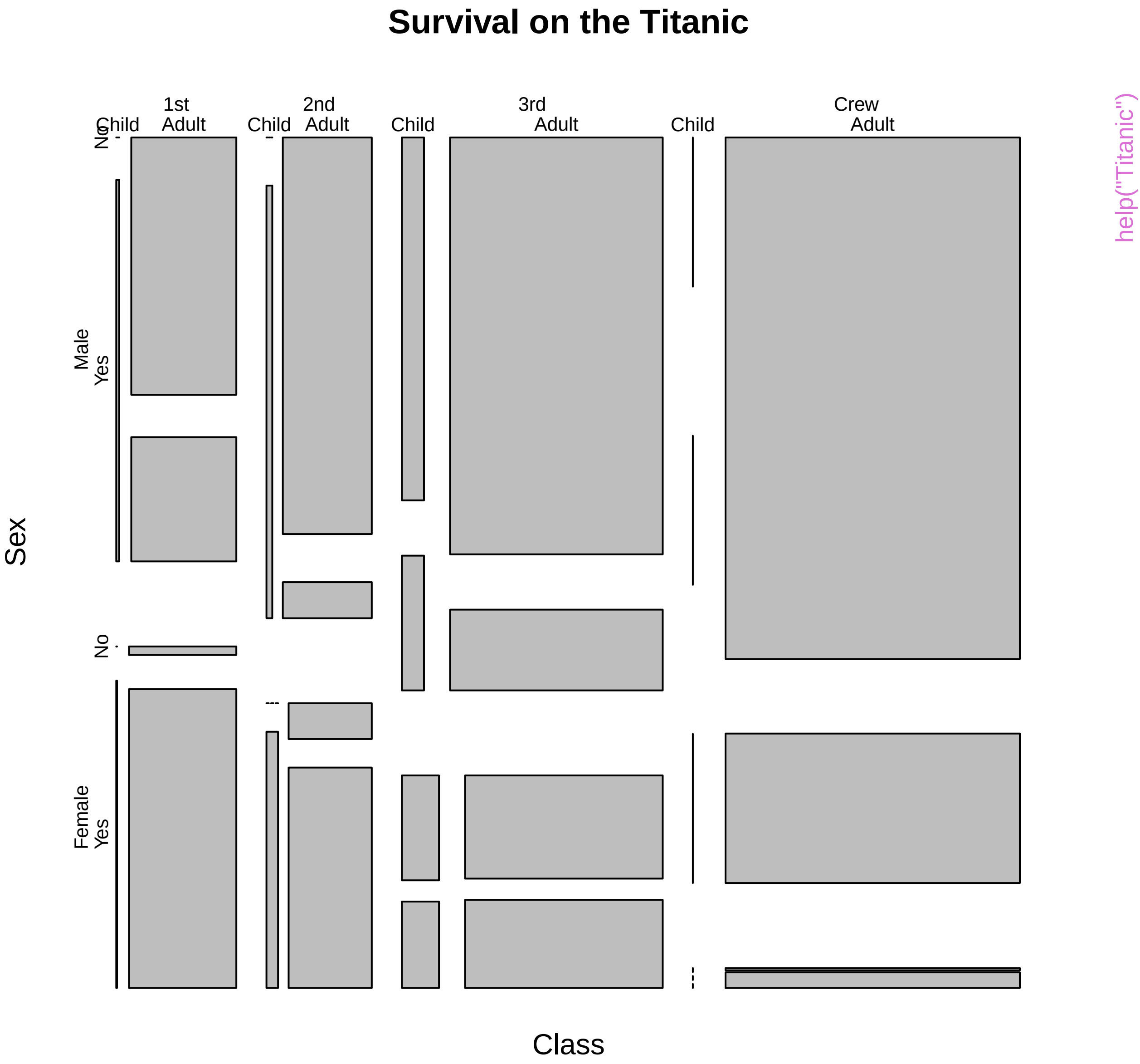

PlantGrowth data
Dried weight of plants
3.5
4.0
4.5
5.0
5.5
6.0
ctrl
trt1
trt2
group
help("PlantGrowth")

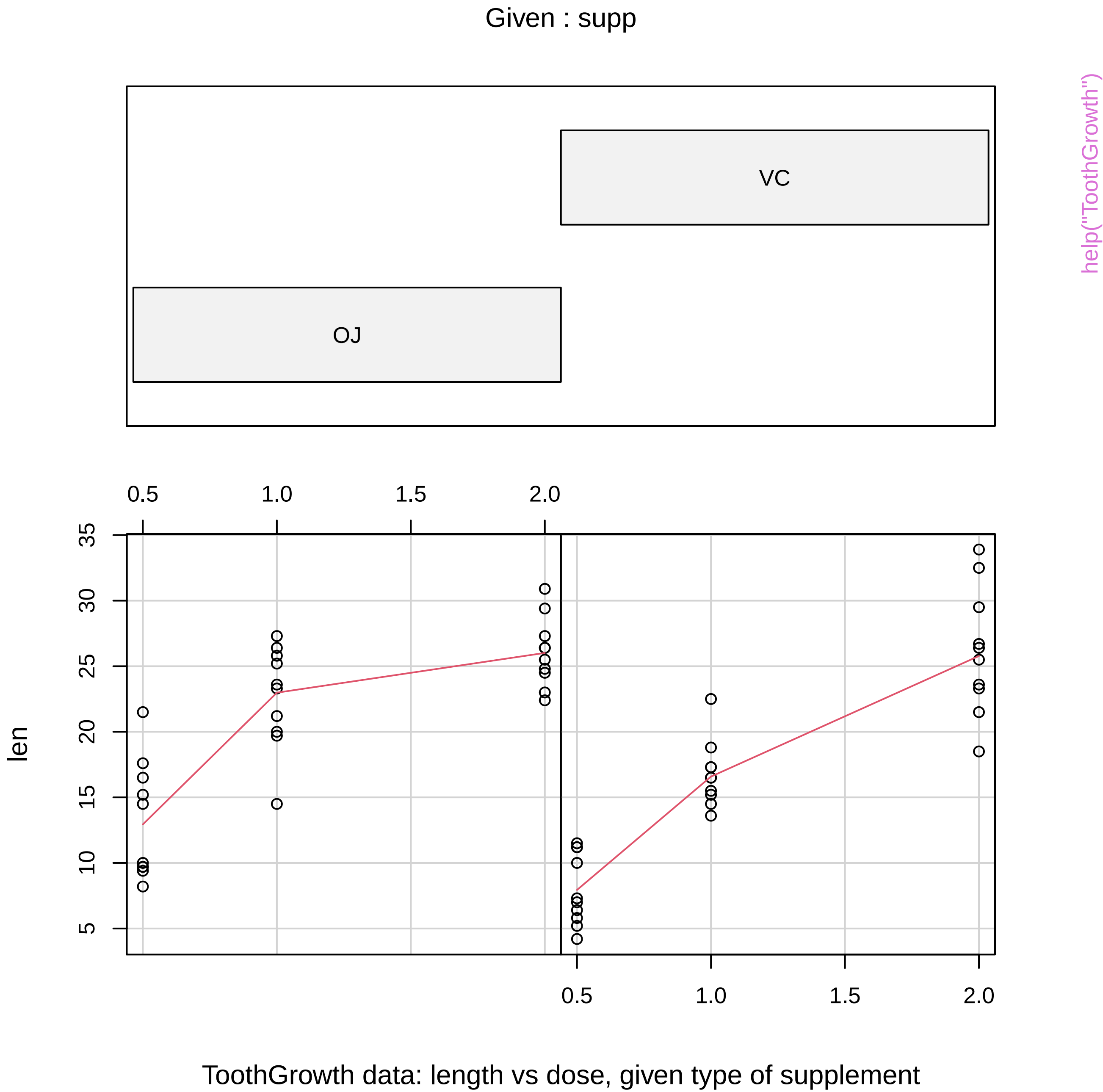
Puromycin data and fitted Michaelis−Menten curves



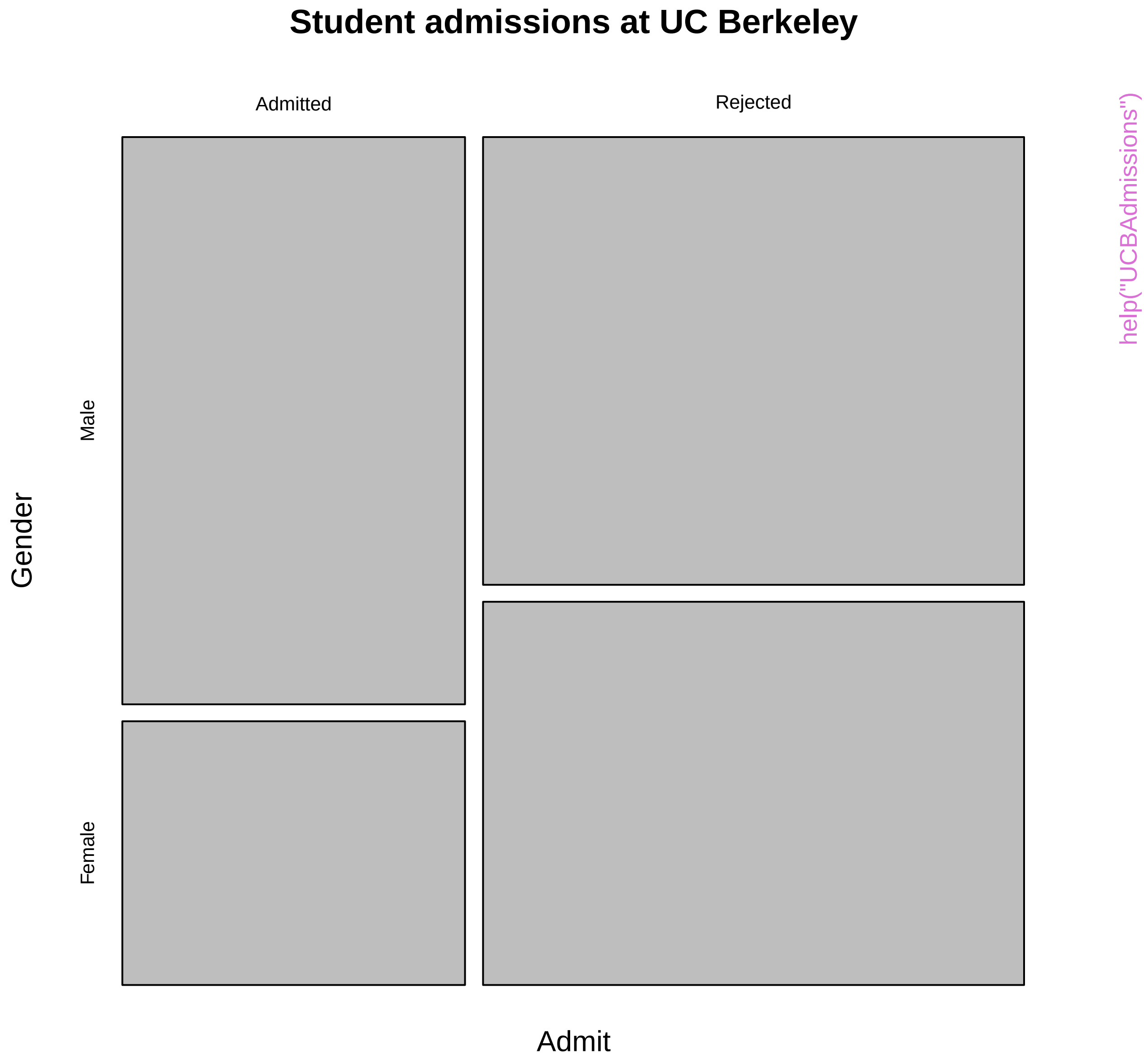

Given : Subject
0
5
10
15
20
25
conc
0
2
4
6
8
10
Time
help("Theoph")


Observed concentrations and fitted model
Theophylline concentration (mg/L)
0
2
4
6
8
0
5
10
15
20
25
Time since drug administration (hr)
Theophylline data − Subject 4 only
help("Theoph")


Survival on the Titanic
1st
2nd
3rd
Crew
Child
Adult
Child
Adult
Child
Adult
Child
Adult
No
Male
Yes
No
Female
Yes
Sex
Class
help("Titanic")

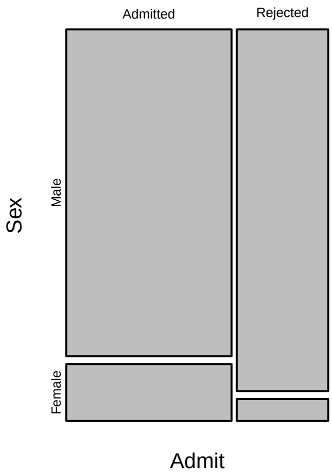


ToothGrowth data: length vs dose, given type of supplement

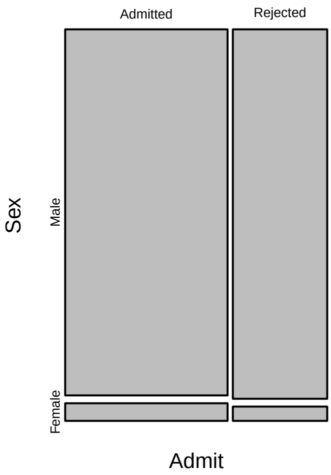

Student admissions at UC Berkeley
Admitted
Rejected
Gender
Male
Female
Admit
help("UCBAdmissions")

Student admissions at UC Berkeley

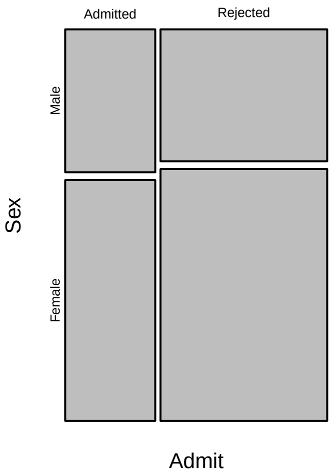
Department A



Department B

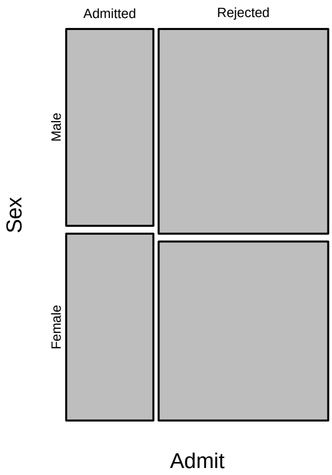


Department C

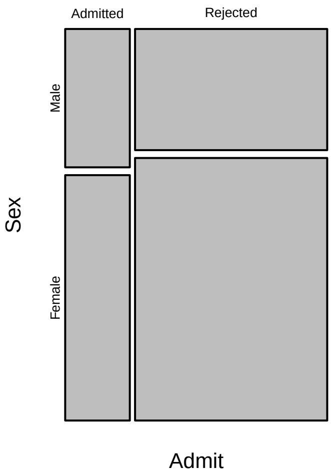


help("UCBAdmissions")

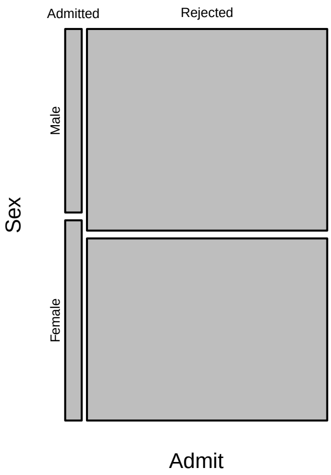
Department D

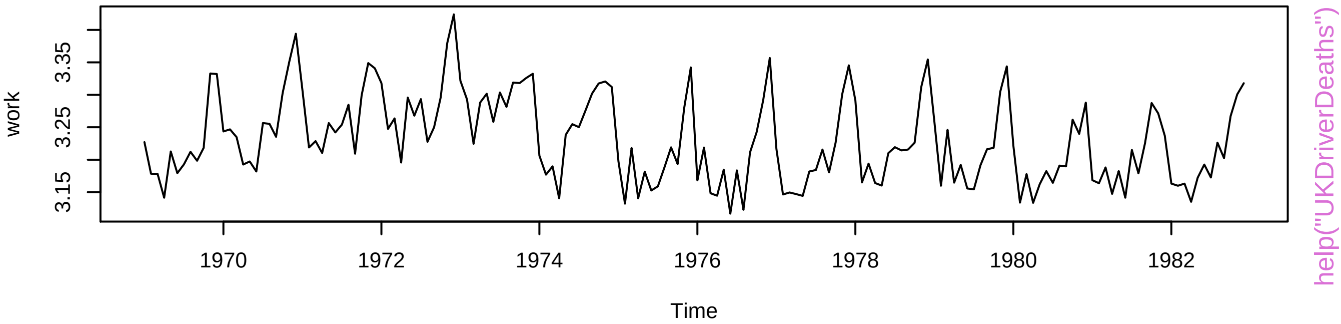


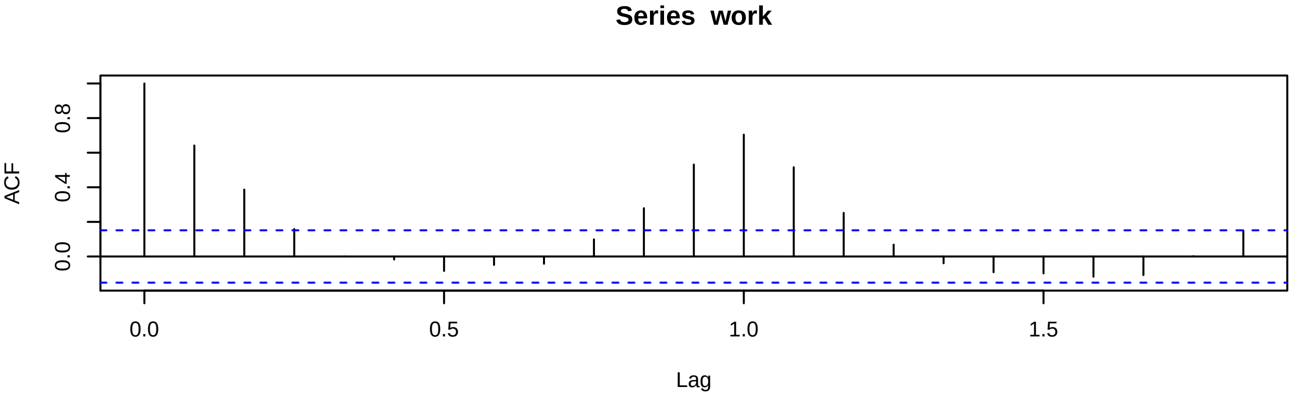
Department E

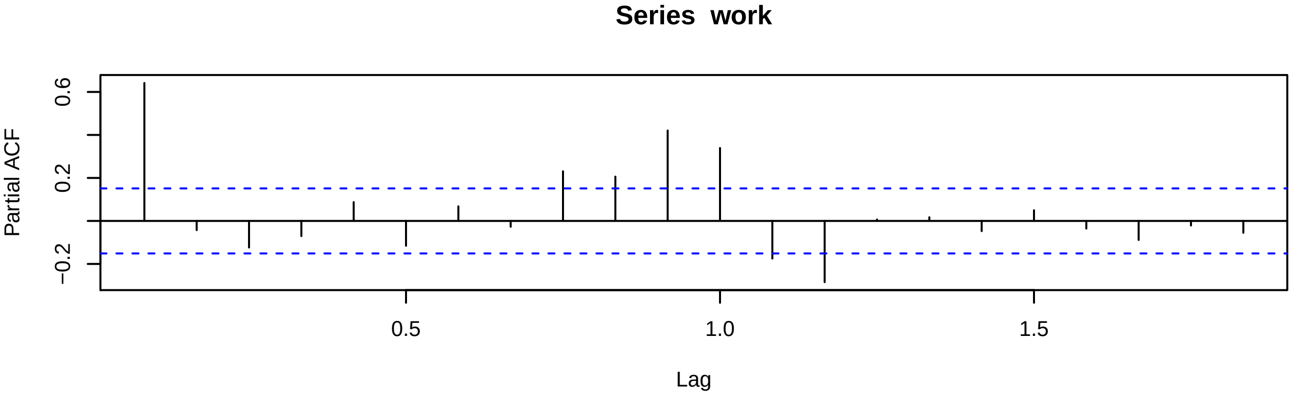


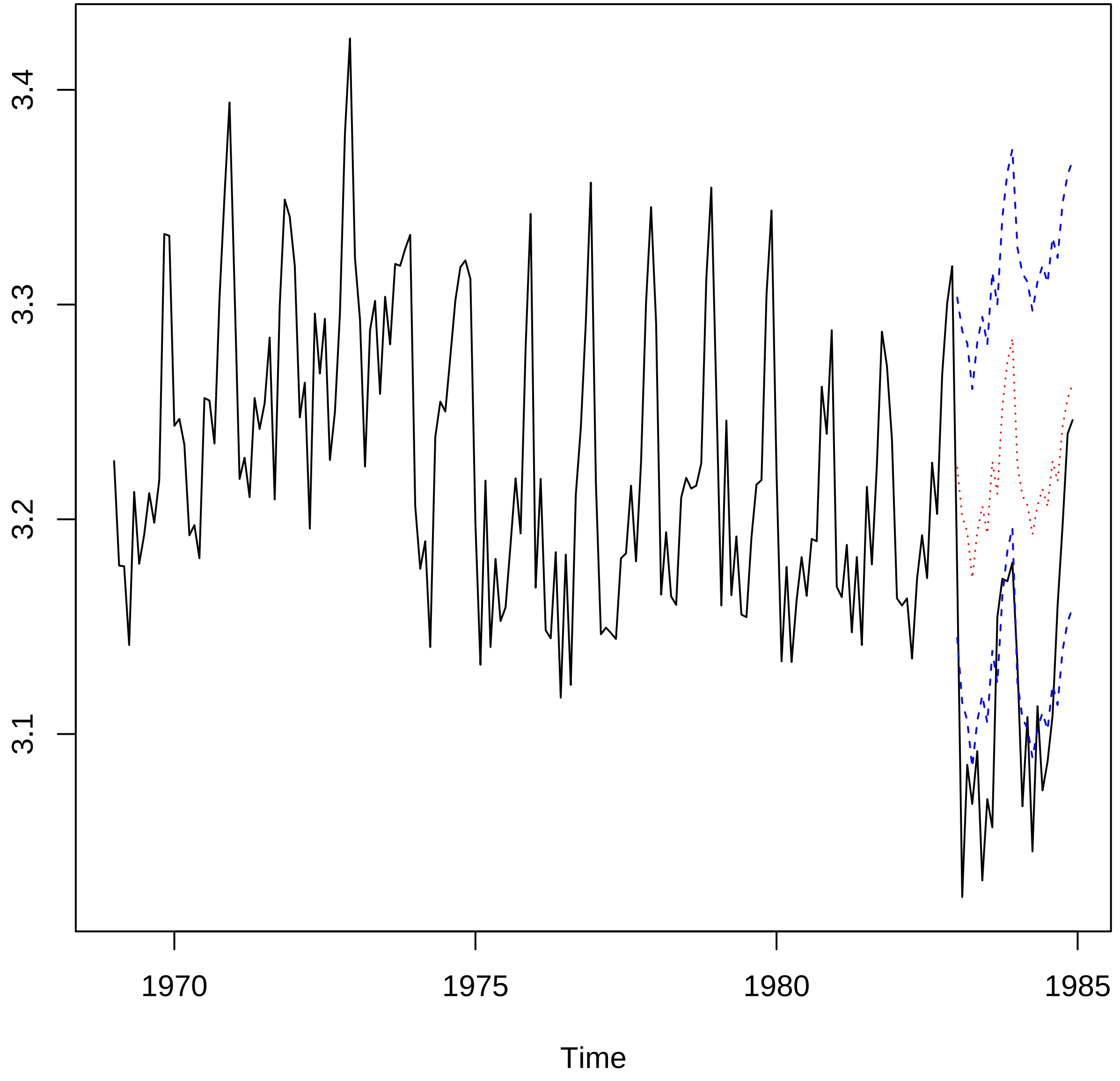
Department F



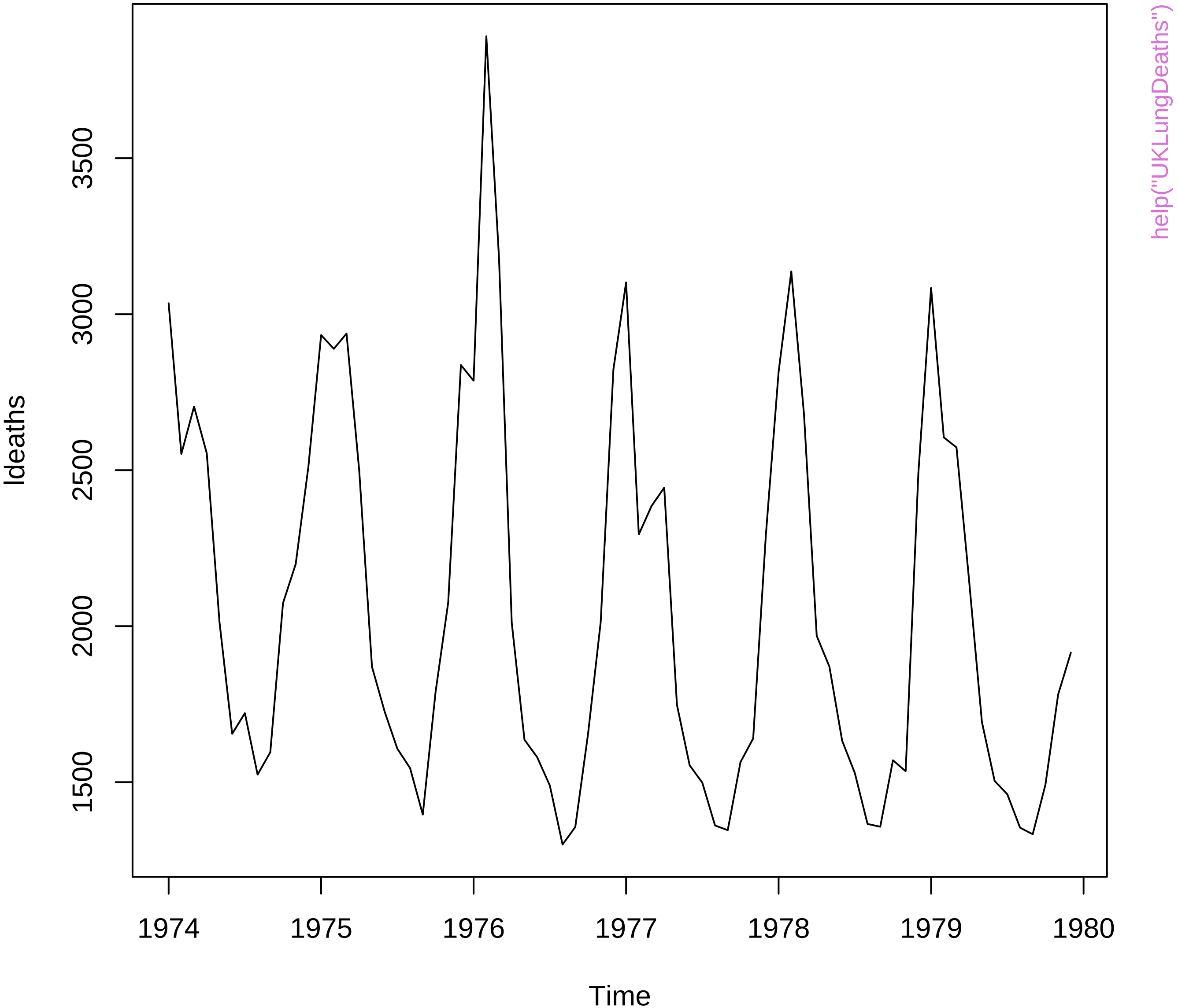

work
3.15
3.25
3.35
1970
1972
1974
1976
1978
1980
1982
Time
help("UKDriverDeaths")


Series work
ACF
0.0
0.4
0.8
0.0
0.5
1.0
1.5
Lag

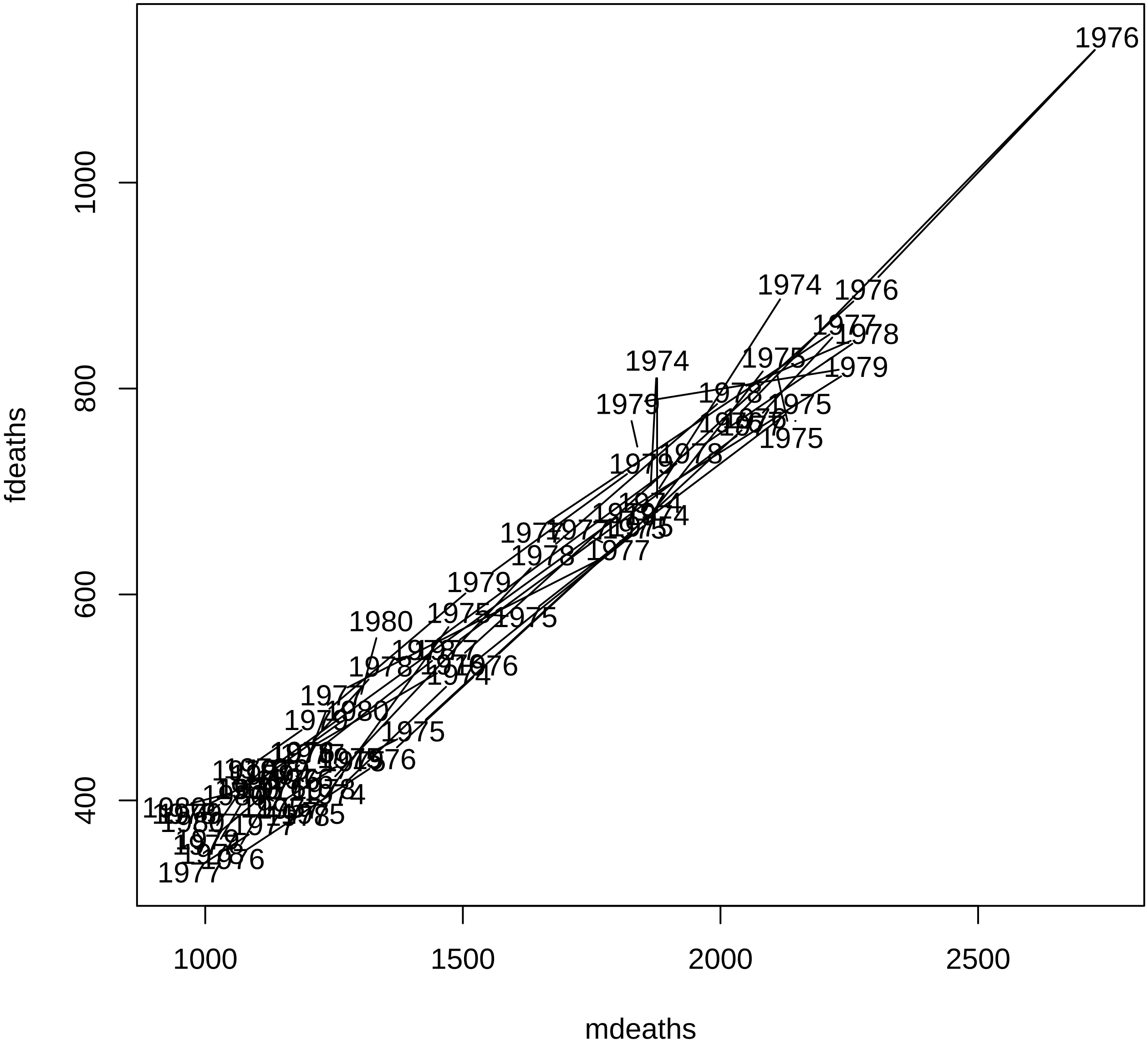

Series work
Partial ACF
−0.2
0.2
0.6
0.5
1.0
1.5
Lag



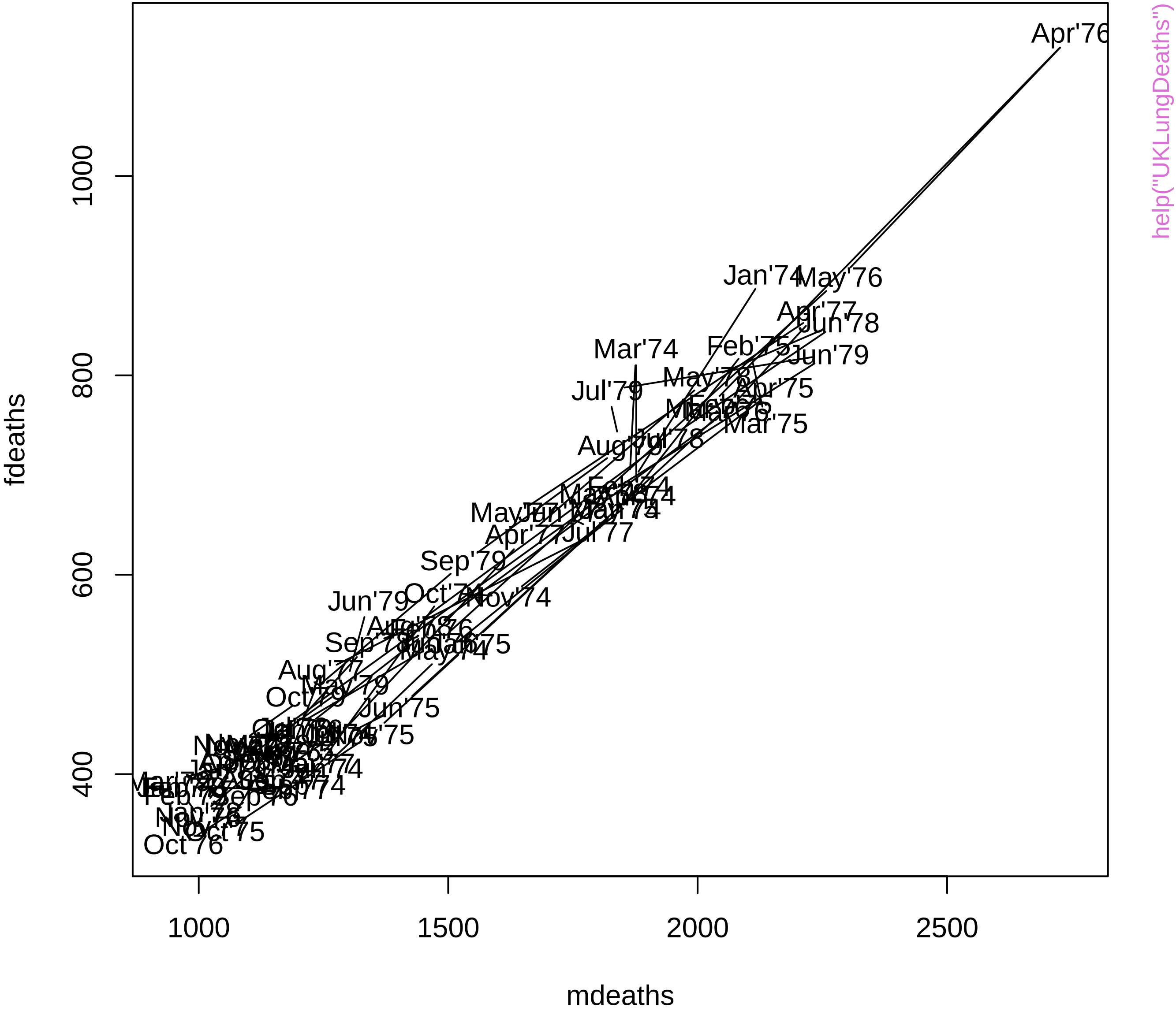
help("UKDriverDeaths")



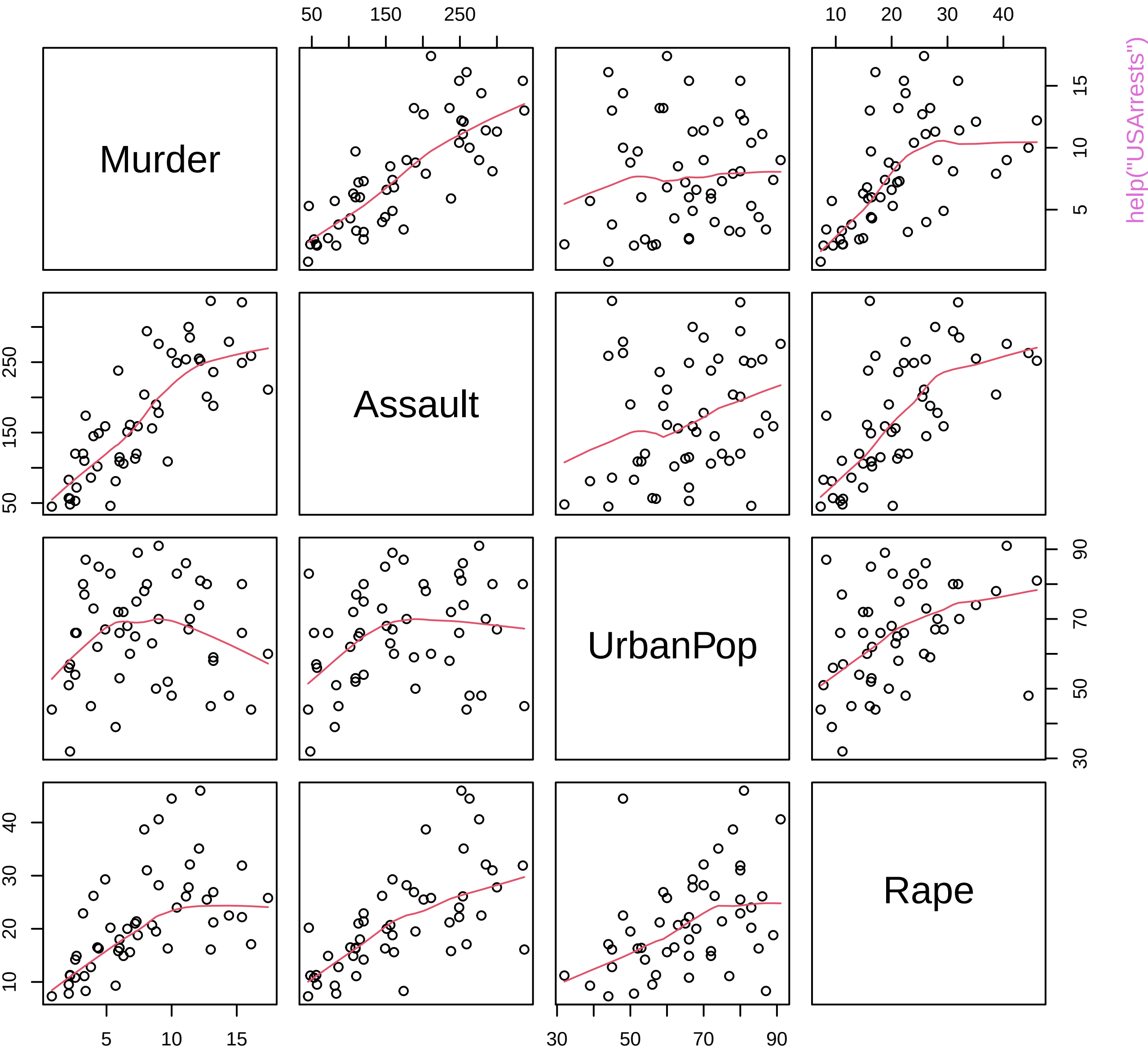
ldeaths
1500
2000
2500
3000
3500
1974
1975
1976
1977
1978
1979
1980
Time
help("UKLungDeaths")



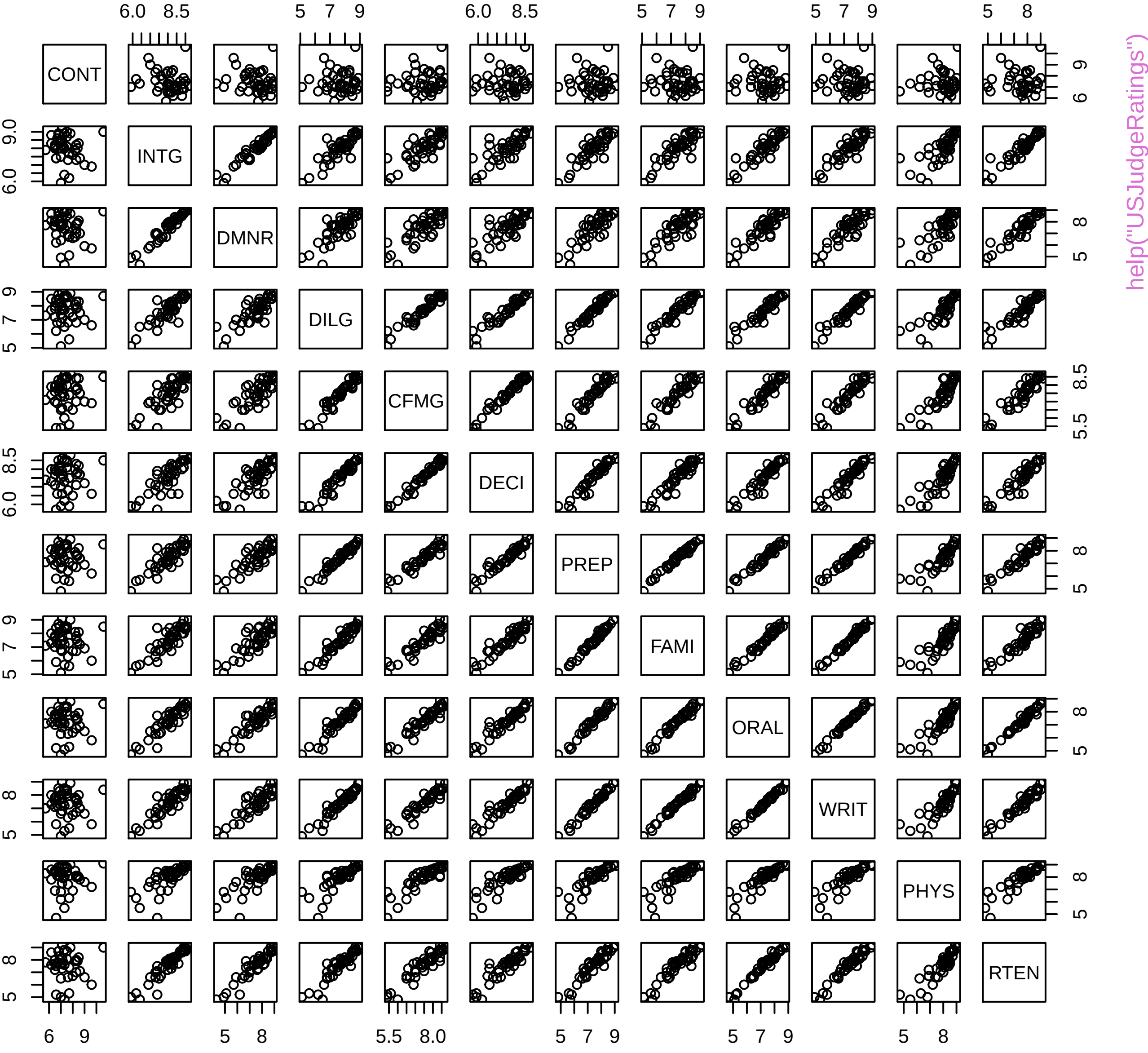
help("UKLungDeaths")

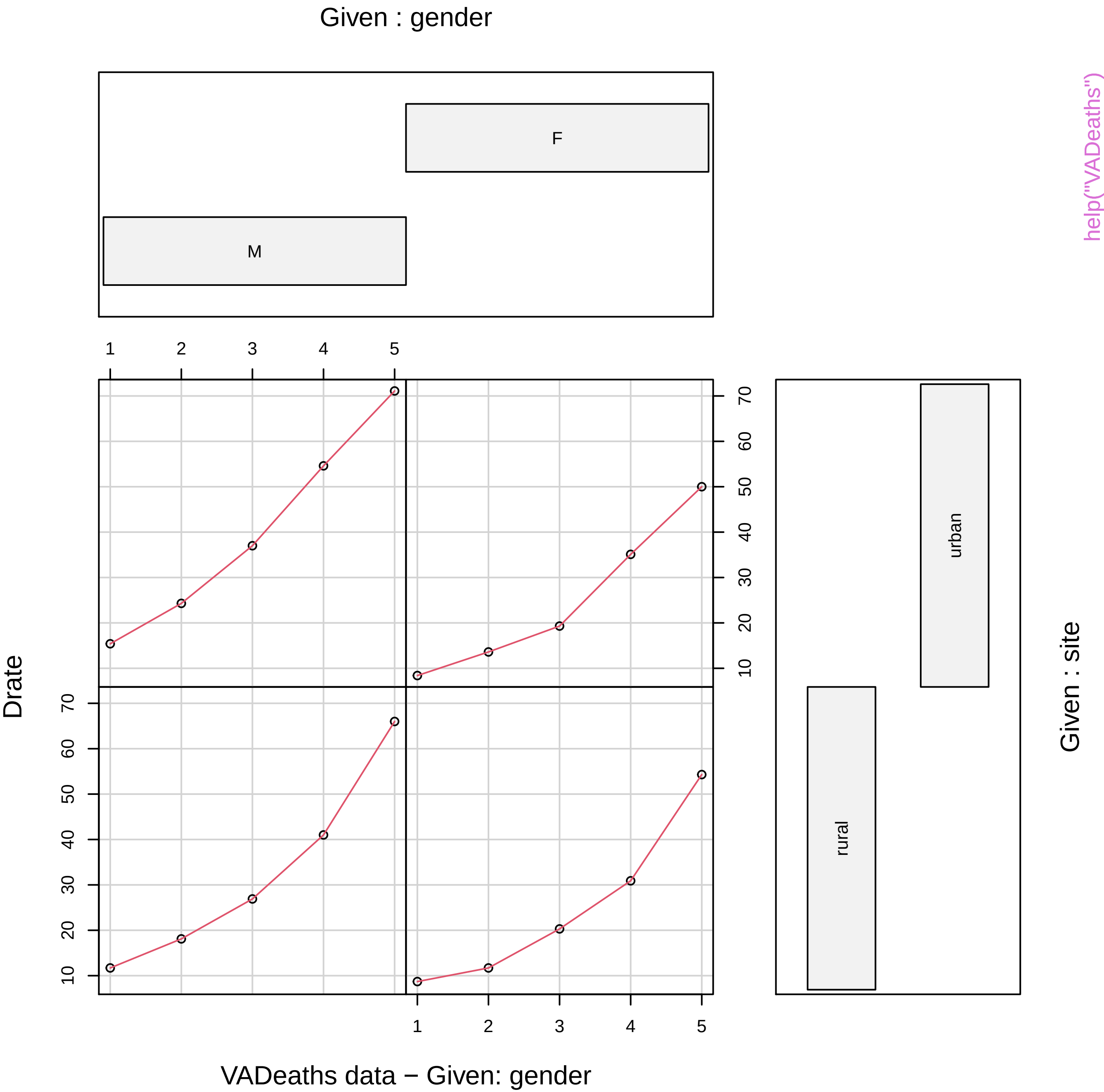

help("UKLungDeaths")
fdeaths
mdeaths
1000
800
600
400
1000
1500
2000
2500
Apr'76
Jan'74
May'76
Apr'77
Jun'78
Feb'75
Jun'79
Mar'74
May'78
Apr'75
Jul'79
Mar'75
Aug'79
Jul'78
Feb'74
May'74
Apr'77
Jul'77
Sep'79
Oct'74
Nov'74
Jun'79
Sep'78
May'74
Aug'77
May'79
Oct'79
Jun'75
Oct'75
Oct'76

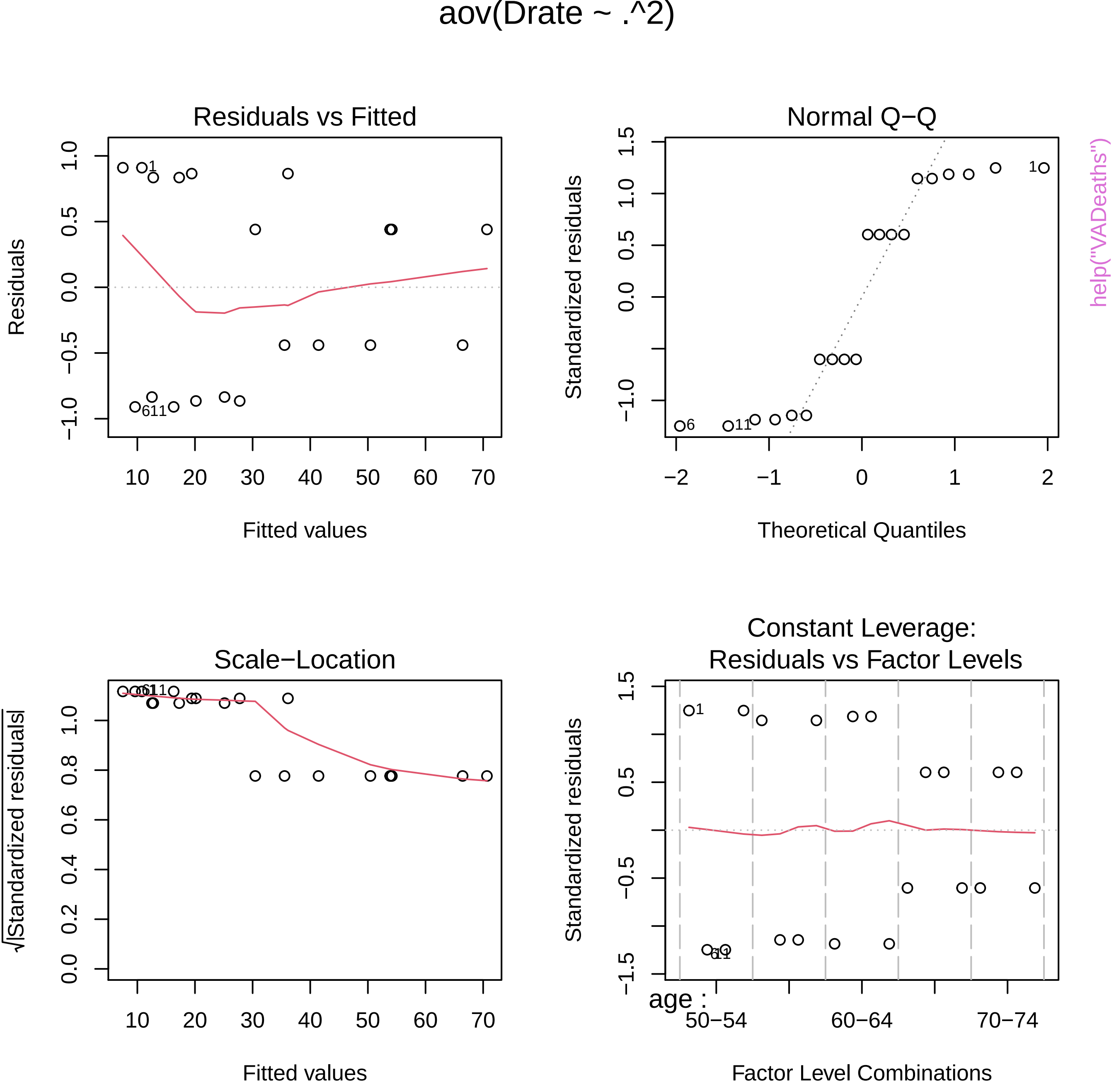
USArrests data

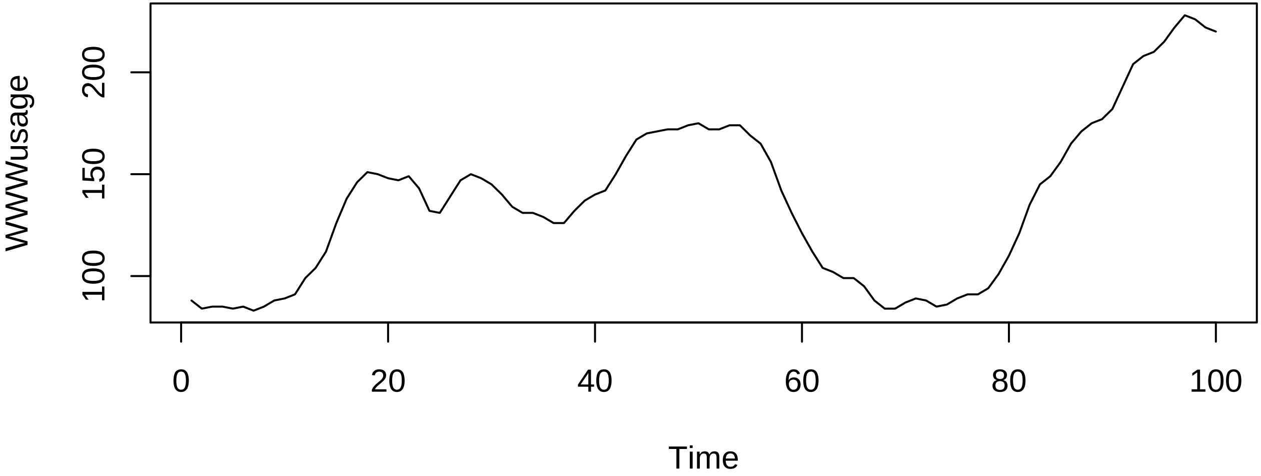


USJudgeRatings data

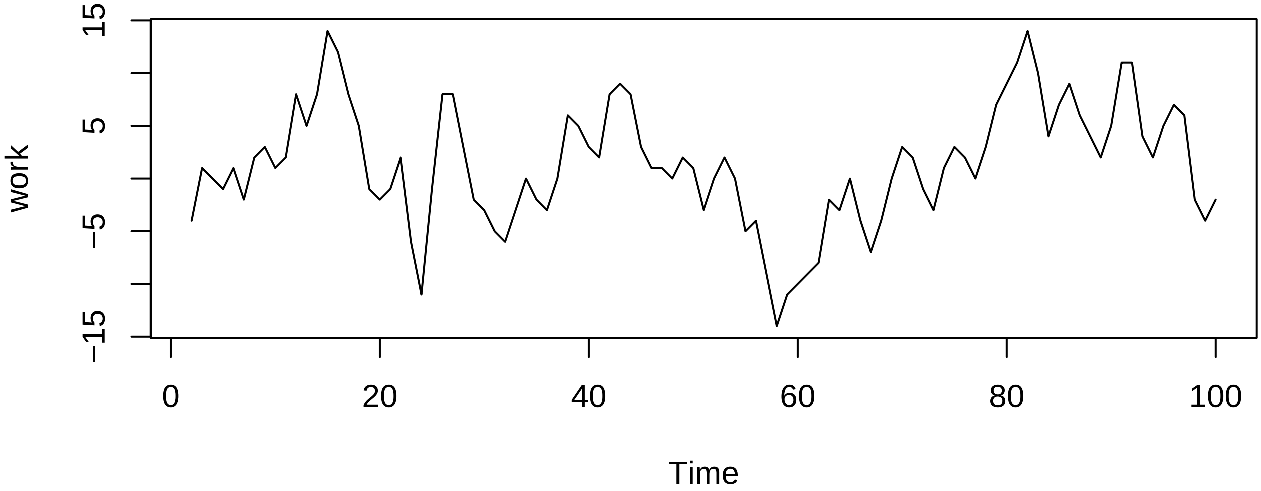


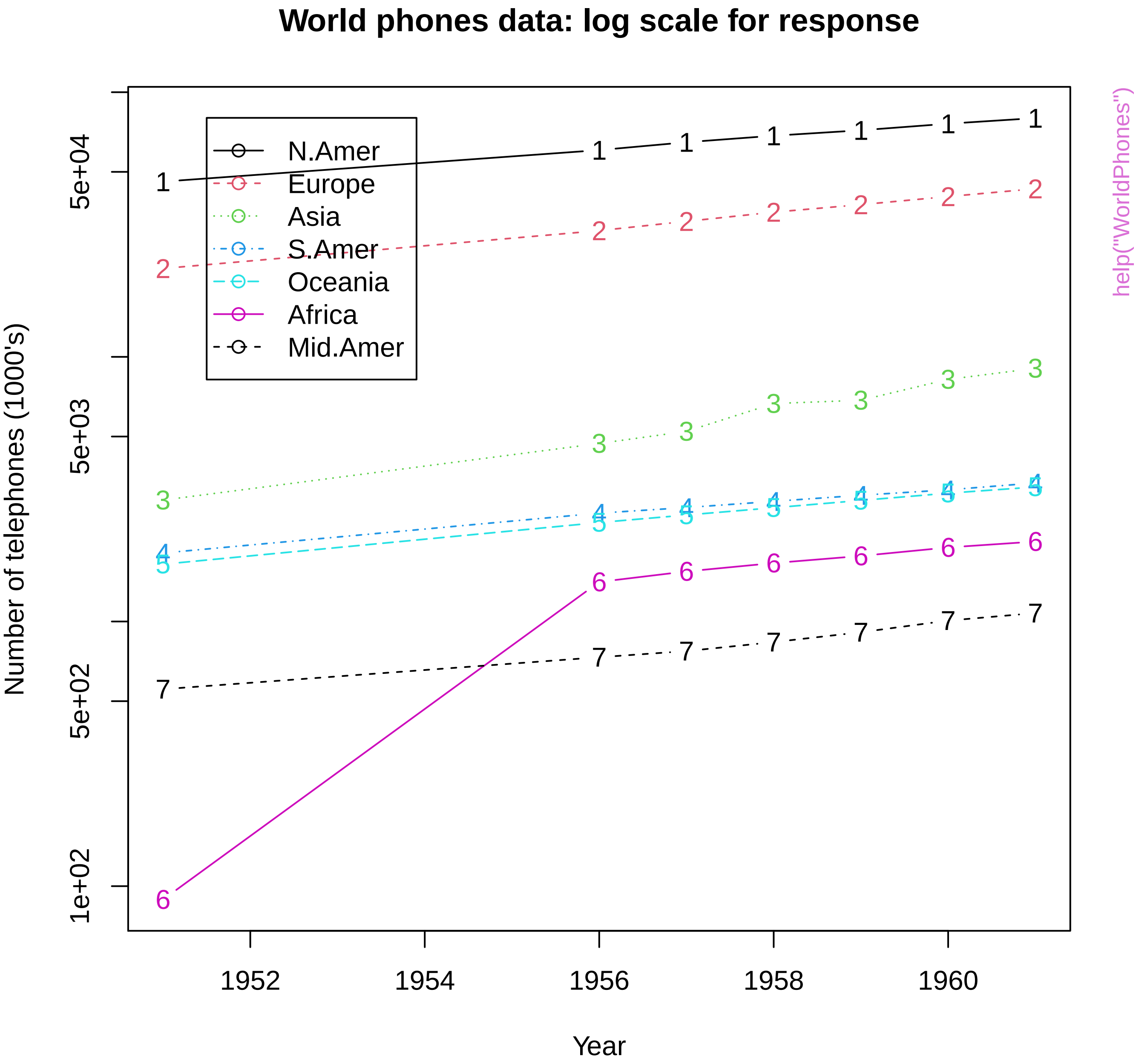

Given : gender
F
M
1
2
3
4
5
Drate
10
20
30
40
50
60
70
urban
rural
Given : site
help("VADeaths")
VADeaths data − Given: gender

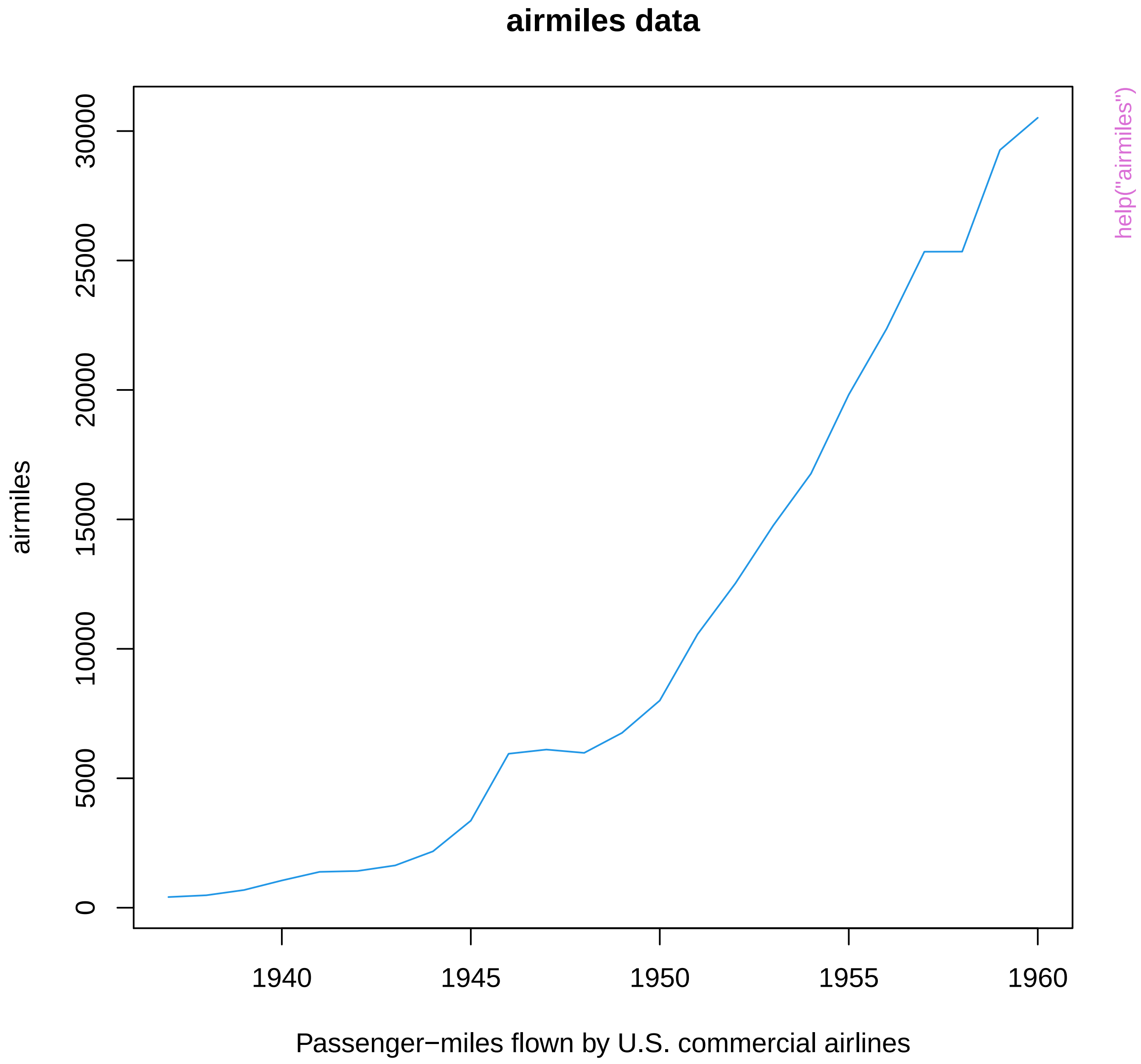

aov(Drate ~ .^2)
Residuals vs Fitted
Residuals
Fitted values
1.0
0.5
0.0
−0.5
−1.0
10
20
30
40
50
60
70
1
611
Normal Q−Q
Standardized residuals
Theoretical Quantiles
1.5
1.0
0.5
0.0
−1.0
−2
−1
0
1
2
6
11
10
help("VADeaths")
Scale−Location
√|Standardized residuals|
Fitted values
0.0
0.2
0.4
0.6
0.8
1.0
611
Constant Leverage:
Residuals vs Factor Levels
Standardized residuals
Factor Level Combinations
age :
50−54
60−64
70−74
1.5
0.5
−0.5
−1.5
1
611



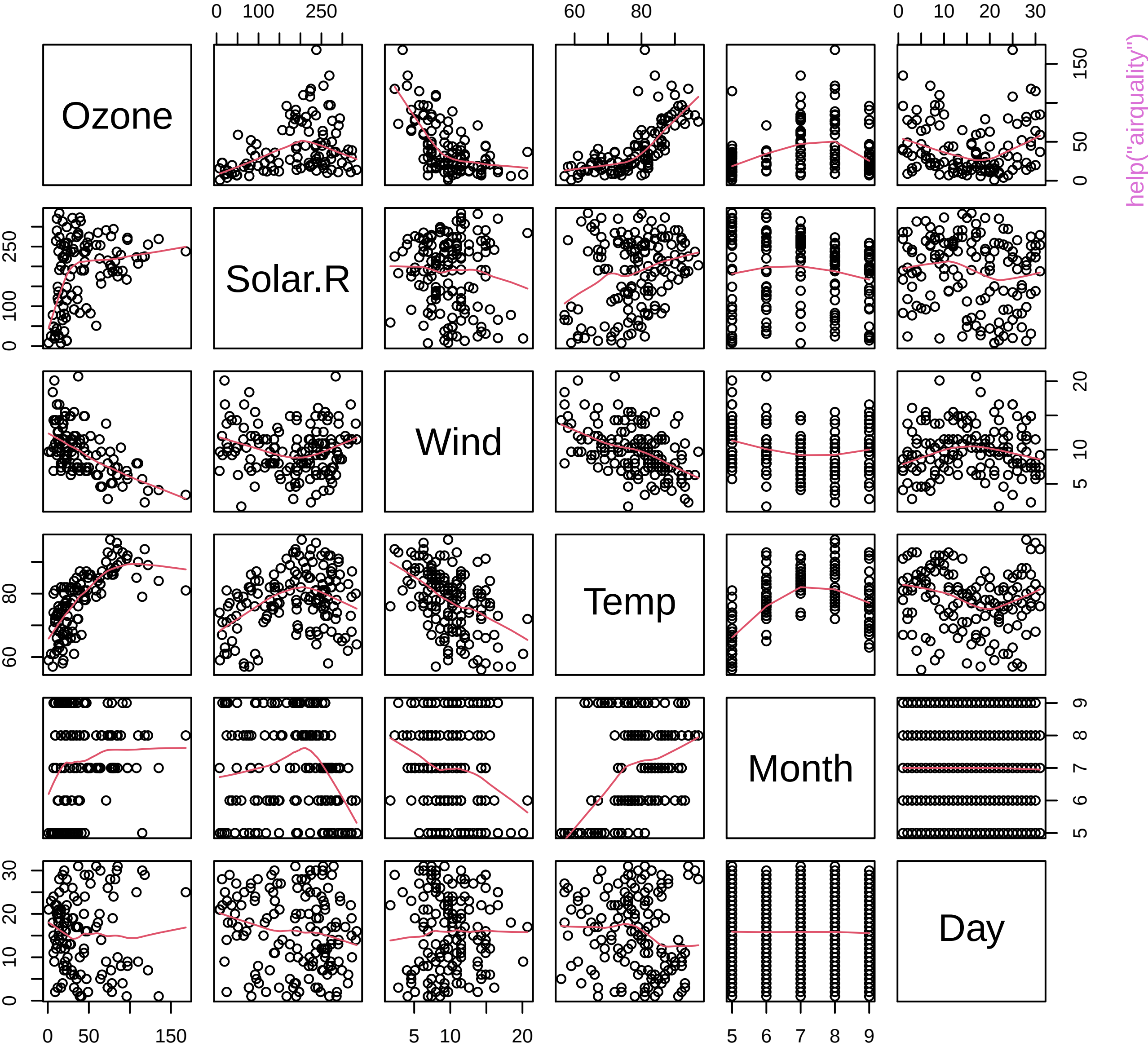
help("WWWusage")

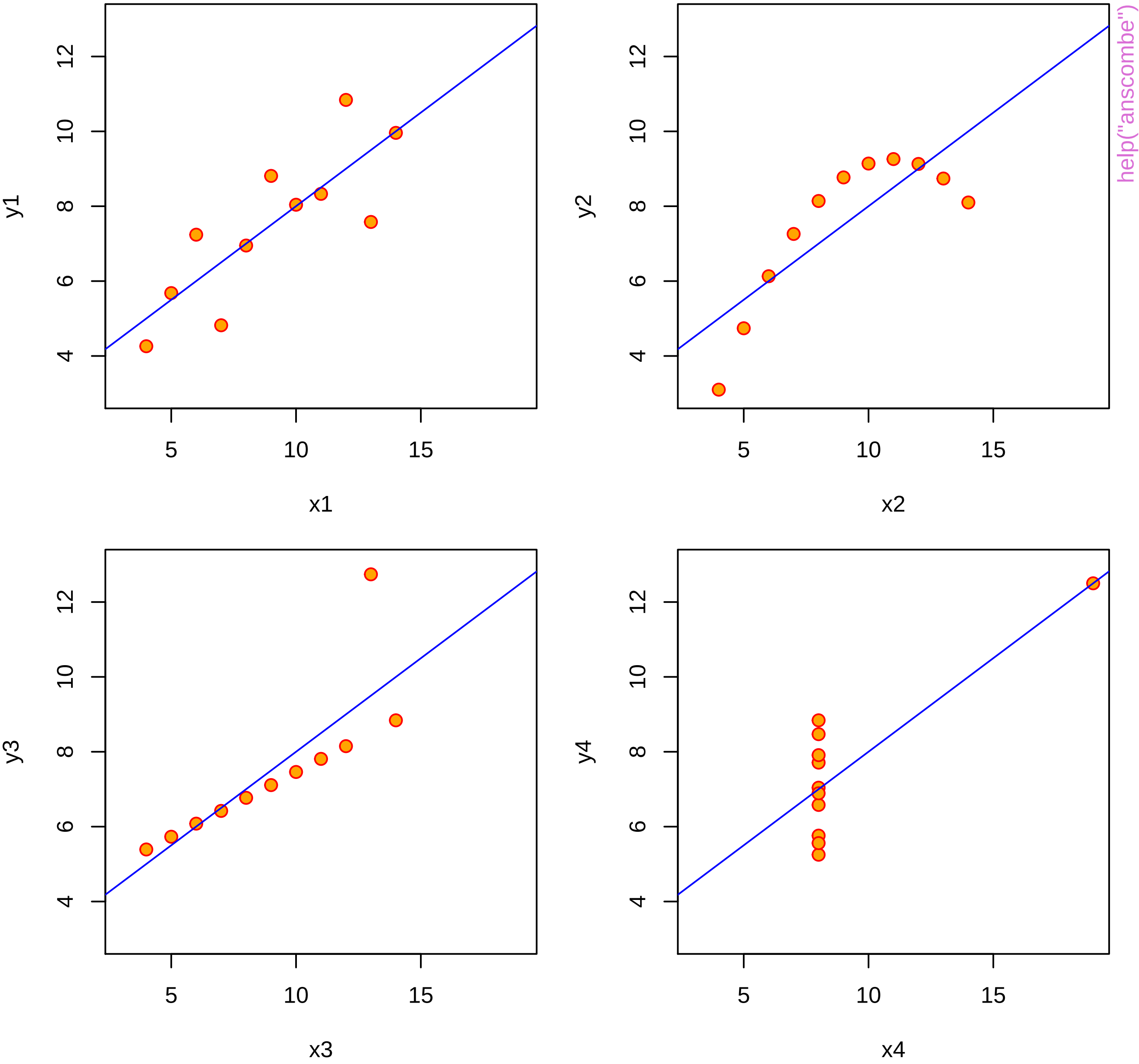



World phones data: log scale for response
Number of telephones (1000's)
5e+04
5e+03
5e+02
1e+02
Year
1952
1954
1956
1958
1960
N.Amer
Europe
Asia
S.Amer
Oceania
Africa
Mid.Amer
help("WorldPhones")

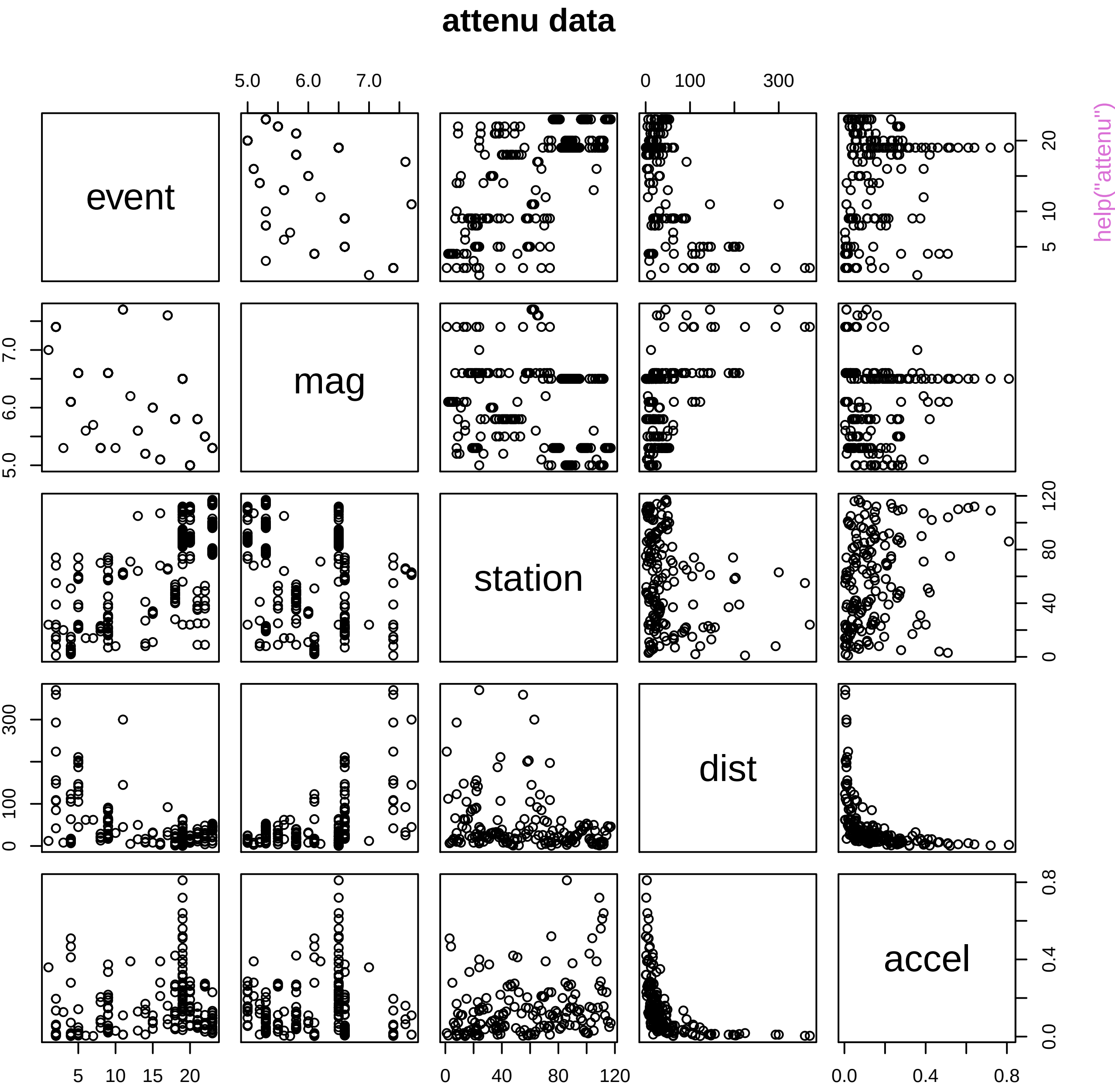

airmiles data
airmiles
0
5000
10000
15000
20000
25000
30000
1940
1945
1950
1955
1960
Passenger−miles flown by U.S. commercial airlines
help("airmiles")

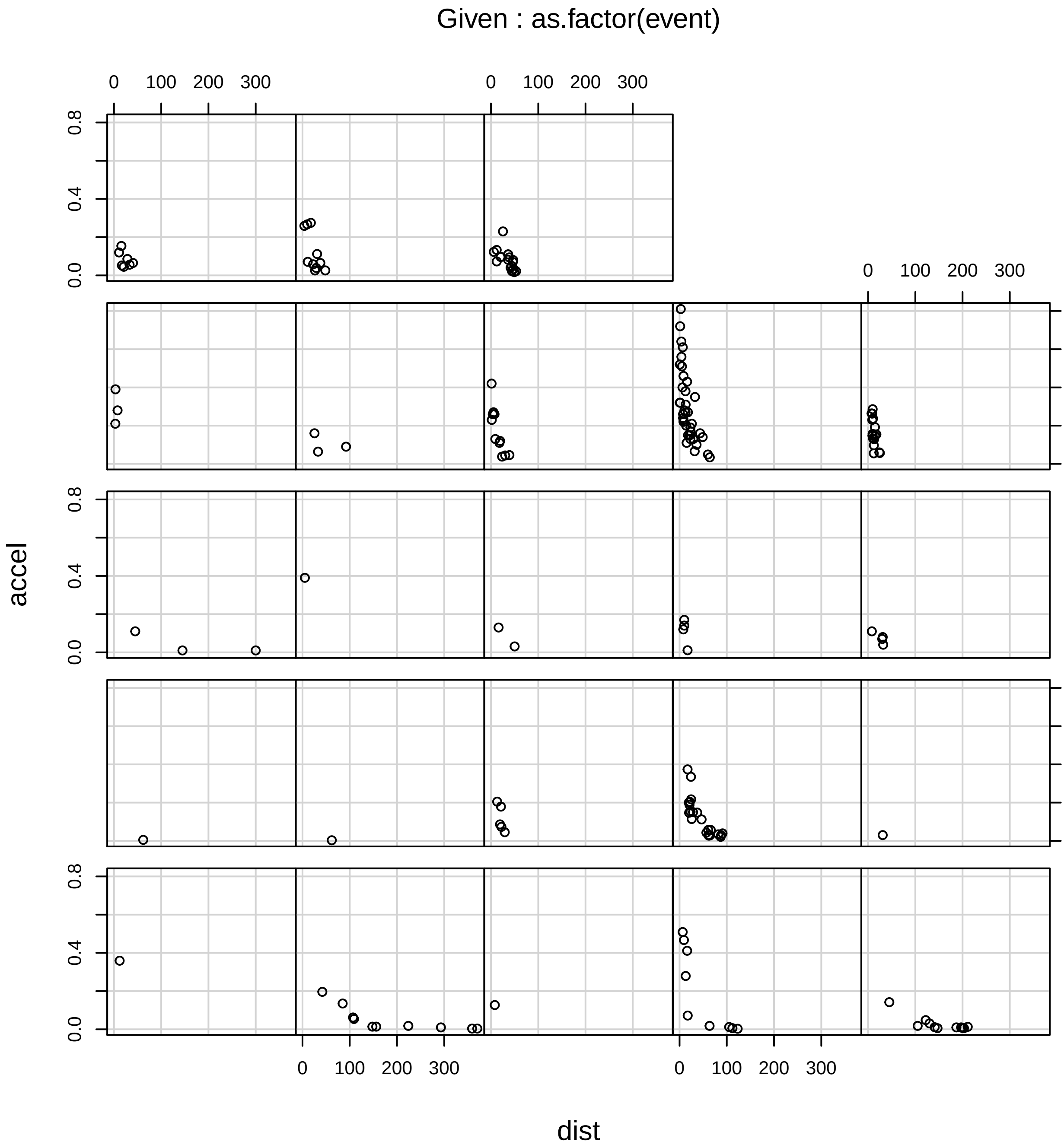
airquality data

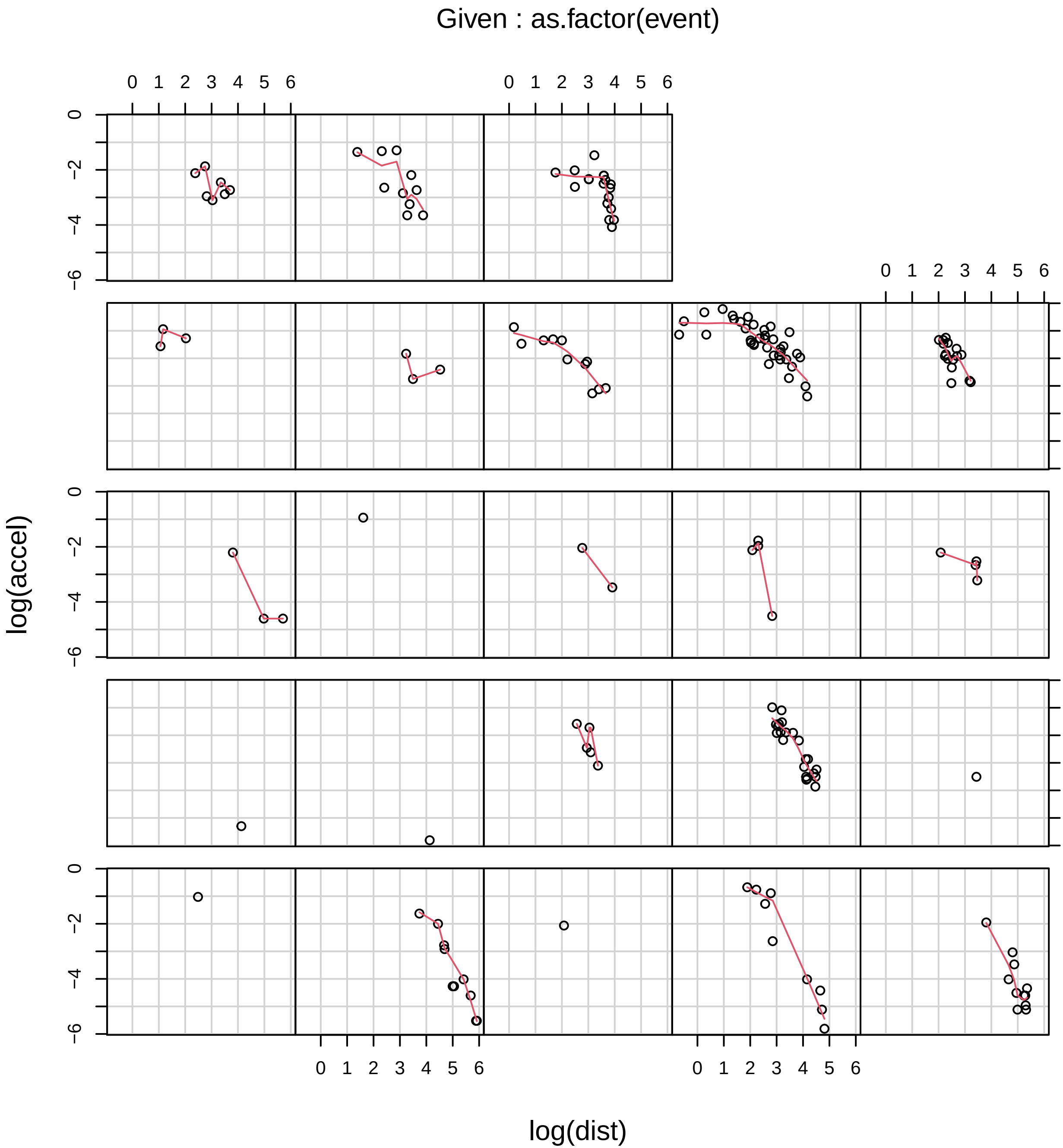




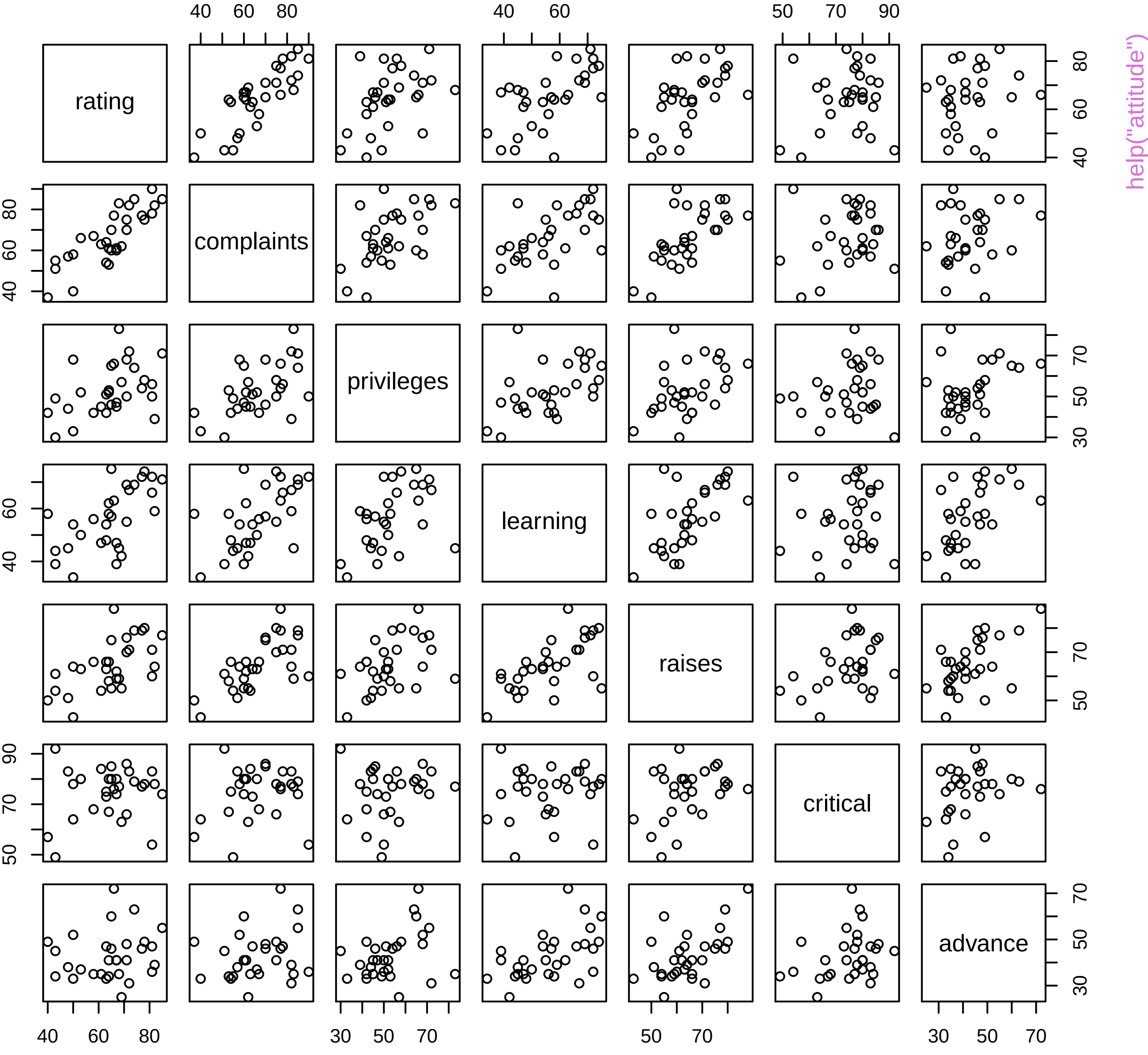
Anscombe's 4 Regression data sets

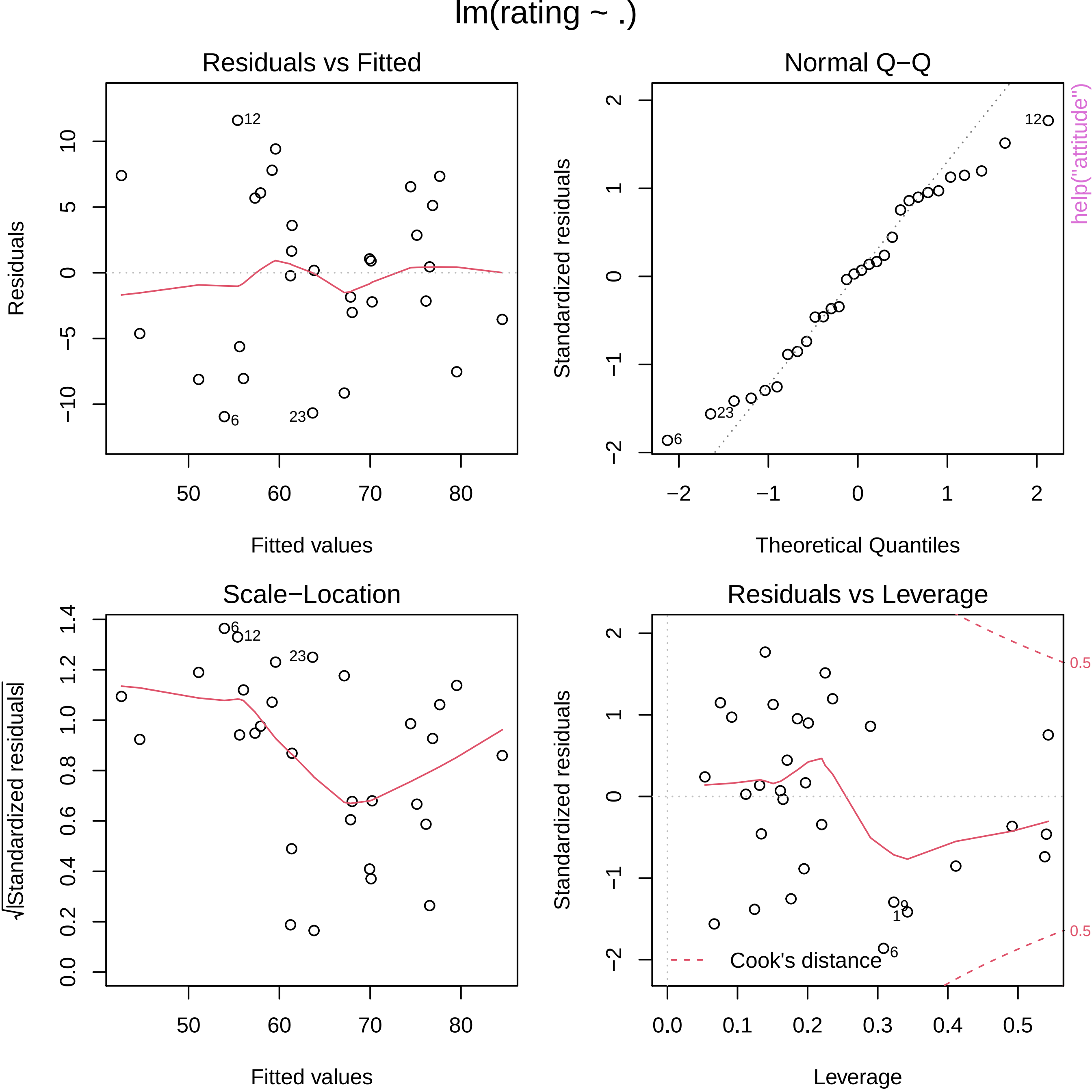

attenu data
event
mag
station
dist
accel
help("attenu")
5.0
6.0
7.0
0
100
300
20
10
5
120
80
40
0
0.8
0.4
0.0
5
10
15
20
0
40
80
120
0.0
0.4
0.8

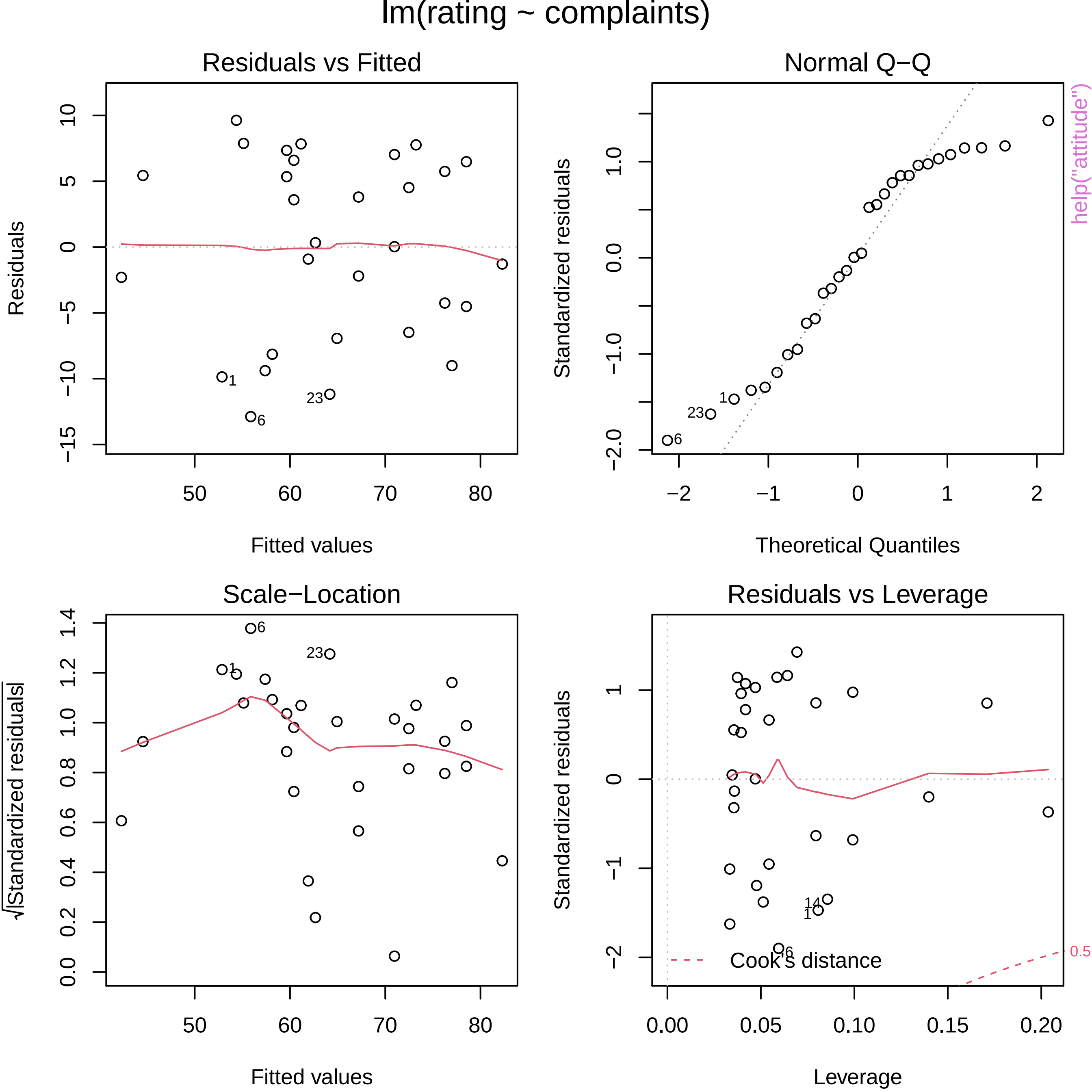

Given : as.factor(event)
accel
dist
0
100
200
300
0.0
0.4
0.8

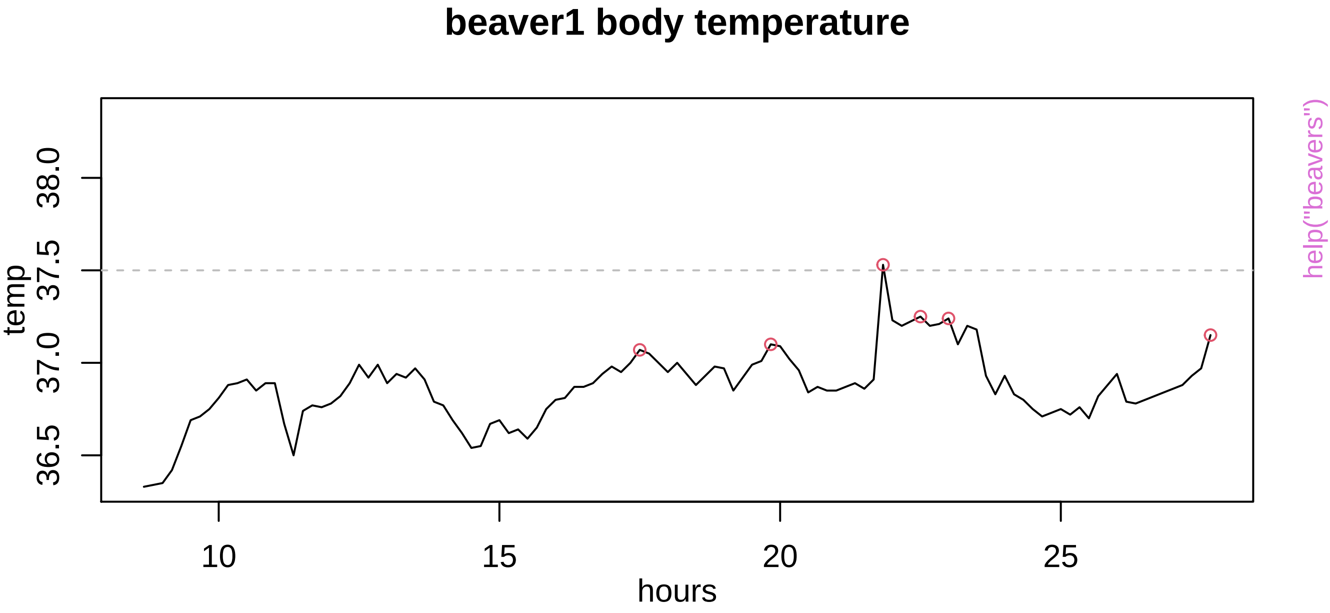

Given : as.factor(event)
0
1
2
3
4
5
6
0
−2
−4
−6
log(accel)
log(dist)

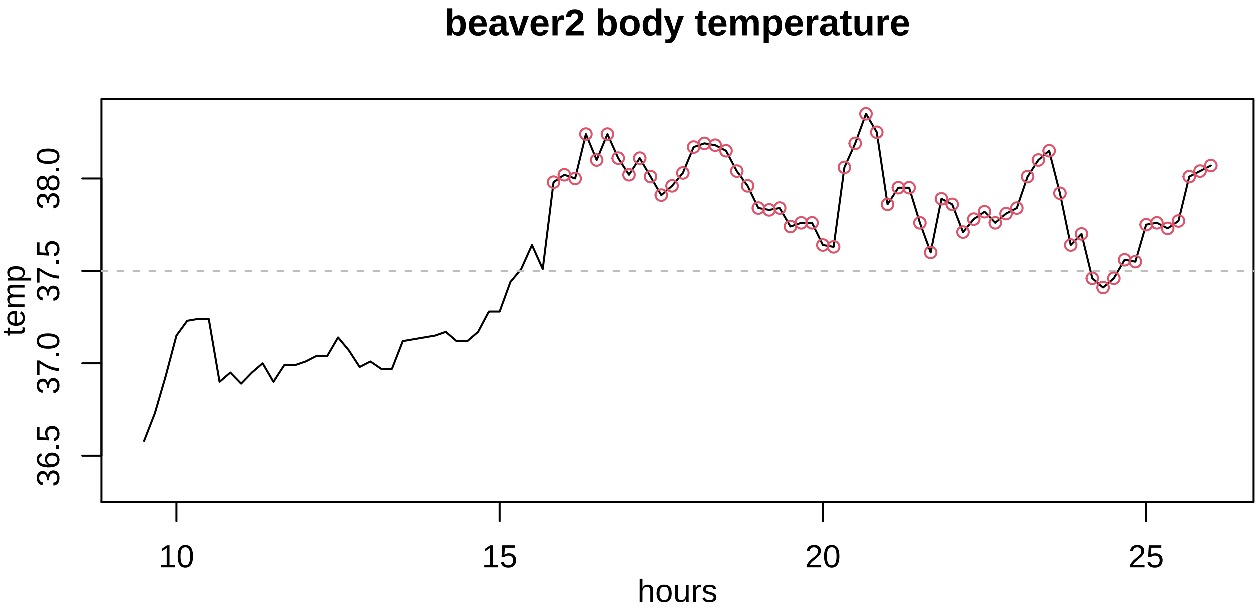
attitude data

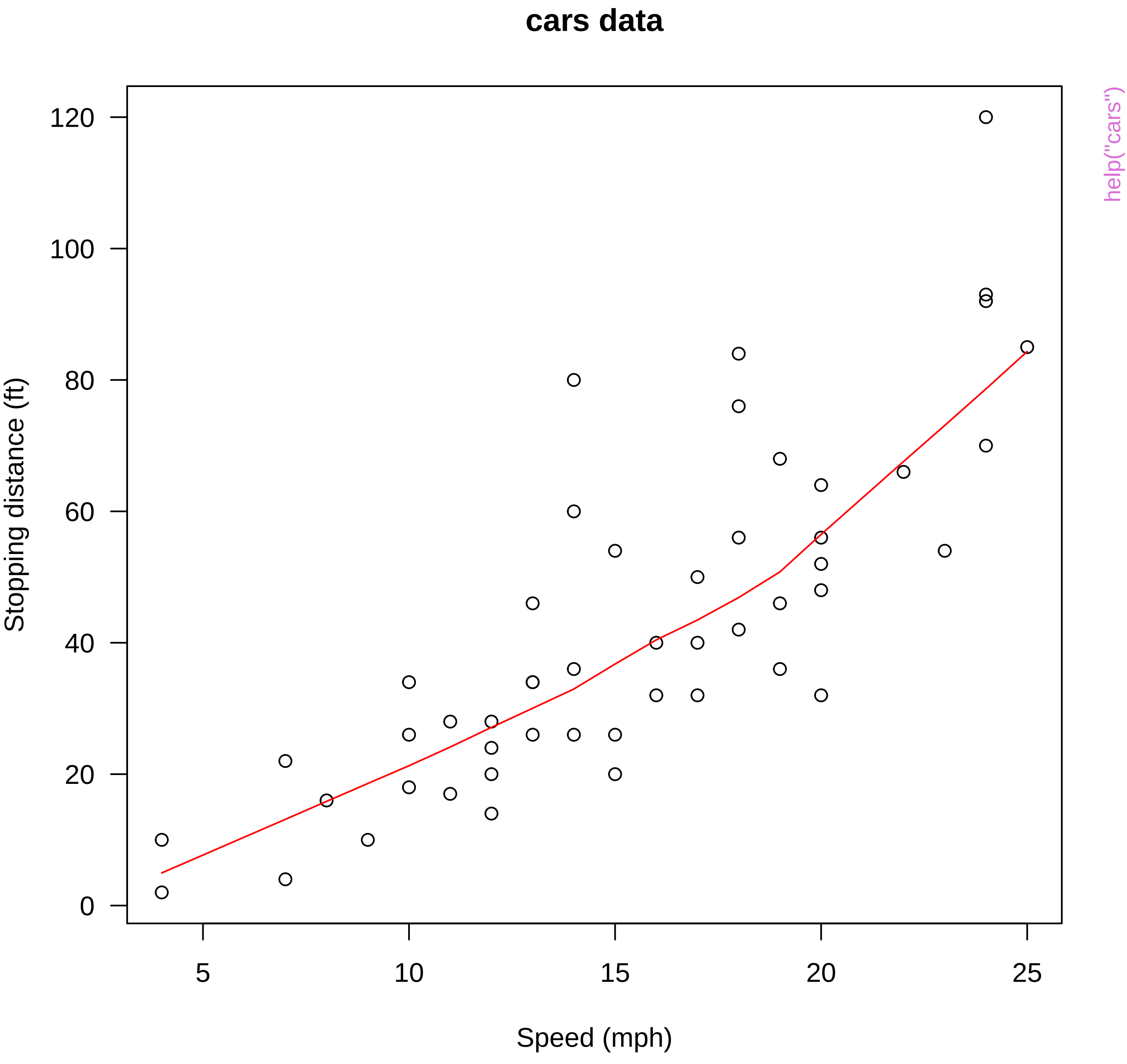



lm(rating ~ .)
Residuals vs Fitted
Residuals
Fitted values
10
5
0
−5
−10
50
60
70
80
12
6
23
Normal Q−Q
Standardized residuals
Theoretical Quantiles
2
1
0
−1
−2
12
23
6
help("attitude")
Scale−Location
√|Standardized residuals|
Fitted values
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
6
12
23
Residuals vs Leverage
Standardized residuals
Leverage
0.0
0.1
0.2
0.3
0.4
0.5
0.5
0.5
9
1
6
Cook's distance

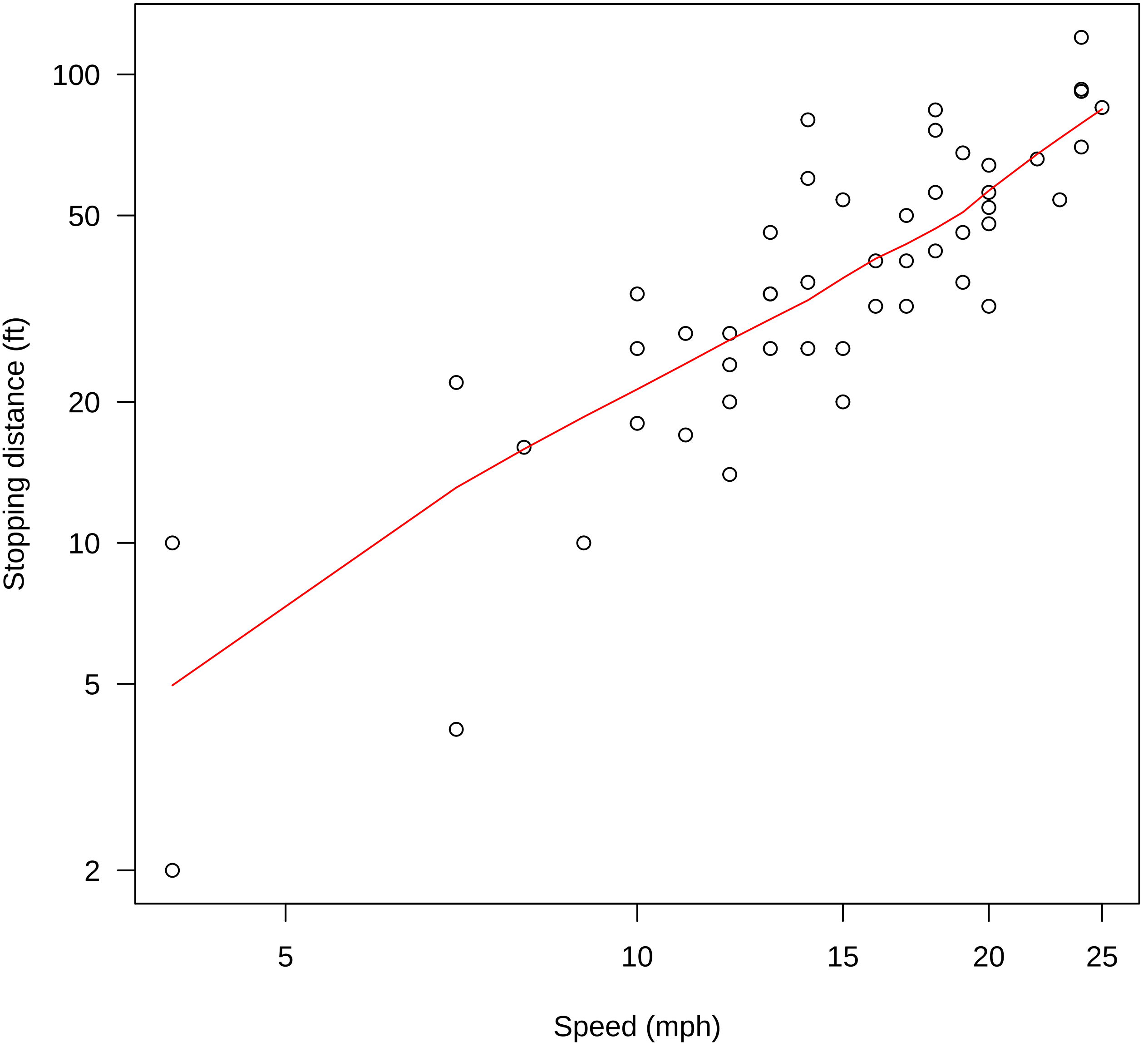

lm(rating ~ complaints)
Residuals vs Fitted
Residuals
Fitted values
10
5
0
−5
−10
−15
50
60
70
80
1
6
23
Normal Q−Q
Standardized residuals
Theoretical Quantiles
1.0
0.0
−1.0
−2.0
−2
−1
0
1
2
1
23
6
help("attitude")
Scale−Location
√|Standardized residuals|
Fitted values
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
50
60
70
80
6
23
1
Residuals vs Leverage
Standardized residuals
Leverage
1
0
−1
−2
0.00
0.05
0.10
0.15
0.20
14
1
6
Cook's distance
0.5


beaver1 body temperature
temp
36.5
37.0
37.5
38.0
10
15
20
25
hours
help("beavers")

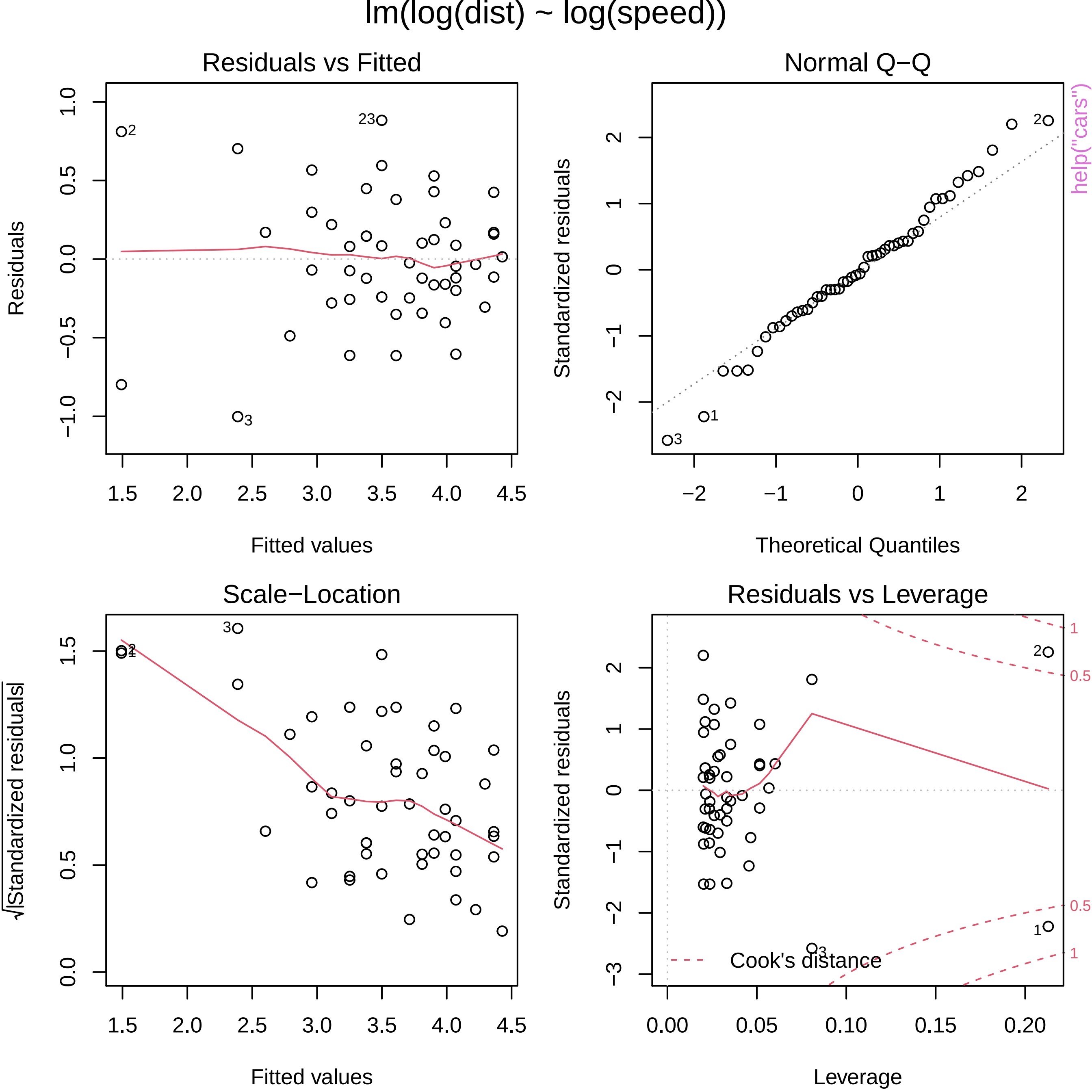

beaver2 body temperature
temp
36.5
37.0
37.5
38.0
10
15
20
25
hours


cars data
Stopping distance (ft)
0
20
40
60
80
100
120
5
10
15
20
25
Speed (mph)
help("cars")

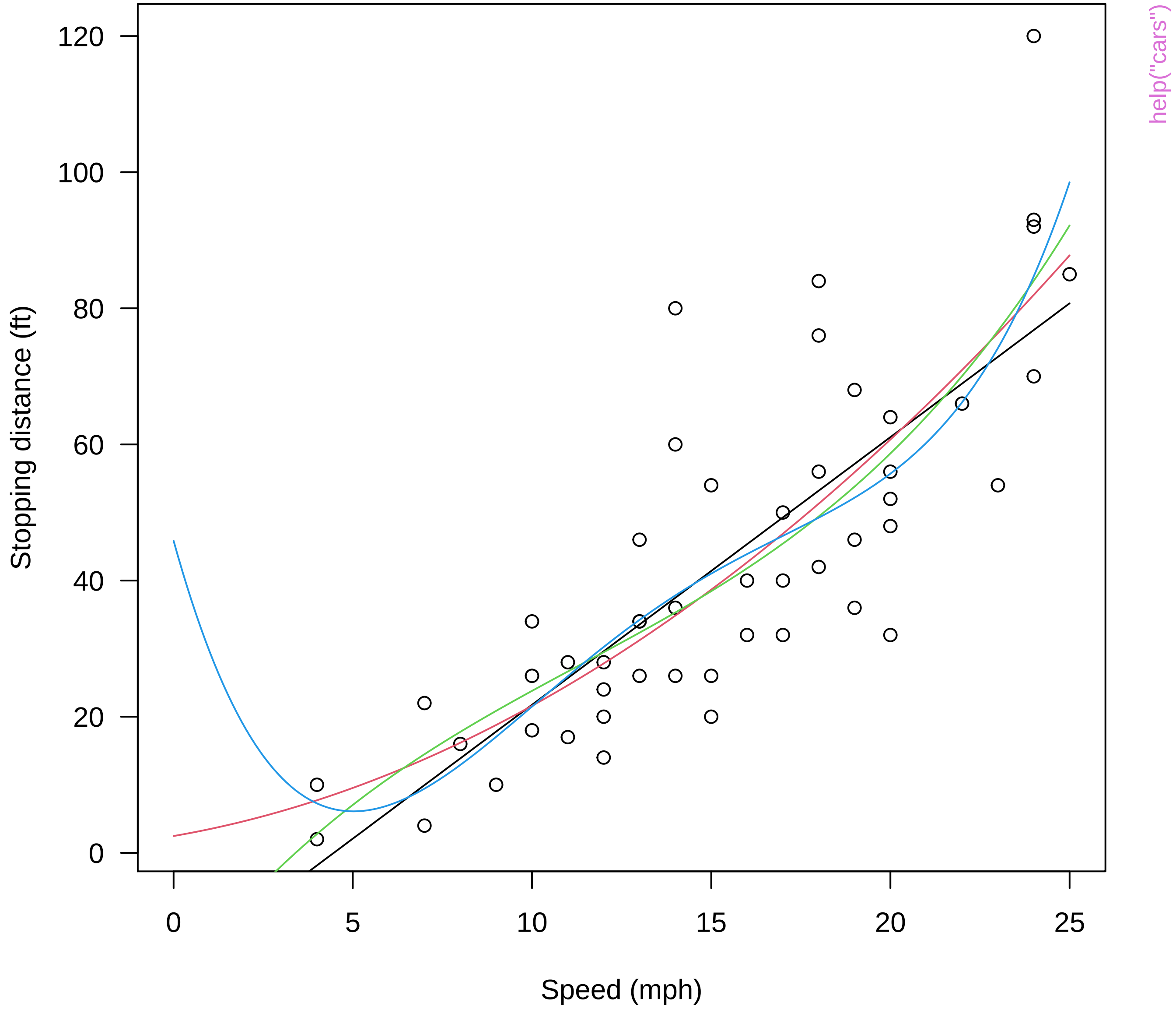
cars data (logarithmic scales)

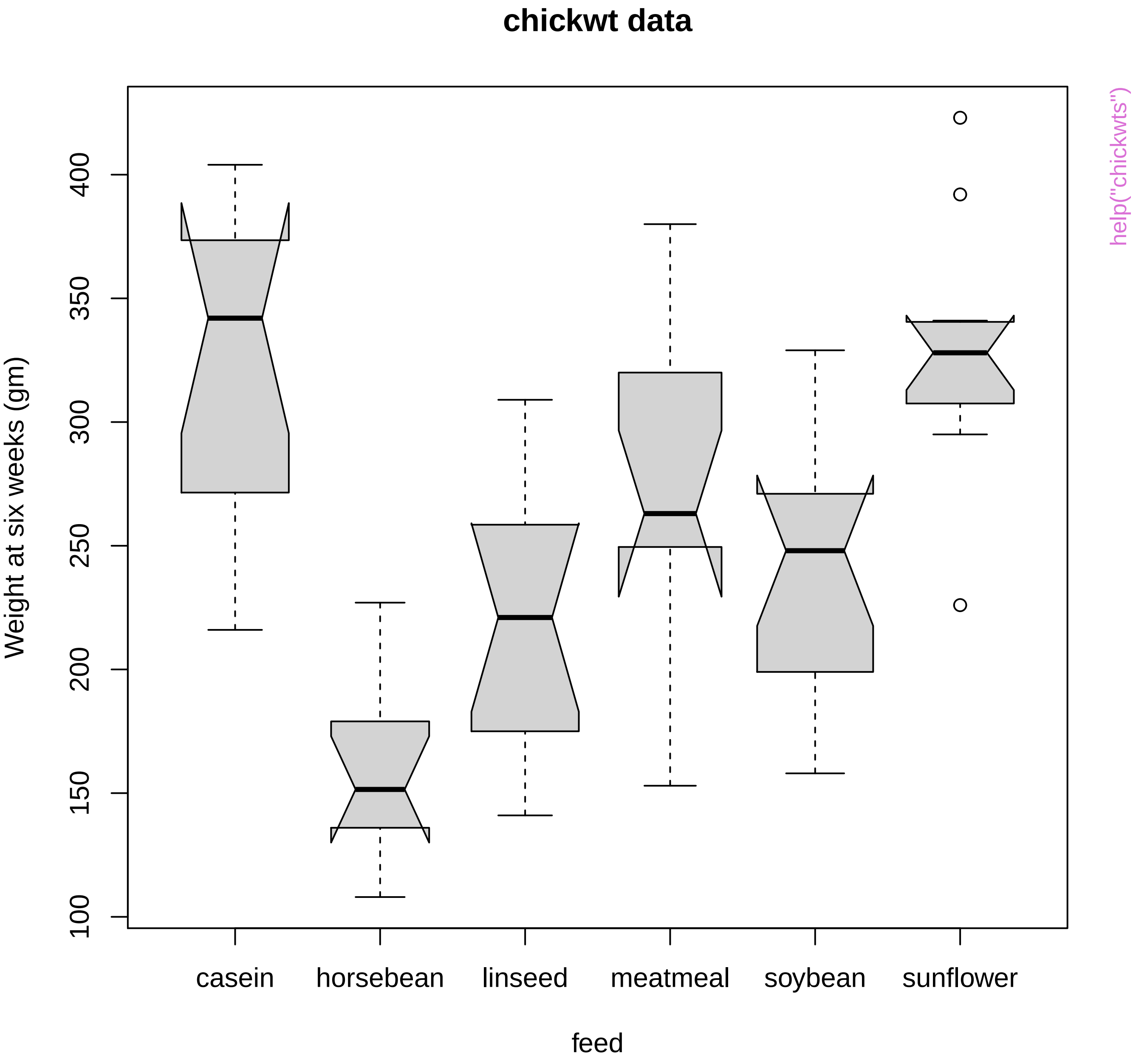


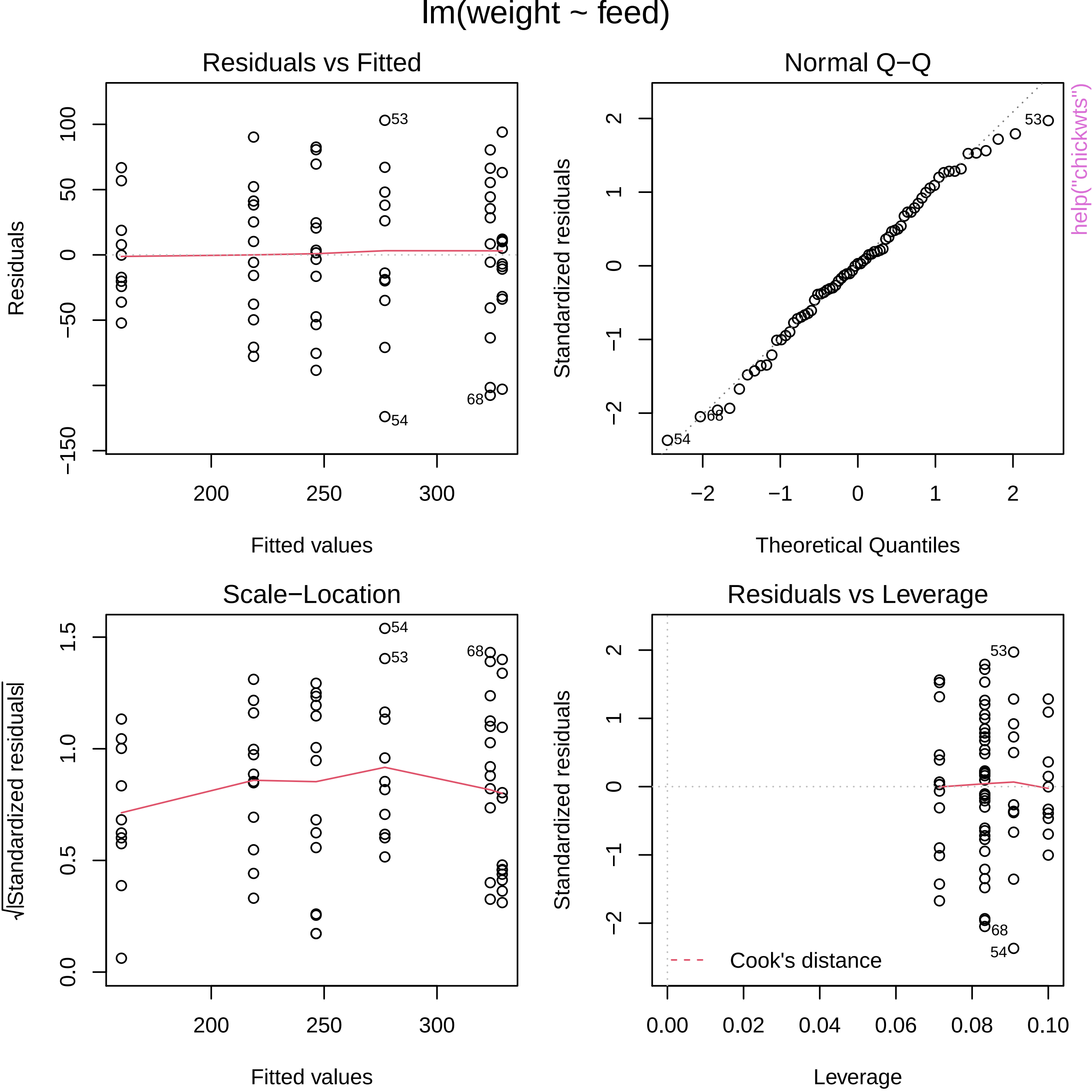
help("cars")

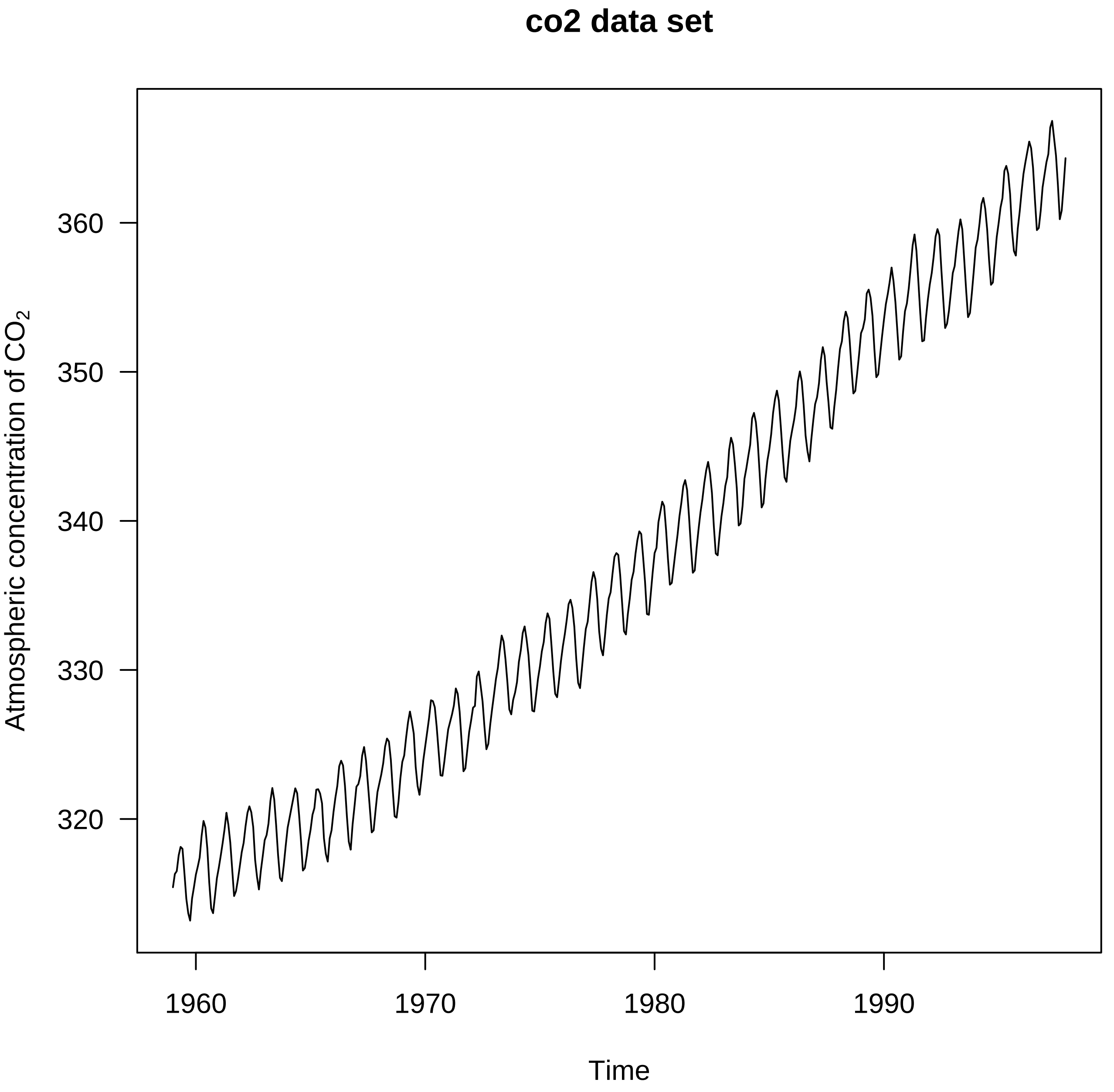


lm(log(dist) ~ log(speed))
Residuals vs Fitted
Residuals
Fitted values
1.0
0.5
0.0
−0.5
−1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
2
23
3
Normal Q−Q
Standardized residuals
Theoretical Quantiles
−2
−1
0
1
2
3
help("cars")
Scale−Location
√|Standardized residuals|
Fitted values
0.0
0.5
1.0
1.5
3
2
1
Residuals vs Leverage
Standardized residuals
Leverage
−3
0.00
0.05
0.10
0.15
0.20
0.5
Cook's distance

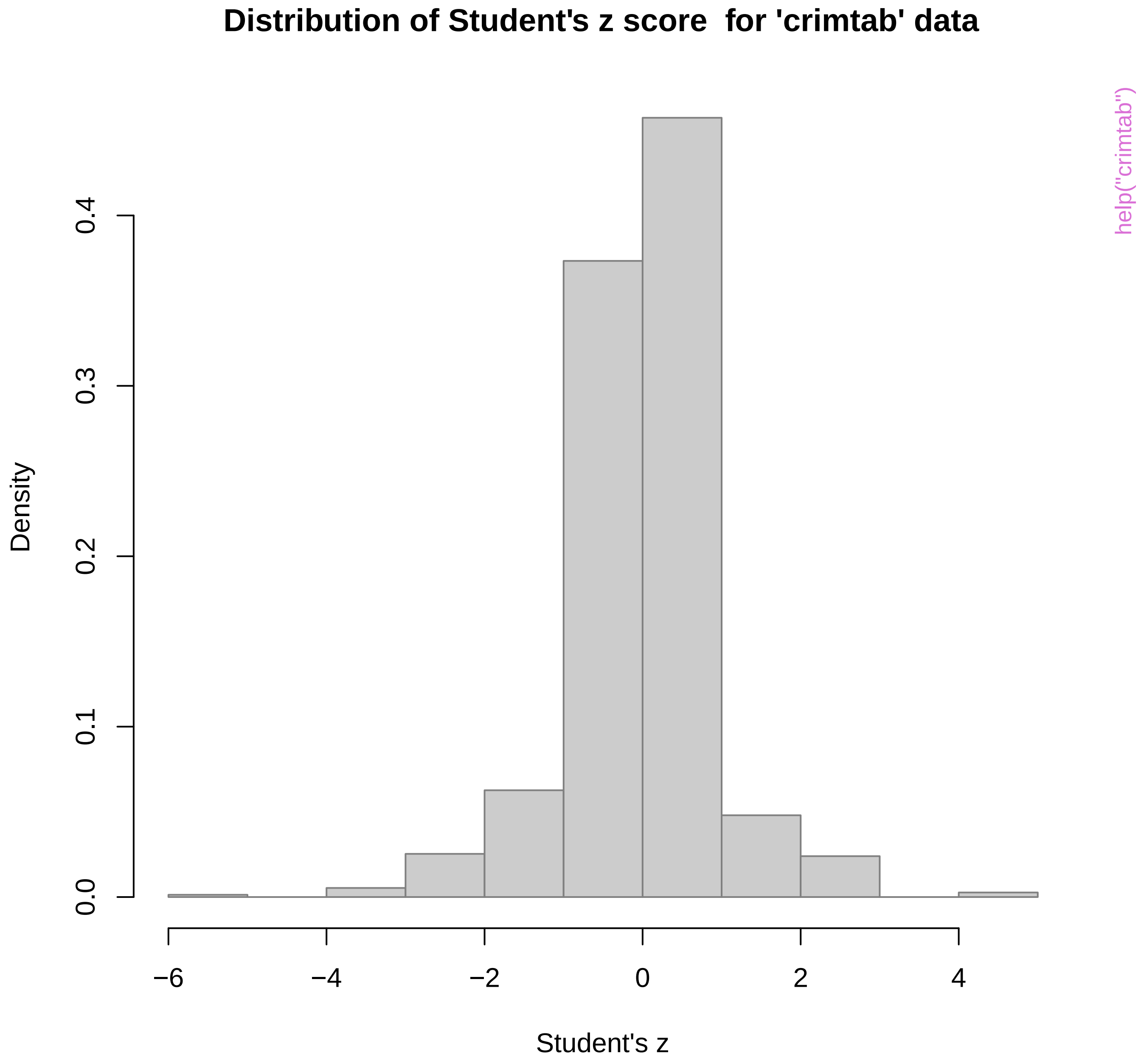

Stopping distance (ft)
0
20
40
60
80
100
120
0
5
10
15
20
25
Speed (mph)
help("cars")

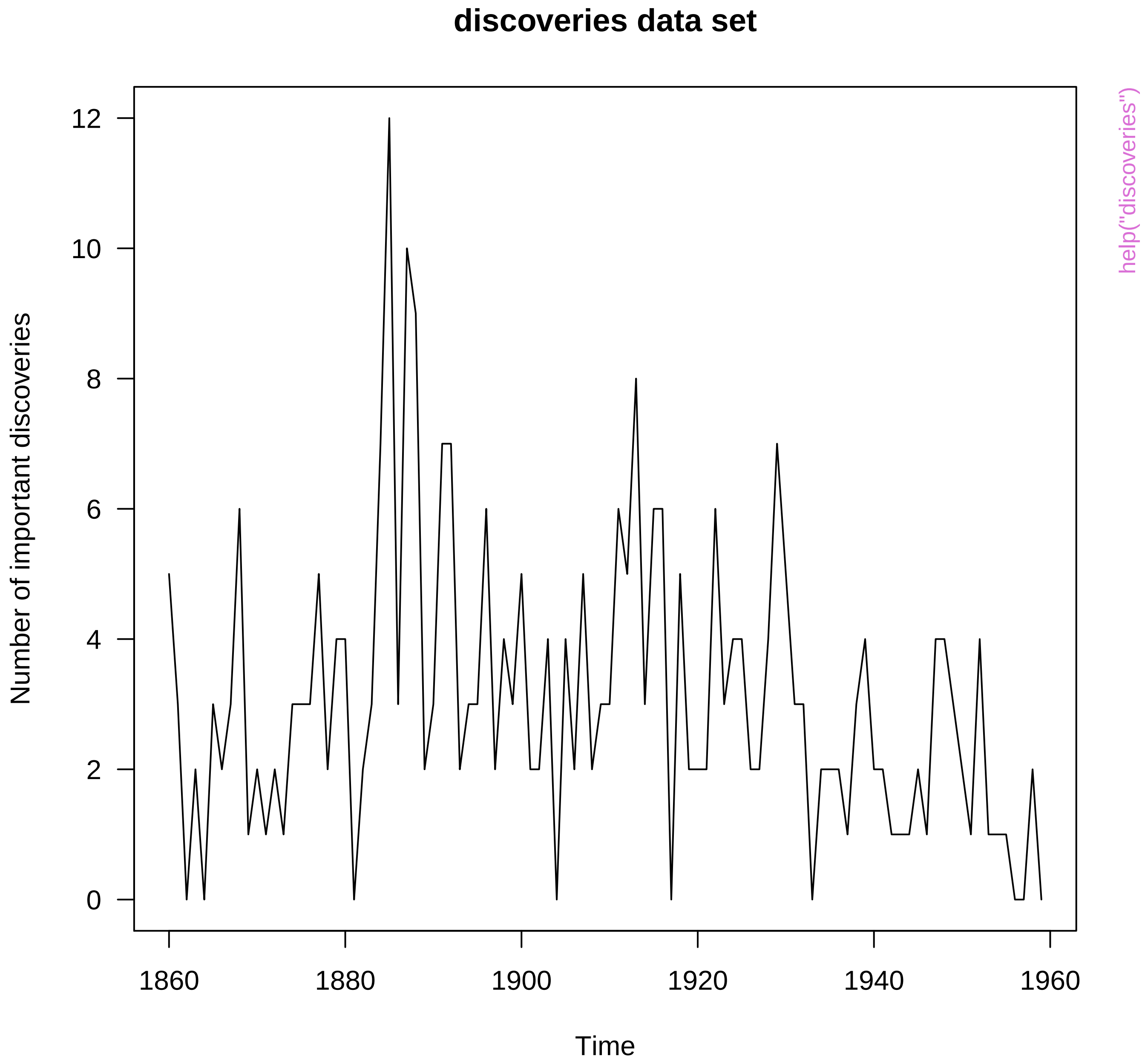

chickwt data
Weight at six weeks (gm)
100
150
200
250
300
350
400
casein
horsebean
linseed
meatmeal
soybean
sunflower
feed
help("chickwts")

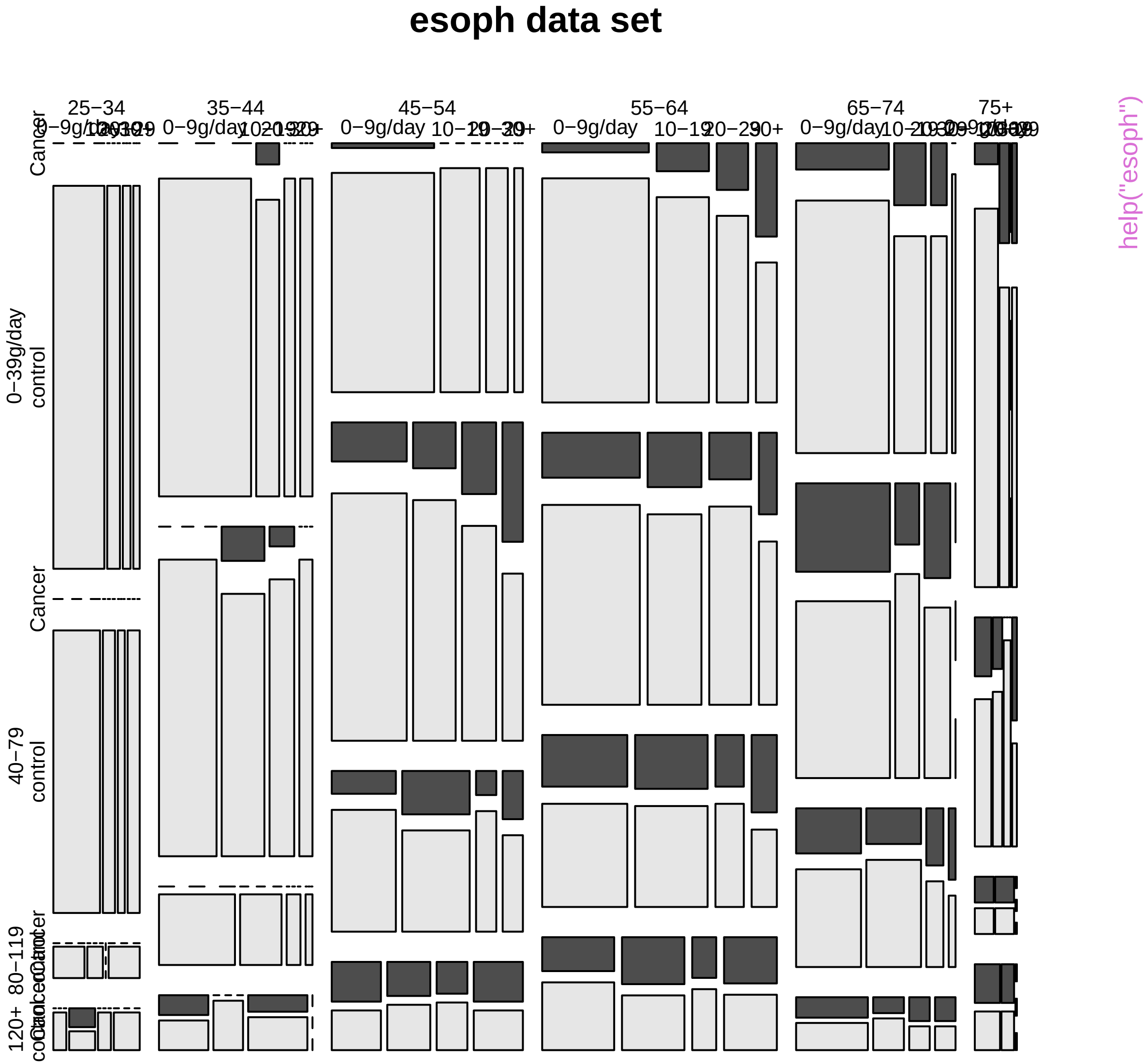

lm(weight ~ feed)
Residuals vs Fitted
Residuals
Fitted values
100
50
0
−50
−150
200
250
300
53
54
68
Normal Q−Q
Standardized residuals
Theoretical Quantiles
2
1
0
−1
−2
53
68
54
help("chickwts")
Scale−Location
√|Standardized residuals|
Fitted values
1.5
1.0
0.5
0.0
200
250
300
54
53
68
Residuals vs Leverage
Standardized residuals
Leverage
0.00
0.02
0.04
0.06
0.08
0.10
2
1
0
−1
−2
53
68
54
Cook's distance

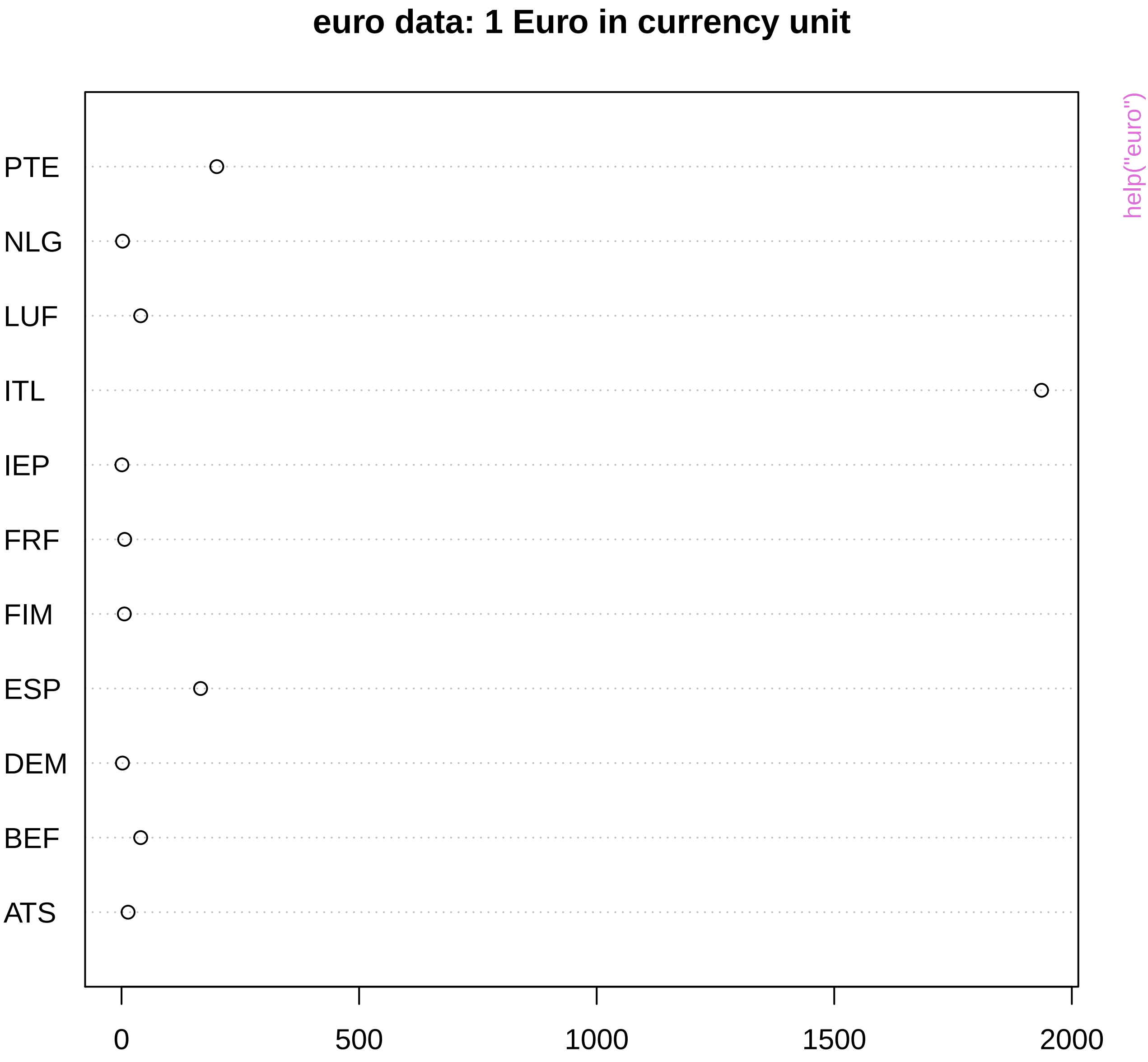

co2 data set
Atmospheric concentration of CO_2
320
330
340
350
360
1960
1970
1980
1990
Time

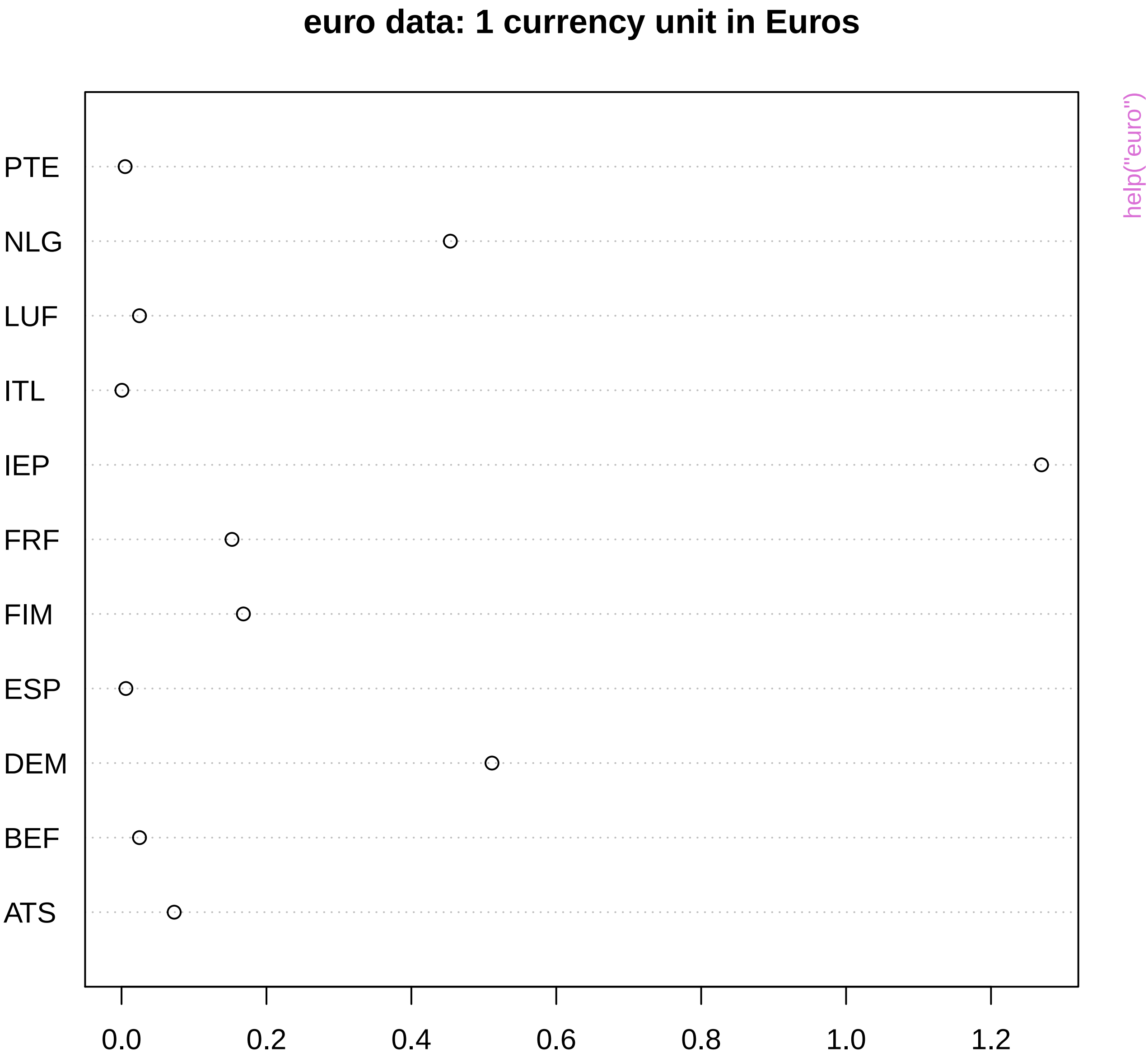
help("co2")

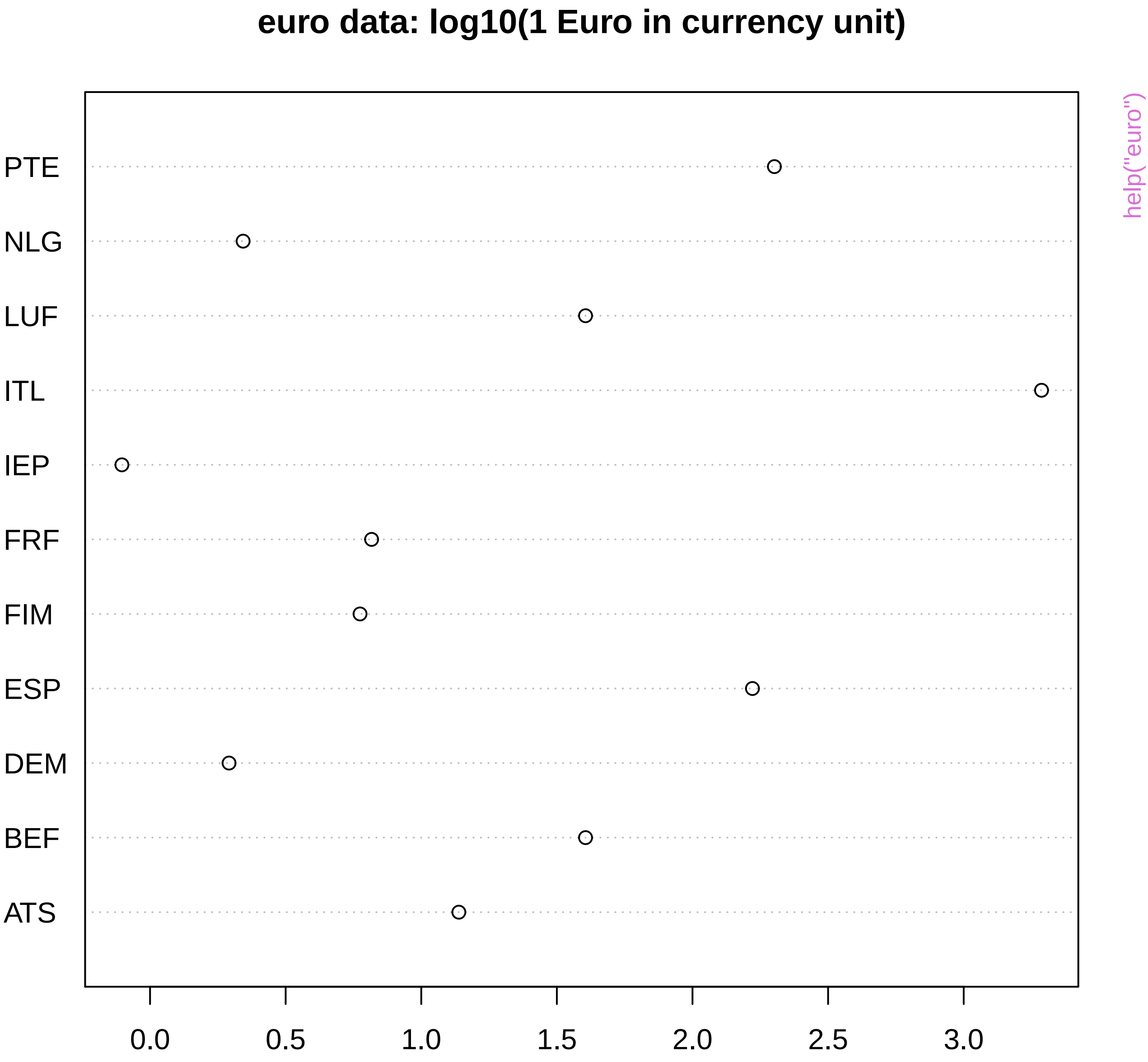

Distribution of Student's z score for 'crimtab' data
Density
0.0
0.1
0.2
0.3
0.4
−6
−4
−2
0
2
4
Student's z
help("crimtab")

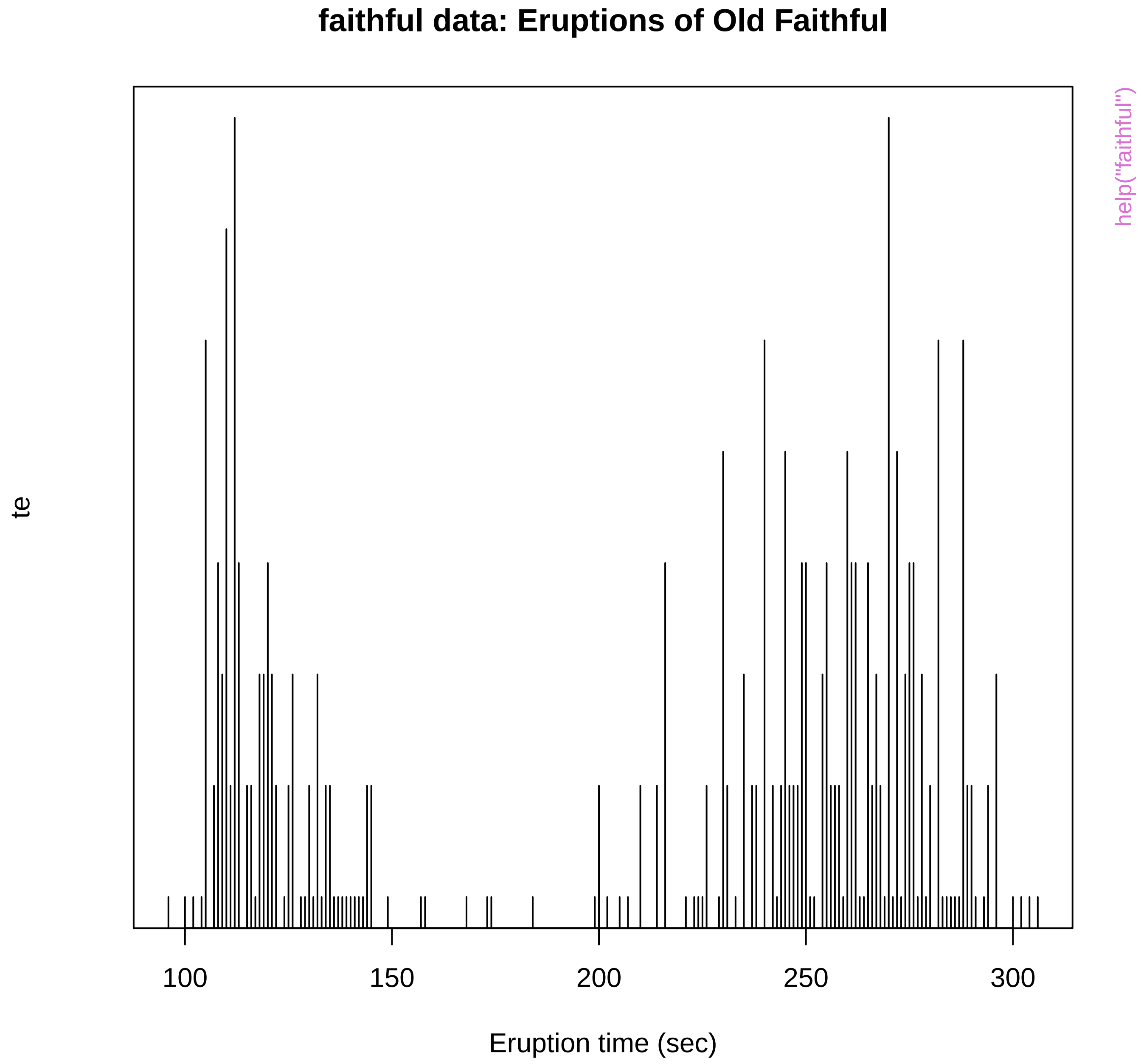

discoveries data set
Number of important discoveries
0
2
4
6
8
10
12
1860
1880
1900
1920
1940
1960
Time
help("discoveries")

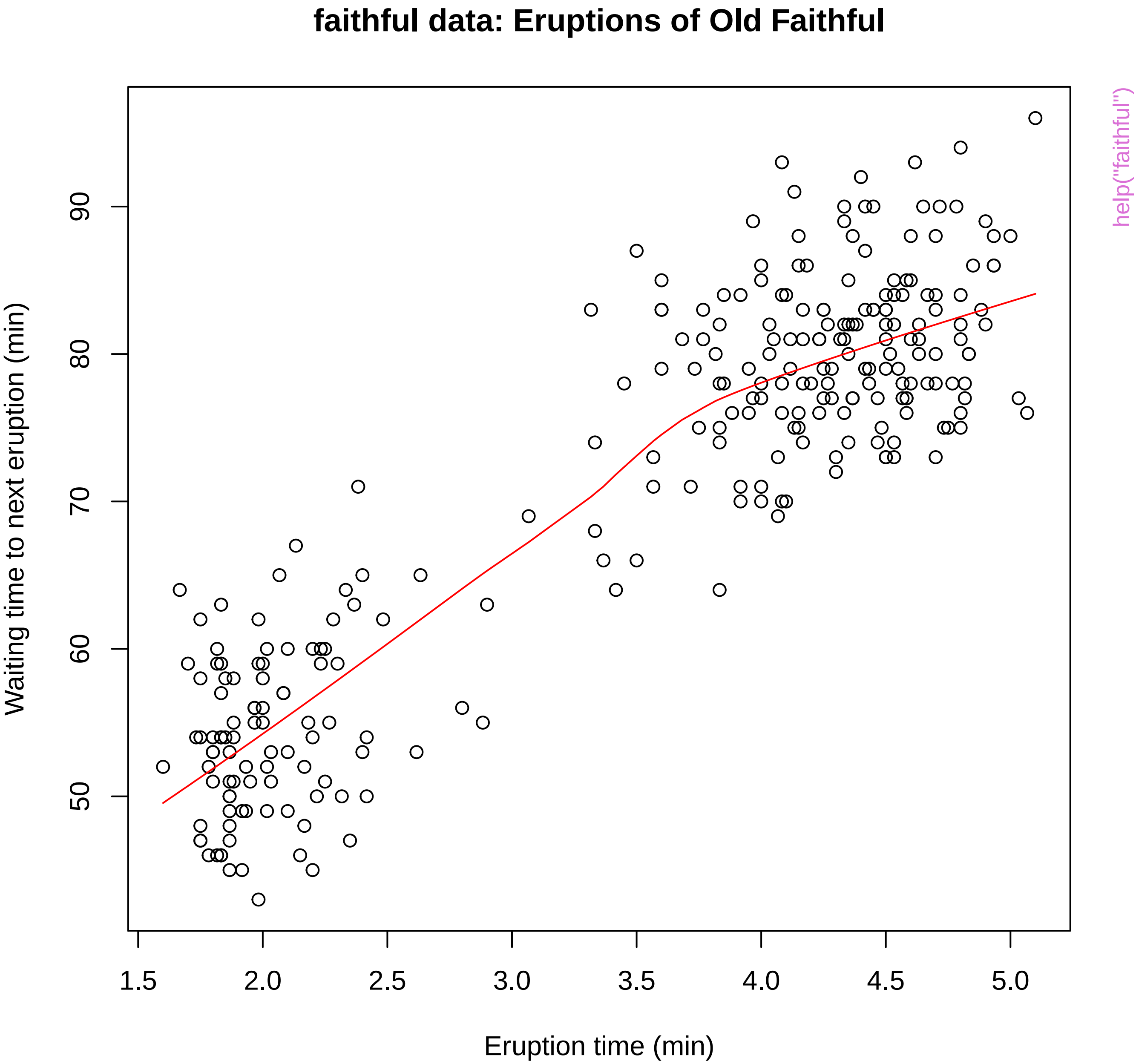

esoph data set
25−34
35−44
45−54
55−64
65−74
75+
0−9g/day
10−19
20−29
30+
Cancer
control
0−39g/day
40−79
80−119
120+
help("esoph")

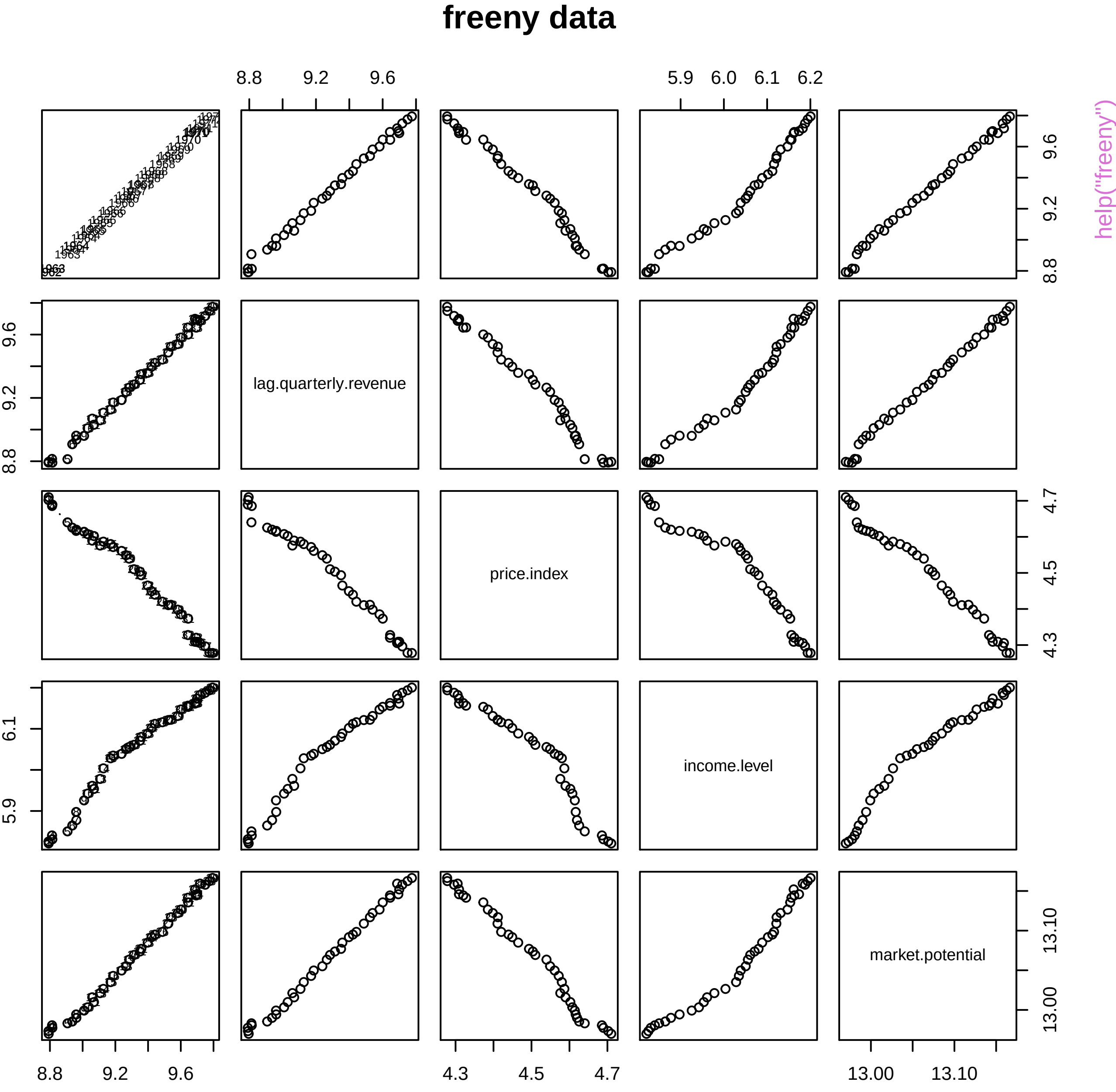

euro data: 1 Euro in currency unit
PTE
NLG
LUF
ITL
IEP
FRF
FIM
ESP
DEM
BEF
ATS
0
500
1000
1500
2000
help("euro")

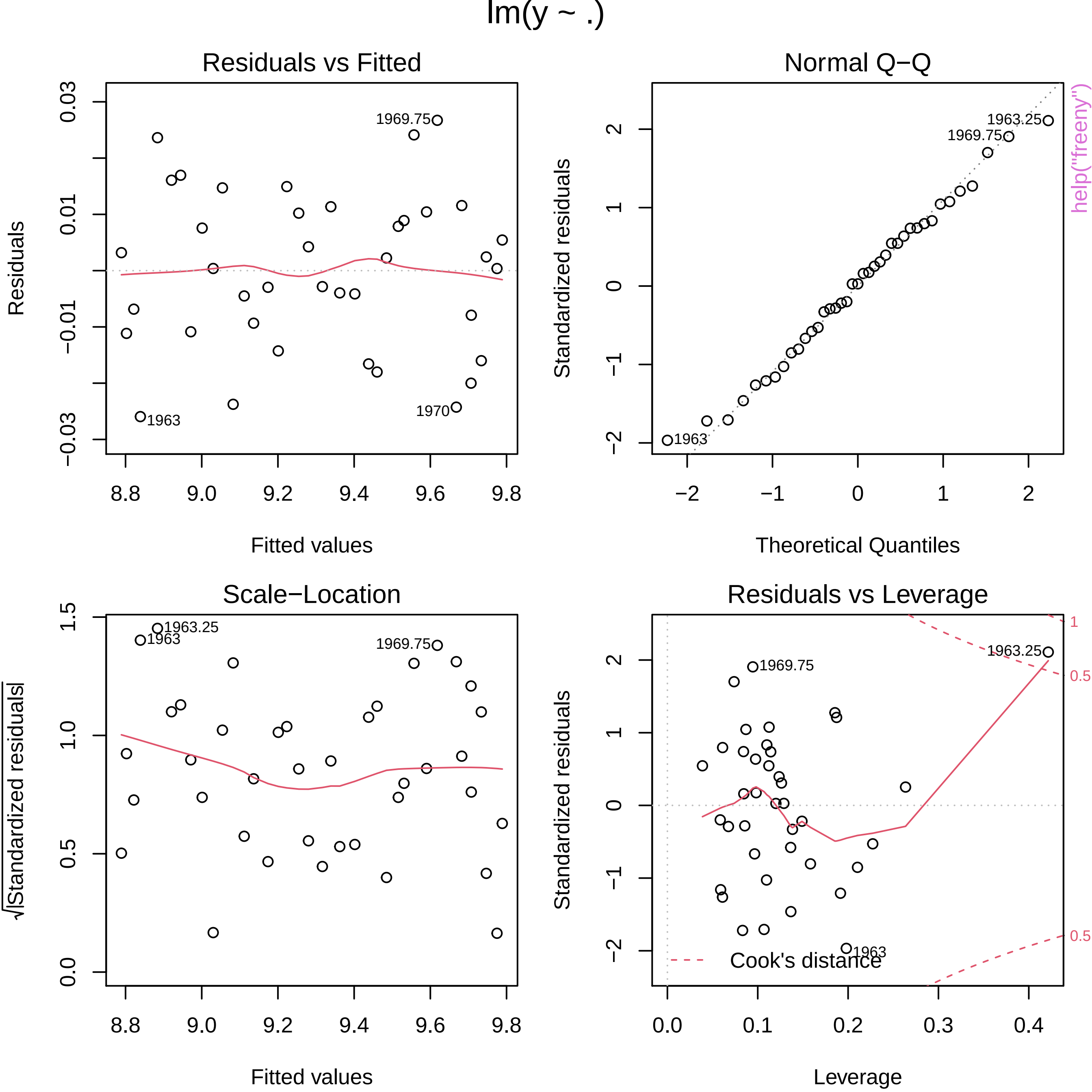

euro data: 1 currency unit in Euros
PTE
NLG
LUF
ITL
IEP
FRF
FIM
ESP
DEM
BEF
ATS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
help("euro")

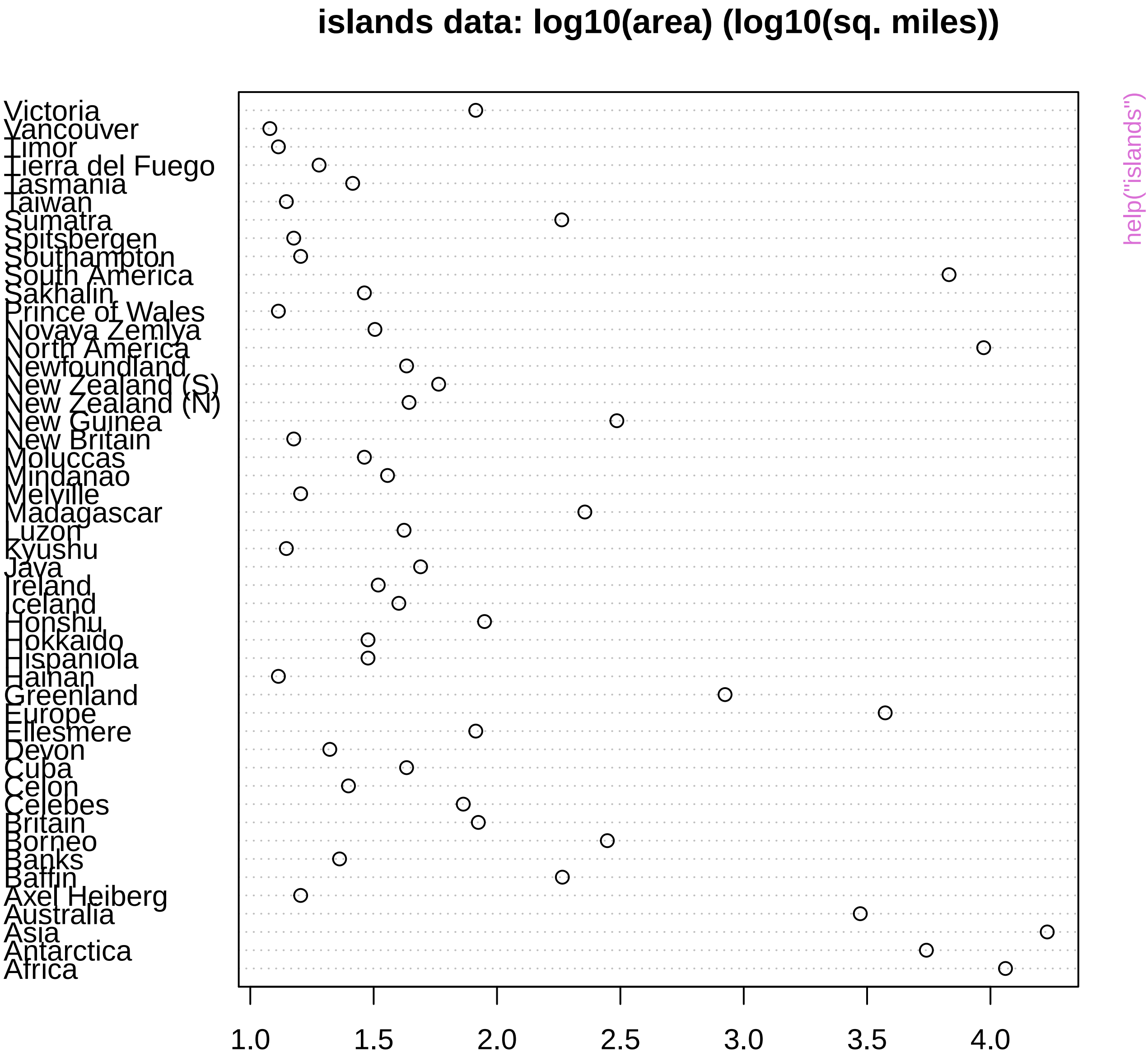

euro data: log10(1 Euro in currency unit)
PTE
NLG
LUF
ITL
IEP
FRF
FIM
ESP
DEM
BEF
ATS
0.0
0.5
1.0
1.5
2.0
2.5
3.0
help("euro")

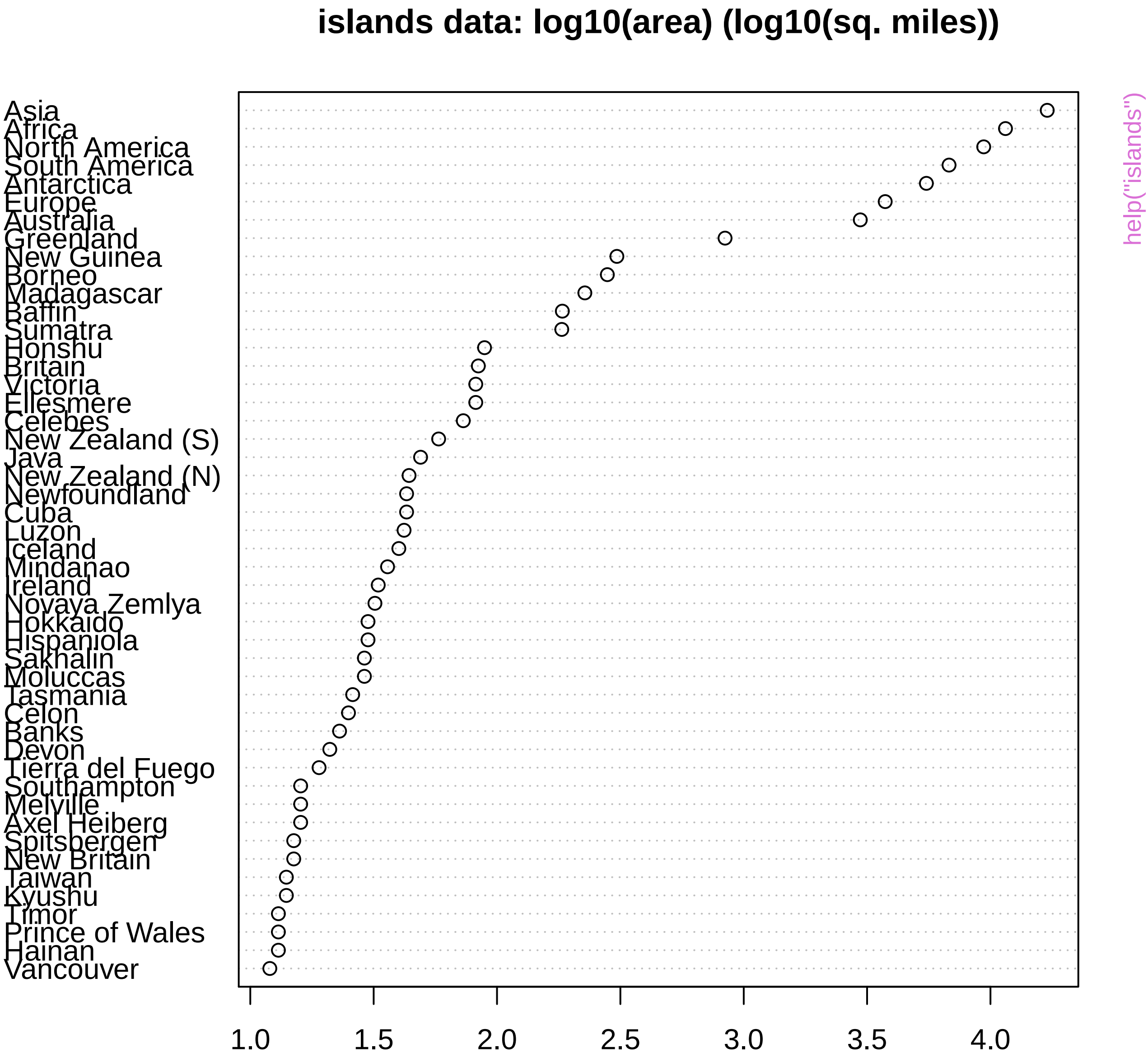

faithful data: Eruptions of Old Faithful
te
100
150
200
250
300
Eruption time (sec)
help("faithful")

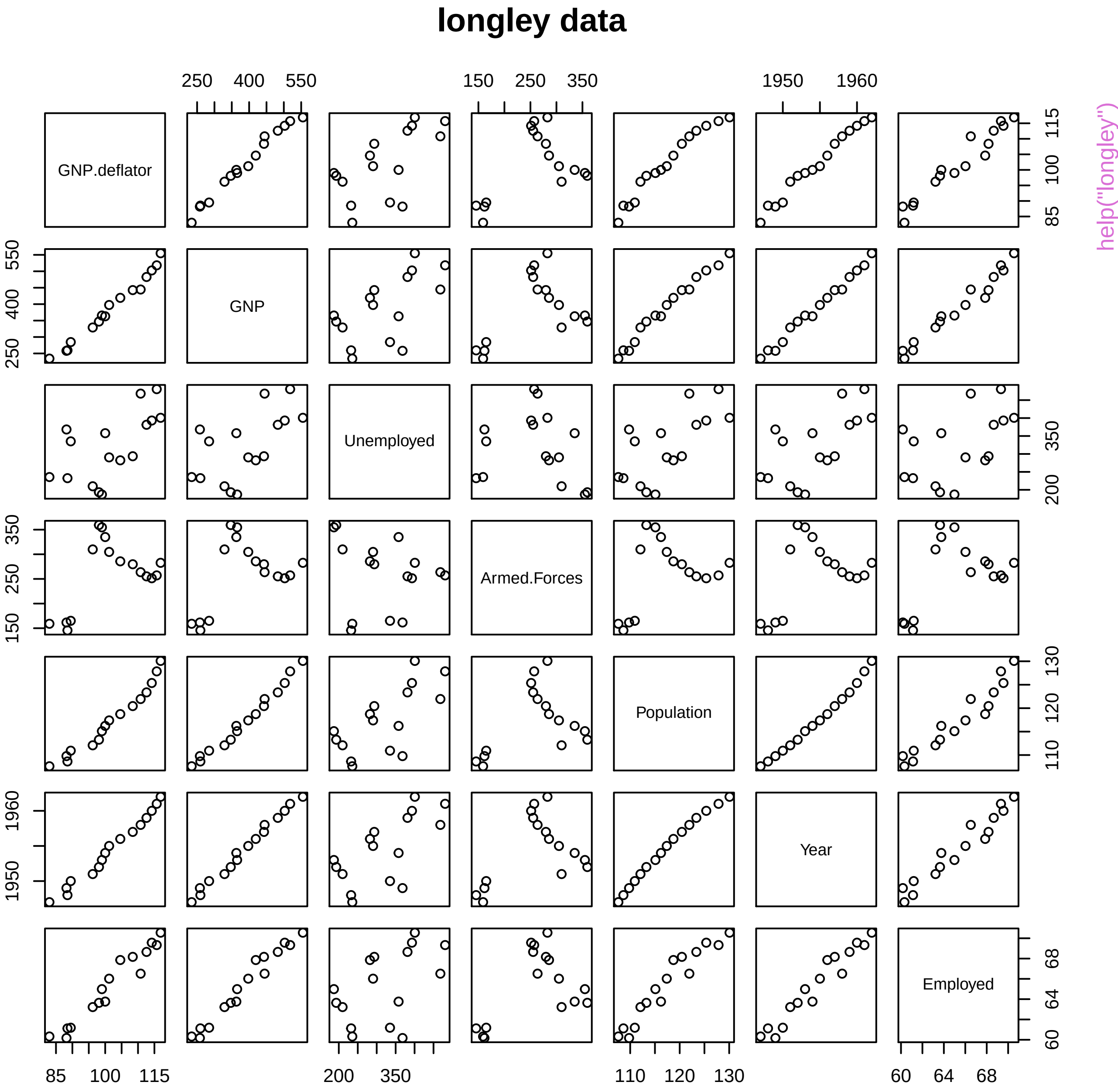

faithful data: Eruptions of Old Faithful
Waiting time to next eruption (min)
50
60
70
80
90
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Eruption time (min)
help("faithful")

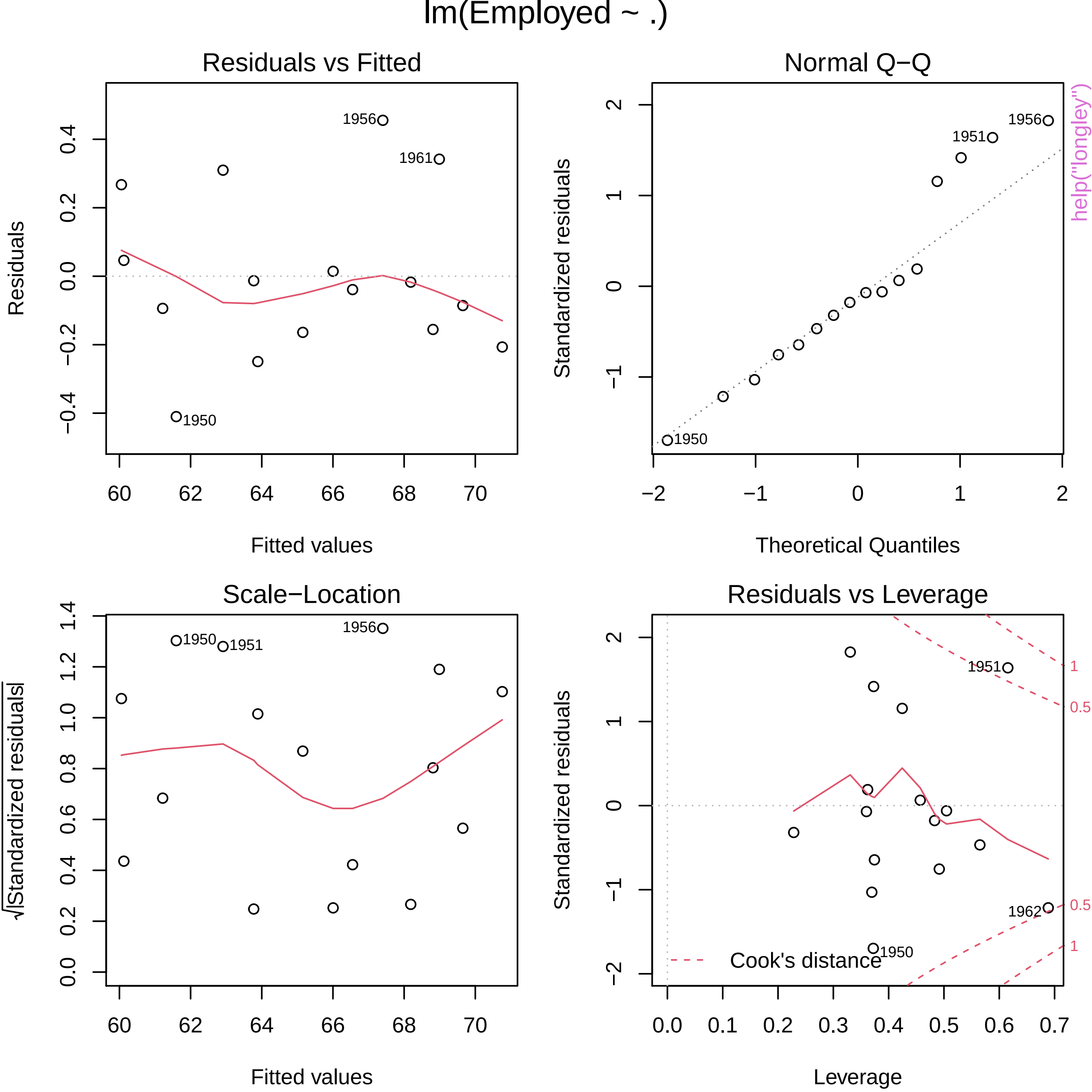

freeny data
lag.quarterly.revenue
price.index
income.level
market.potential
help("freeny")
8.8
9.2
9.6
5.9
6.0
6.1
6.2
4.3
4.5
4.7
13.00
13.10

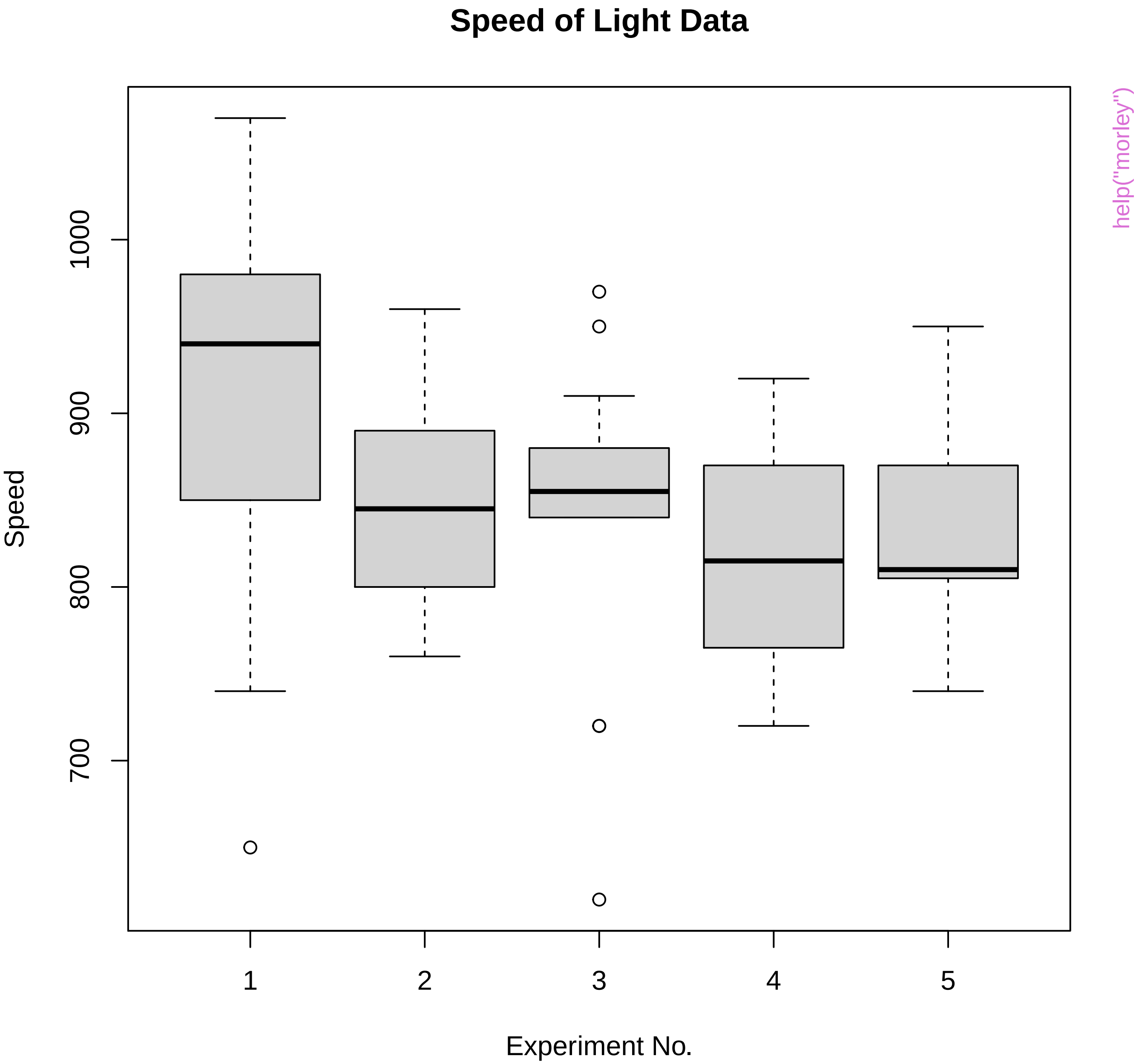

lm(y ~ .)
Residuals vs Fitted
Residuals
Fitted values
0.03
0.01
−0.01
−0.03
8.8
9.0
9.2
9.4
9.6
9.8
1969.75
1963
1970
Normal Q−Q
Standardized residuals
Theoretical Quantiles
2
1
0
−1
−2
1963.25
1969.75
1963
help("freeny")
Scale−Location
√|Standardized residuals|
Fitted values
1.5
1.0
0.5
0.0
1963.25
1963
1969.75
Residuals vs Leverage
Standardized residuals
Leverage
0.0
0.1
0.2
0.3
0.4
1963.25
1969.75
1963
Cook's distance
1
0.5
0.5


islands data: log10(area) (log10(sq. miles))
Victoria
Vancouver
Timor
Tierra del Fuego
Tasmania
Taiwan
Sumatra
Spitsbergen
Southampton
South America
Sakhalin
Prince of Wales
Novaya Zemlya
North America
Newfoundland
New Zealand (S)
New Zealand (N)
New Guinea
New Britain
Moluccas
Mindanao
Melville
Madagascar
Luzon
Kyushu
Java
Ireland
Iceland
Honshu
Hokkaido
Hispaniola
Hainan
Greenland
Europe
Ellesmere
Devon
Cuba
Celon
Celebes
Britain
Borneo
Banks
Baffin
Axel Heiberg
Australia
Asia
Antarctica
Africa
1.0
1.5
2.0
2.5
3.0
3.5
4.0
help("islands")

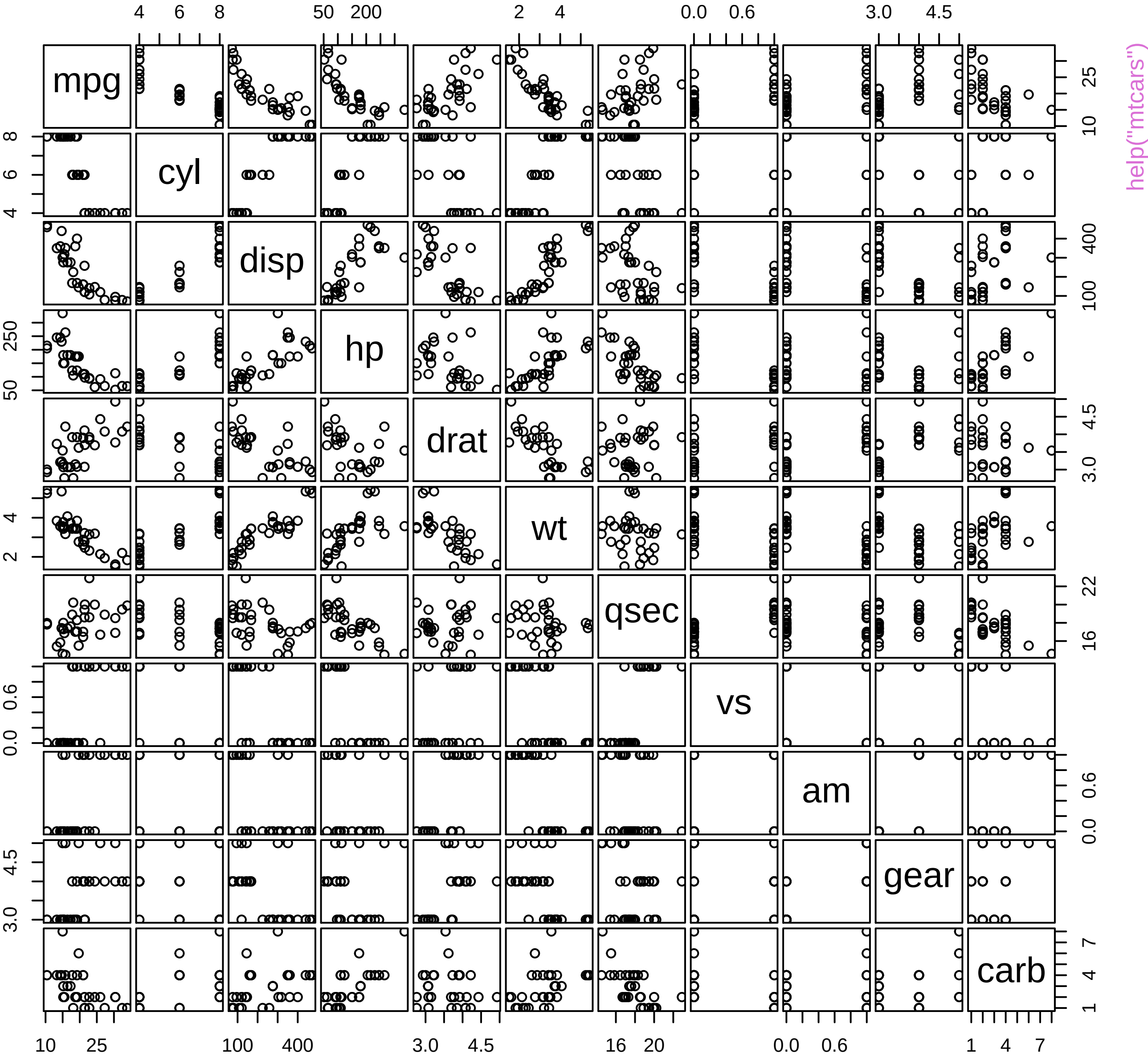

islands data: log10(area) (log10(sq. miles))
Asia
Africa
North America
South America
Antarctica
Europe
Australia
Greenland
New Guinea
Borneo
Madagascar
Baffin
Sumatra
Honshu
Britain
Victoria
Ellesmere
Celebes
New Zealand (S)
Java
New Zealand (N)
Newfoundland
Cuba
Luzon
Iceland
Mindanao
Ireland
Novaya Zemlya
Hokkaido
Hispaniola
Sakhalin
Moluccas
Tasmania
Celon
Banks
Devon
Tierra del Fuego
Southampton
Melville
Axel Heiberg
Spitsbergen
New Britain
Taiwan
Kyushu
Timor
Prince of Wales
Hainan
Vancouver
1.0
1.5
2.0
2.5
3.0
3.5
4.0
help("islands")

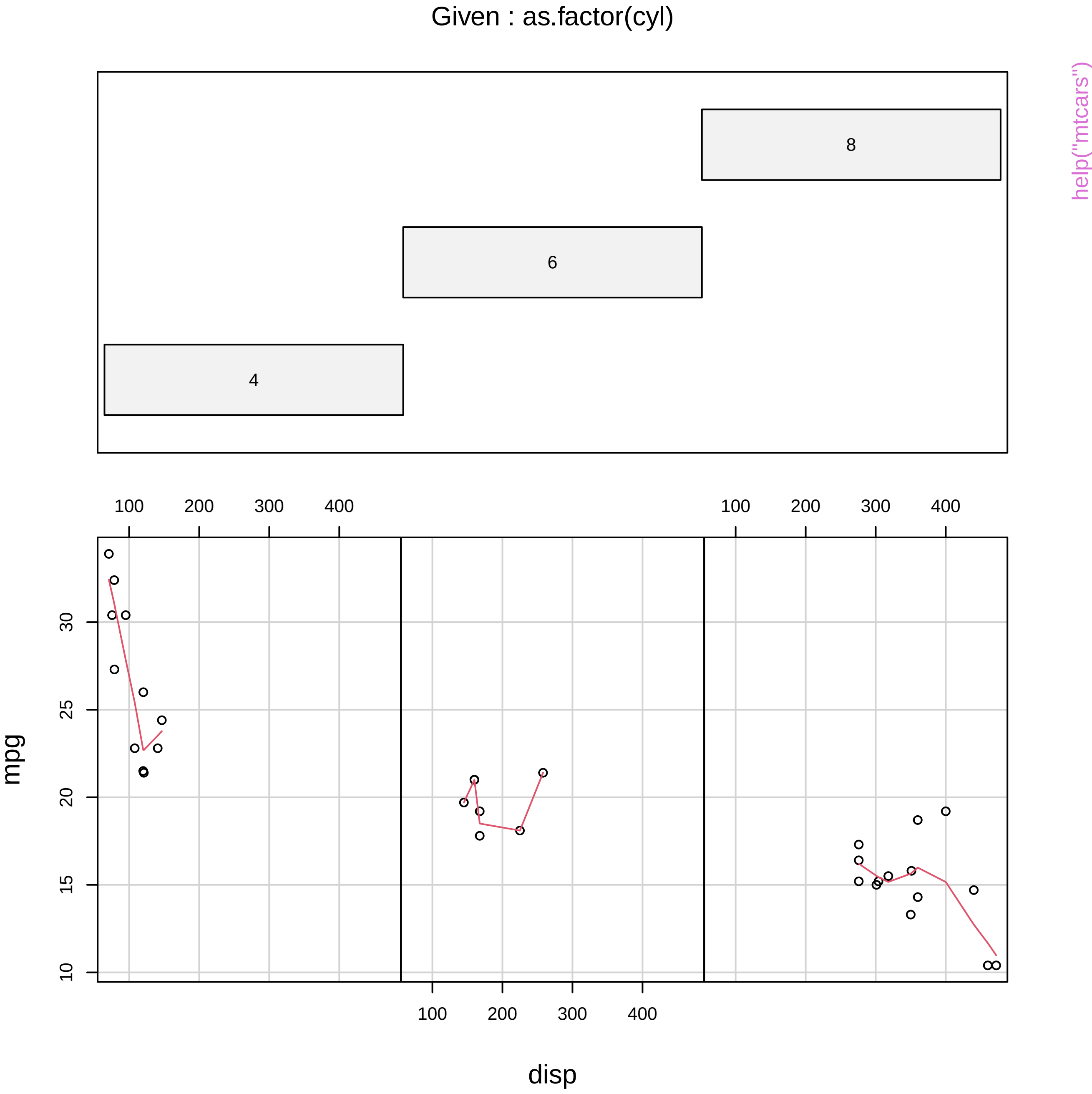

longley data
GNP.deflator
GNP
Unemployed
Armed.Forces
Population
Year
Employed
250
400
550
150
250
350
1950
1960
115
100
85
550
400
250
350
200
350
250
150
130
120
110
1960
1950
68
64
60
85
100
115
200
350
110
120
130
60
64
68
help("longley")

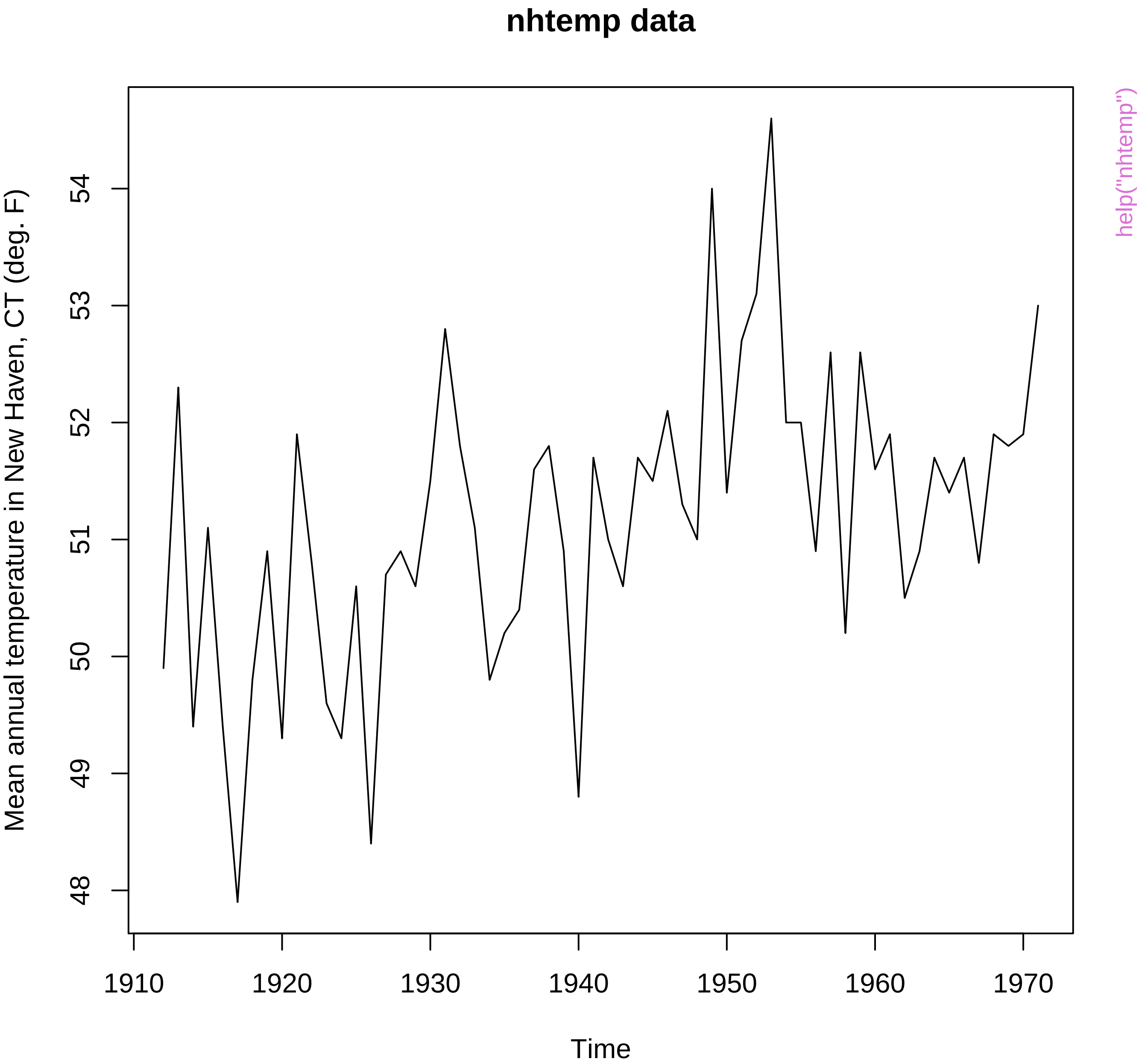

lm(Employed ~ .)
Residuals vs Fitted
Residuals
0.4
0.2
0.0
−0.2
−0.4
1956
1961
1950
60
62
64
66
68
70
Fitted values
Normal Q−Q
Standardized residuals
2
1
0
−1
1956
1951
1950
−2
−1
0
1
2
Theoretical Quantiles
help("longley")
Scale−Location
√|Standardized residuals|
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1950
1951
1956
60
62
64
66
68
70
Fitted values
Residuals vs Leverage
Standardized residuals
2
1
0
−1
−2
1951
1962
1950
1
0.5
0.5
1
Cook's distance
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Leverage

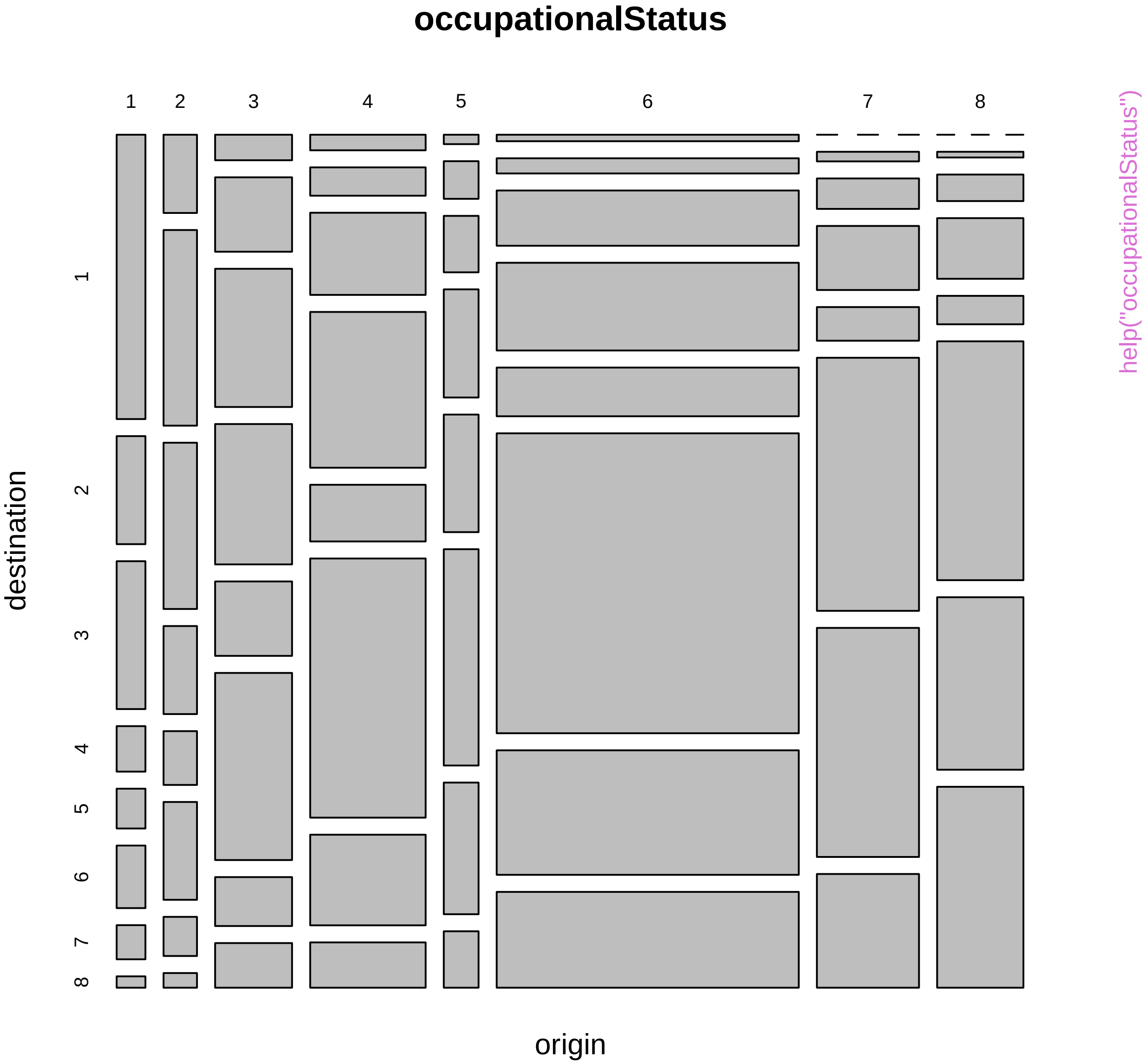


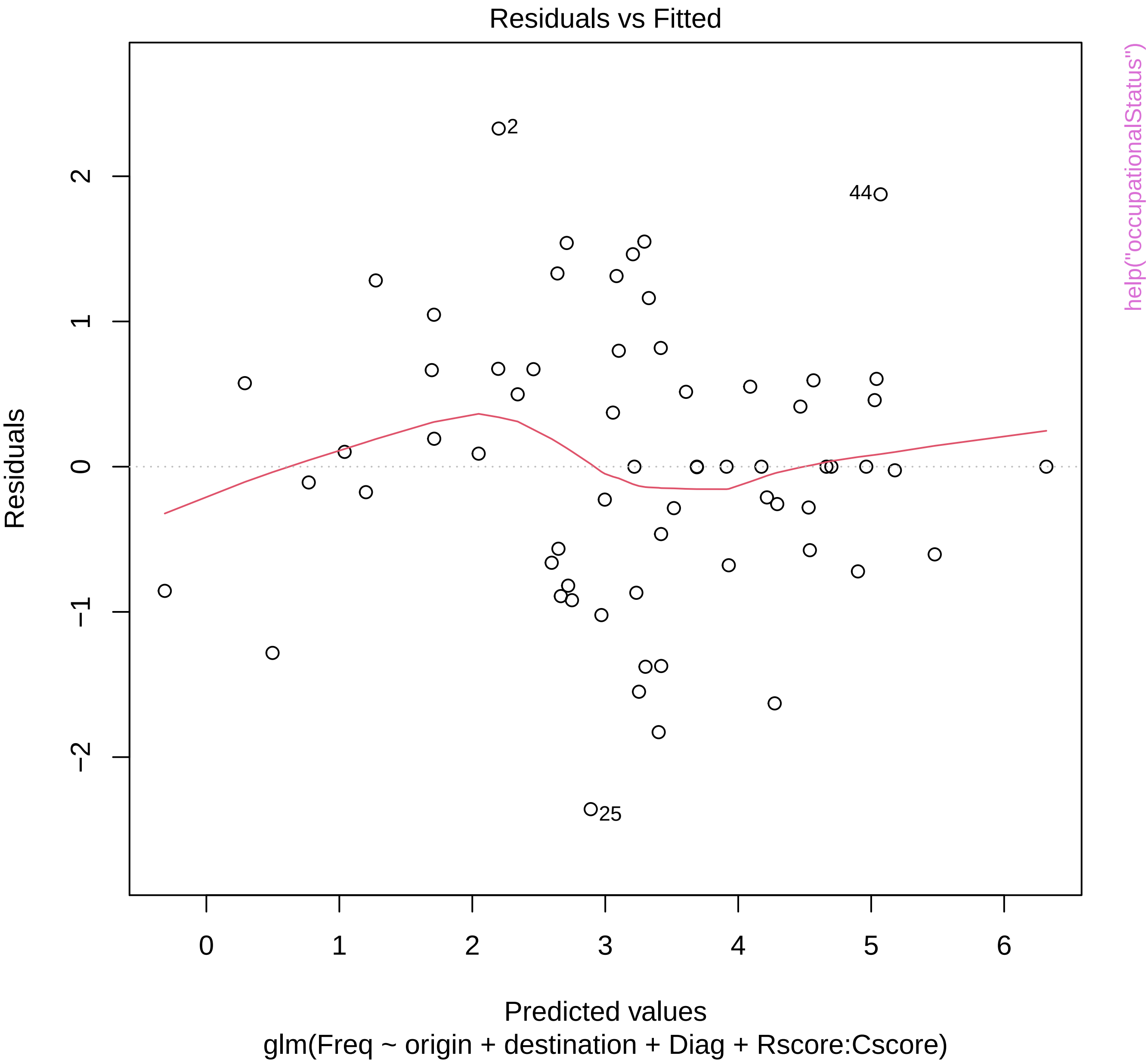
Speed of Light Data
Speed
1000
900
800
700
1
2
3
4
5
Experiment No.
help("morley")

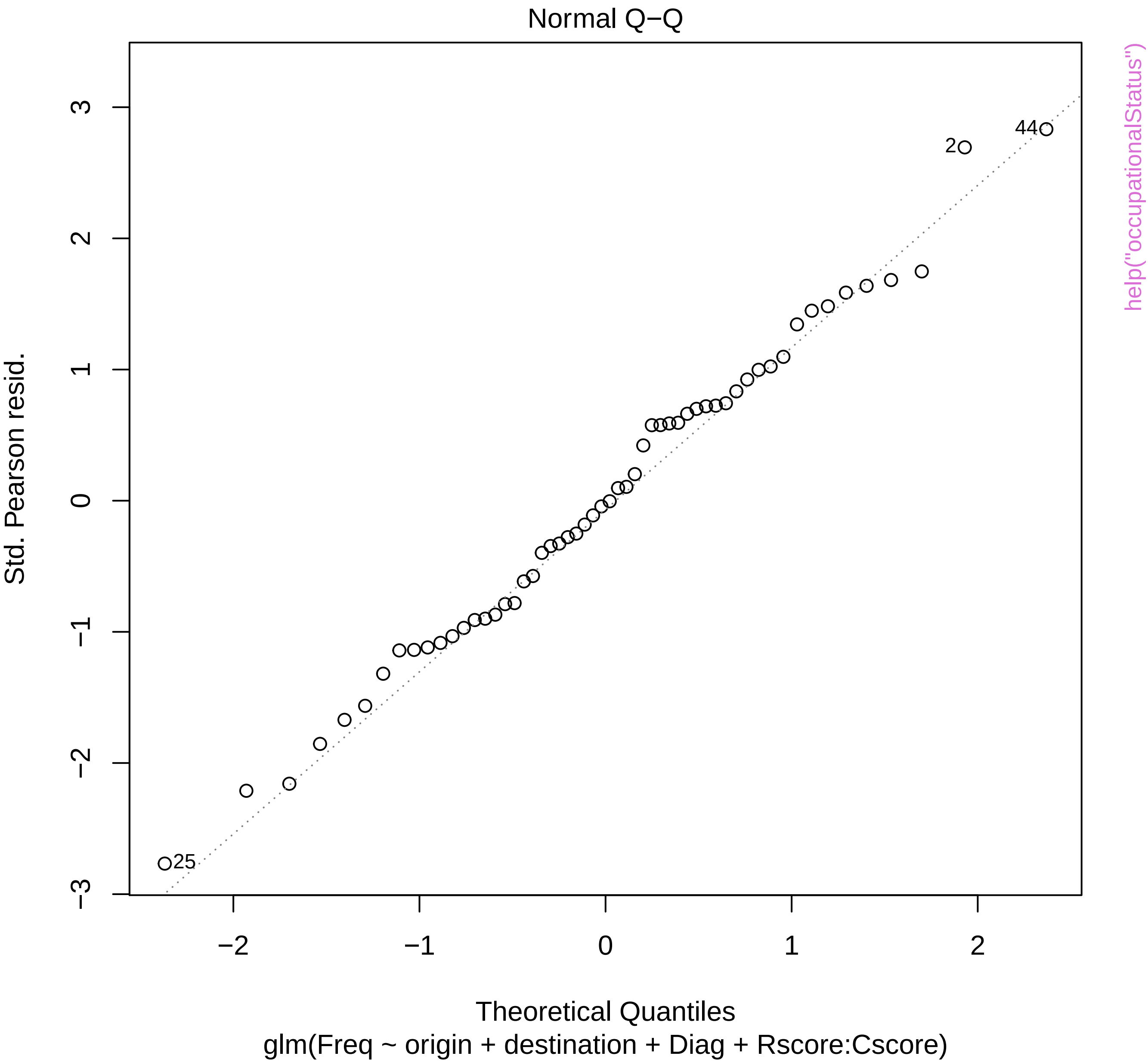

mtcars data
mpg
cyl
disp
hp
drat
wt
qsec
vs
am
gear
carb
4
6
8
50
200
2
4
0.0
0.6
3.0
4.5
25
10
8
6
4
400
100
250
50
4.5
3.0
4
2
22
16
0.0
0.6
0.6
0.0
4.5
3.0
7
4
1
10
25
100
400
3.0
4.5
16
20
0.0
0.6
1
4
7
help("mtcars")

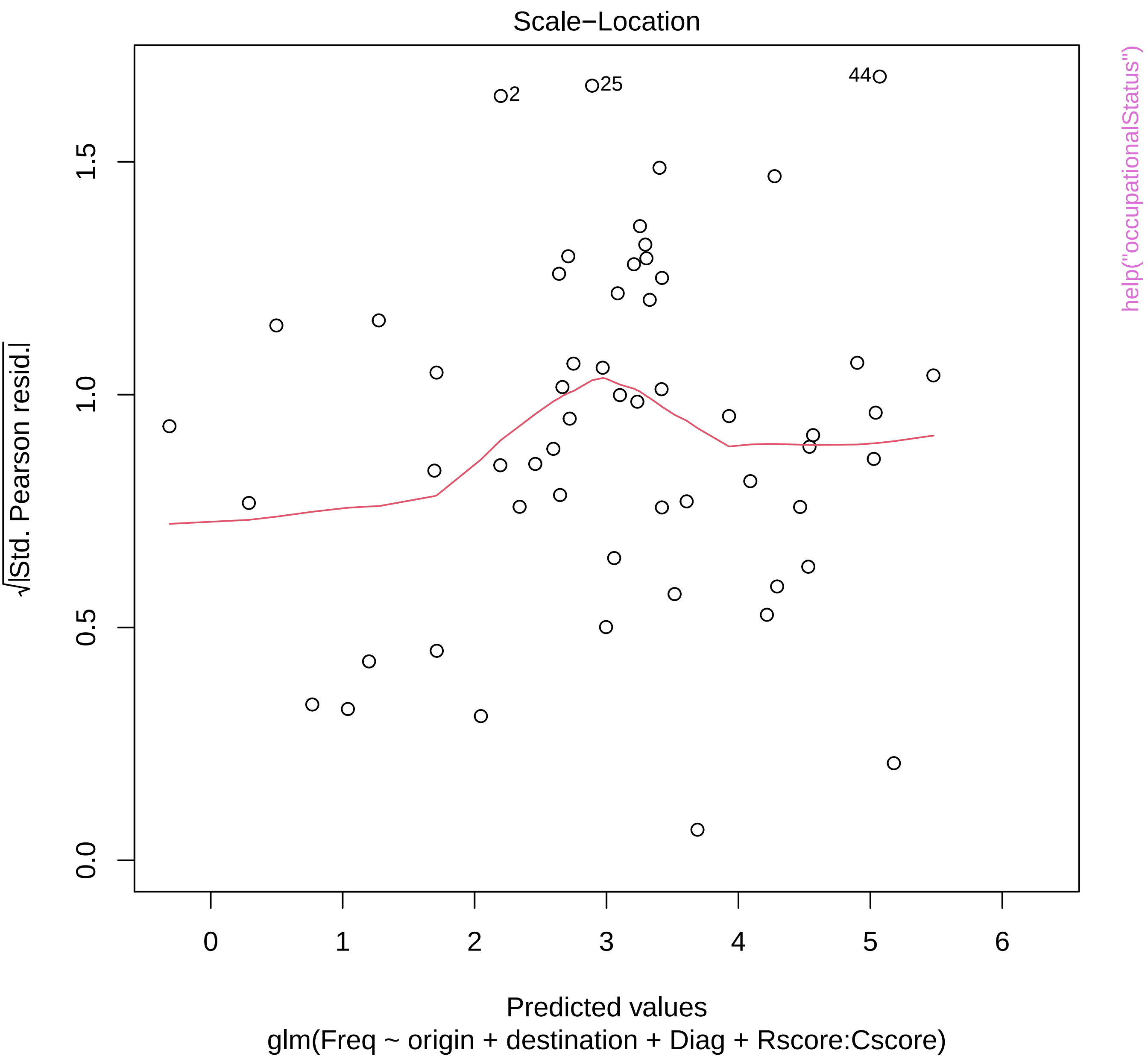

Given : as.factor(cyl)
8
6
4
help("mtcars")
100
200
300
400
100
200
300
400
mpg
30
25
20
15
10
100
200
300
400
disp

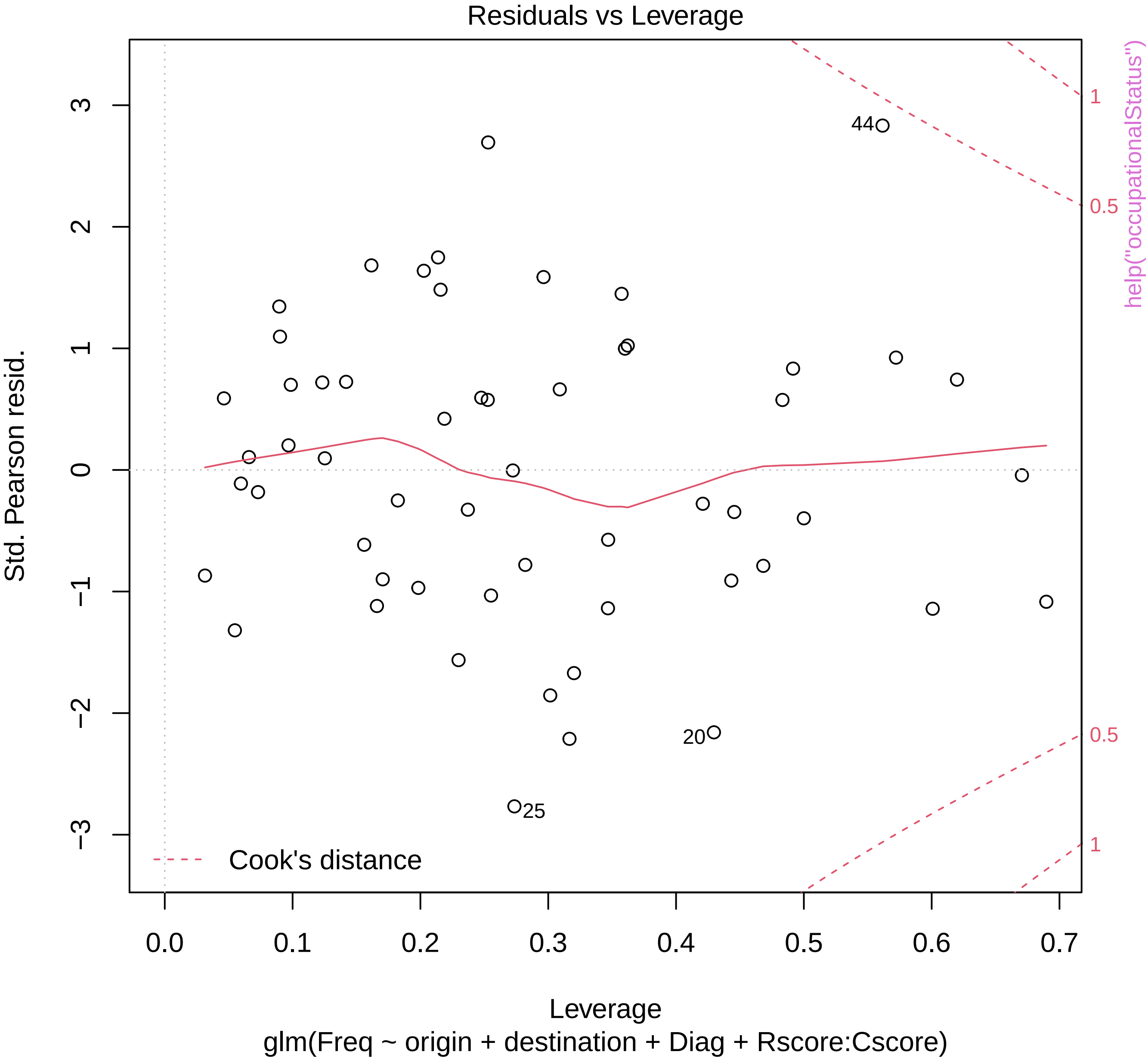

nhtemp data
Mean annual temperature in New Haven, CT (deg. F)
48
49
50
51
52
53
54
1910
1920
1930
1940
1950
1960
1970
Time
help("nhtemp")

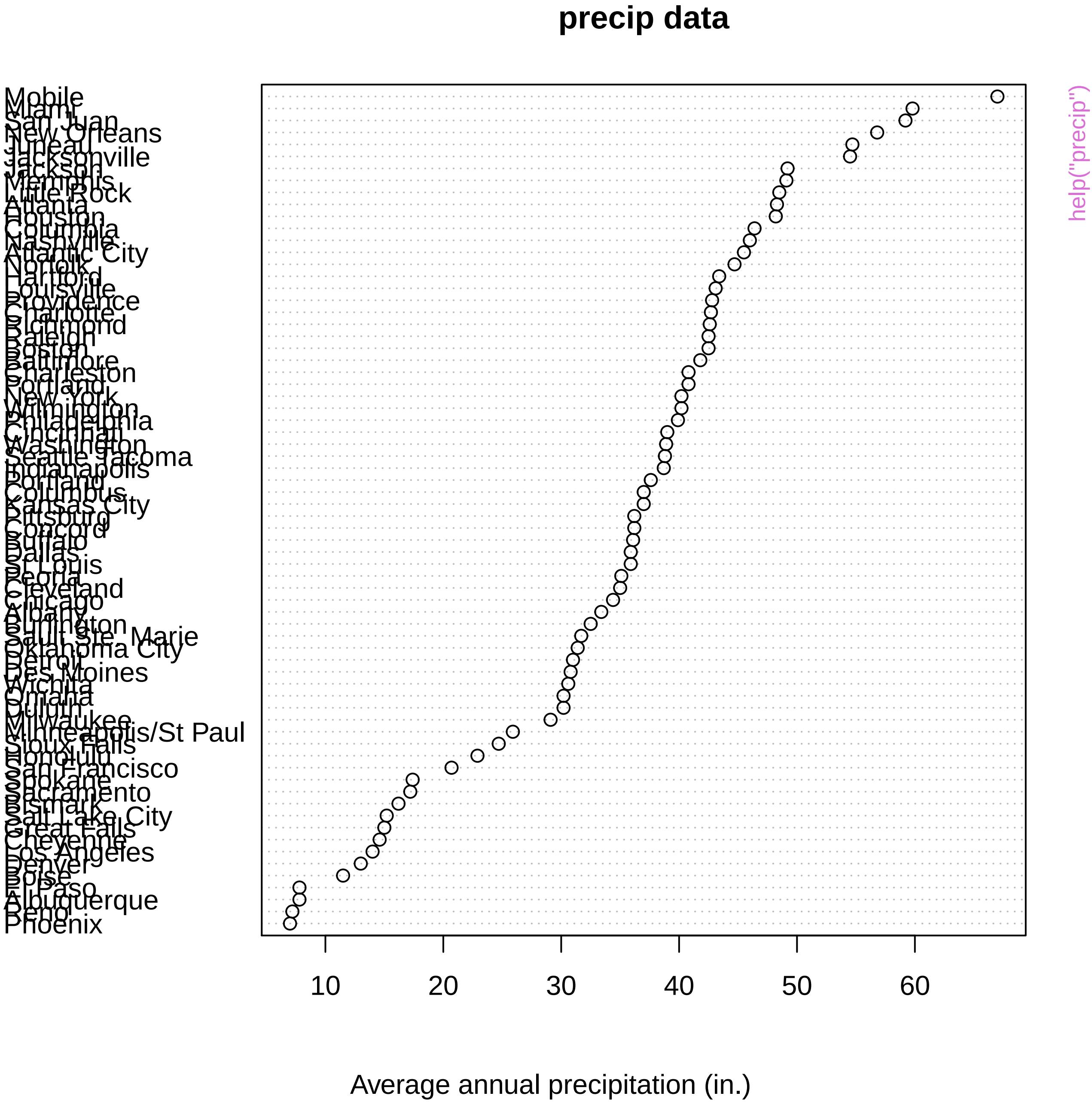

occupationalStatus
1
2
3
4
5
6
7
8
destination
1
2
3
4
5
6
7
8
origin
help("occupationalStatus")

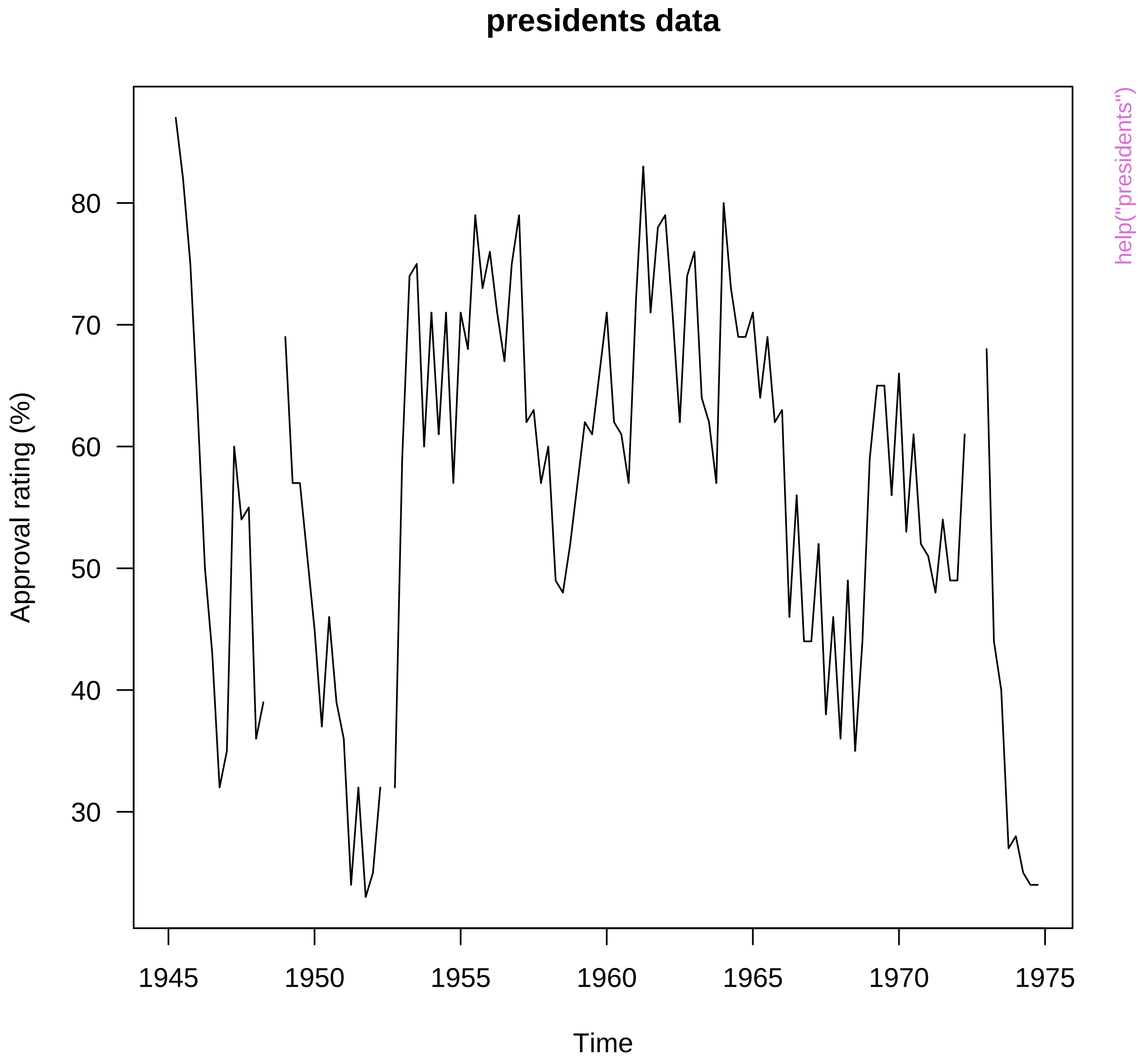

Residuals vs Fitted
Residuals
2
1
0
−1
−2
0
1
2
3
4
5
6
Predicted values
glm(Freq ~ origin + destination + Diag + Rscore:Cscore)
2
44
25
help("occupationalStatus")


Normal Q−Q
Std. Pearson resid.
Theoretical Quantiles
glm(Freq ~ origin + destination + Diag + Rscore:Cscore)
help("occupationalStatus")
−3
−2
−1
0
1
2
3
−2
−1
0
1
2
25
2
44

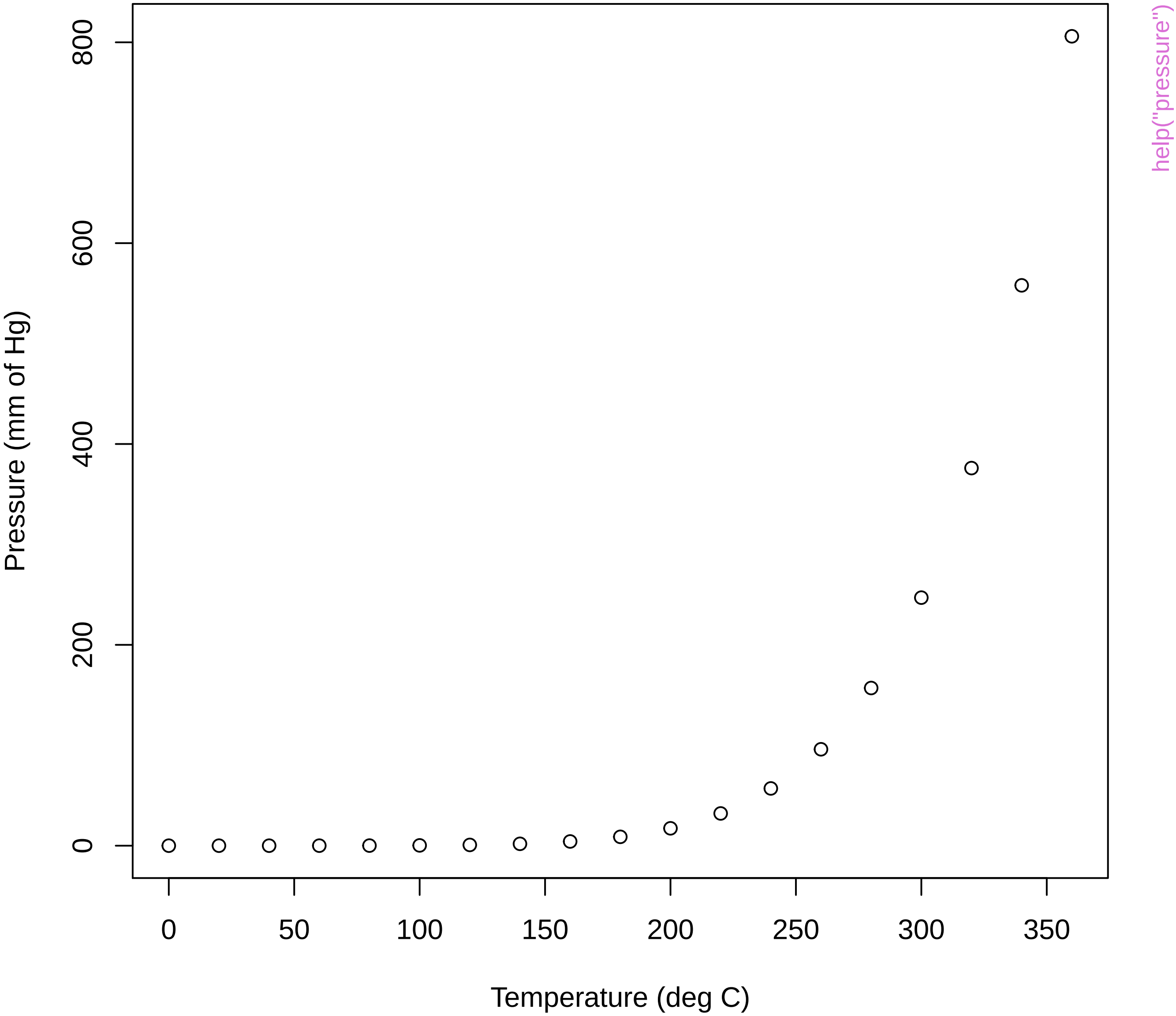

Scale−Location
1.5
1.0
0.5
0.0
√|Std. Pearson resid.|
0
1
2
3
4
5
6
2
25
44
Predicted values
glm(Freq ~ origin + destination + Diag + Rscore:Cscore)
help("occupationalStatus")

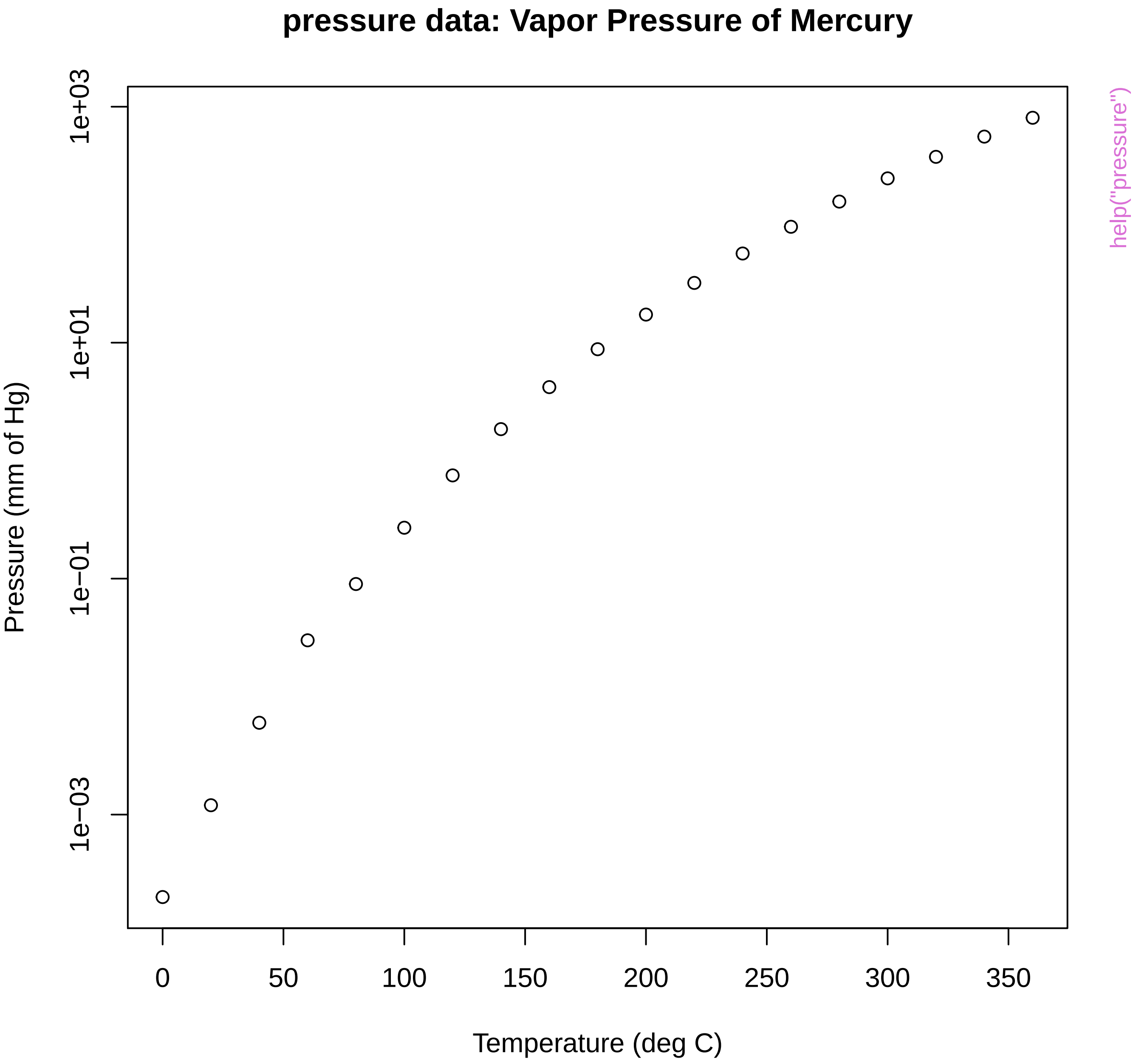

Residuals vs Leverage
Std. Pearson resid.
3
2
1
0
−1
−2
−3
Leverage
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
44
20
25
1
0.5
0.5
1
Cook's distance
help("occupationalStatus")
glm(Freq ~ origin + destination + Diag + Rscore:Cscore)


precip data
Mobile
Miami
San Juan
New Orleans
Juneau
Jacksonville
Jackson
Memphis
Little Rock
Atlanta
Houston
Columbia
Nashville
Atlantic City
Norfolk
Hartford
Louisville
Providence
Charlotte
Richmond
Raleigh
Boston
Baltimore
Charleston
Portland
New York
Wilmington
Philadelphia
Cincinnati
Washington
Seattle Tacoma
Indianapolis
Portland
Columbus
Kansas City
Pittsburg
Concord
Buffalo
Dallas
St Louis
Peoria
Cleveland
Chicago
Albany
Burlington
Sault Ste. Marie
Oklahoma City
Detroit
Des Moines
Wichita
Omaha
Duluth
Milwaukee
Minneapolis/St Paul
Sioux Falls
Honolulu
San Francisco
Spokane
Sacramento
Bismark
Salt Lake City
Great Falls
Cheyenne
Los Angeles
Denver
Boise
El Paso
Albuquerque
Reno
Phoenix
10
20
30
40
50
60
Average annual precipitation (in.)
help("precip")

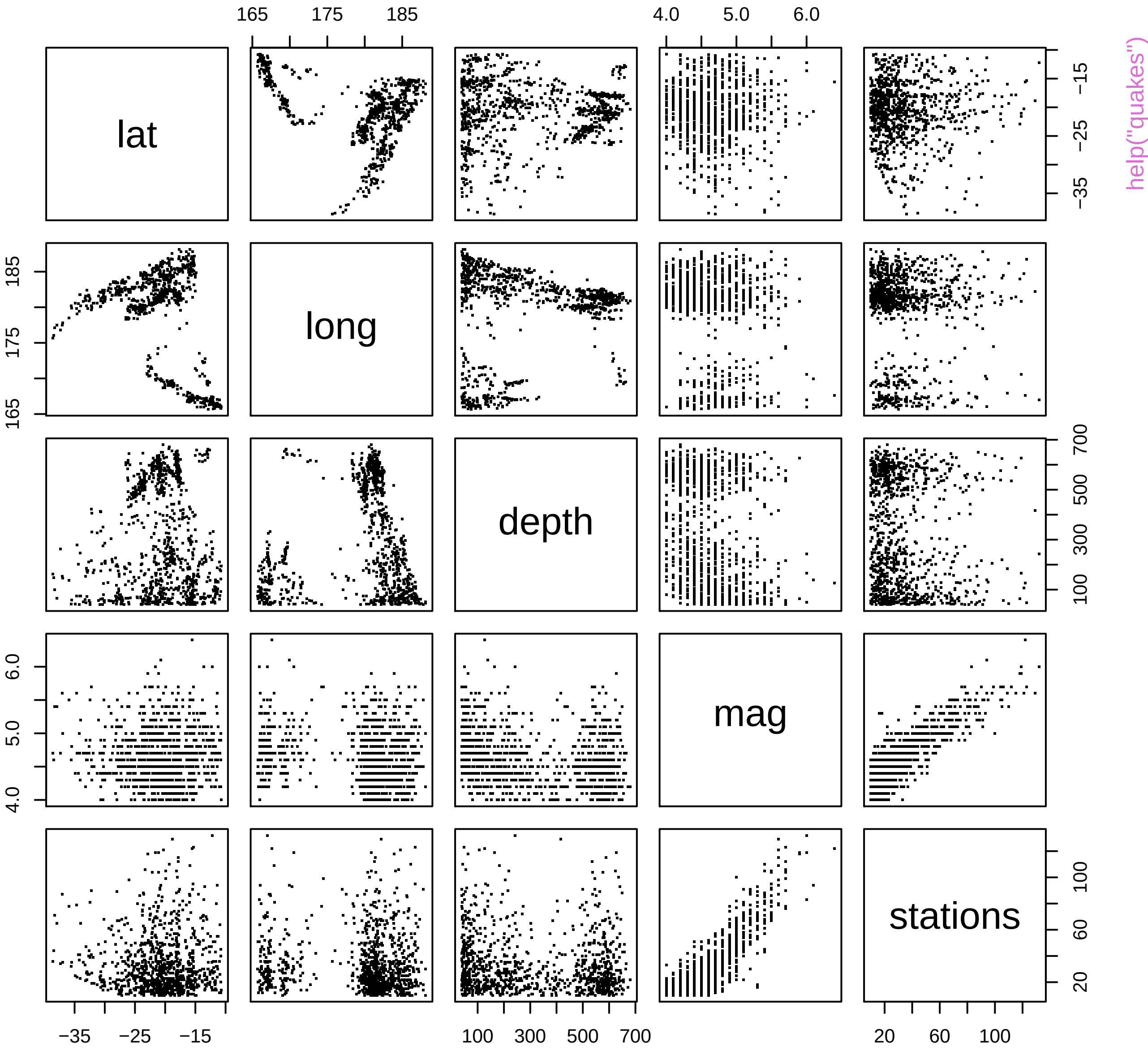

presidents data
Approval rating (%)
80
70
60
50
40
30
1945
1950
1955
1960
1965
1970
1975
Time
help("presidents")

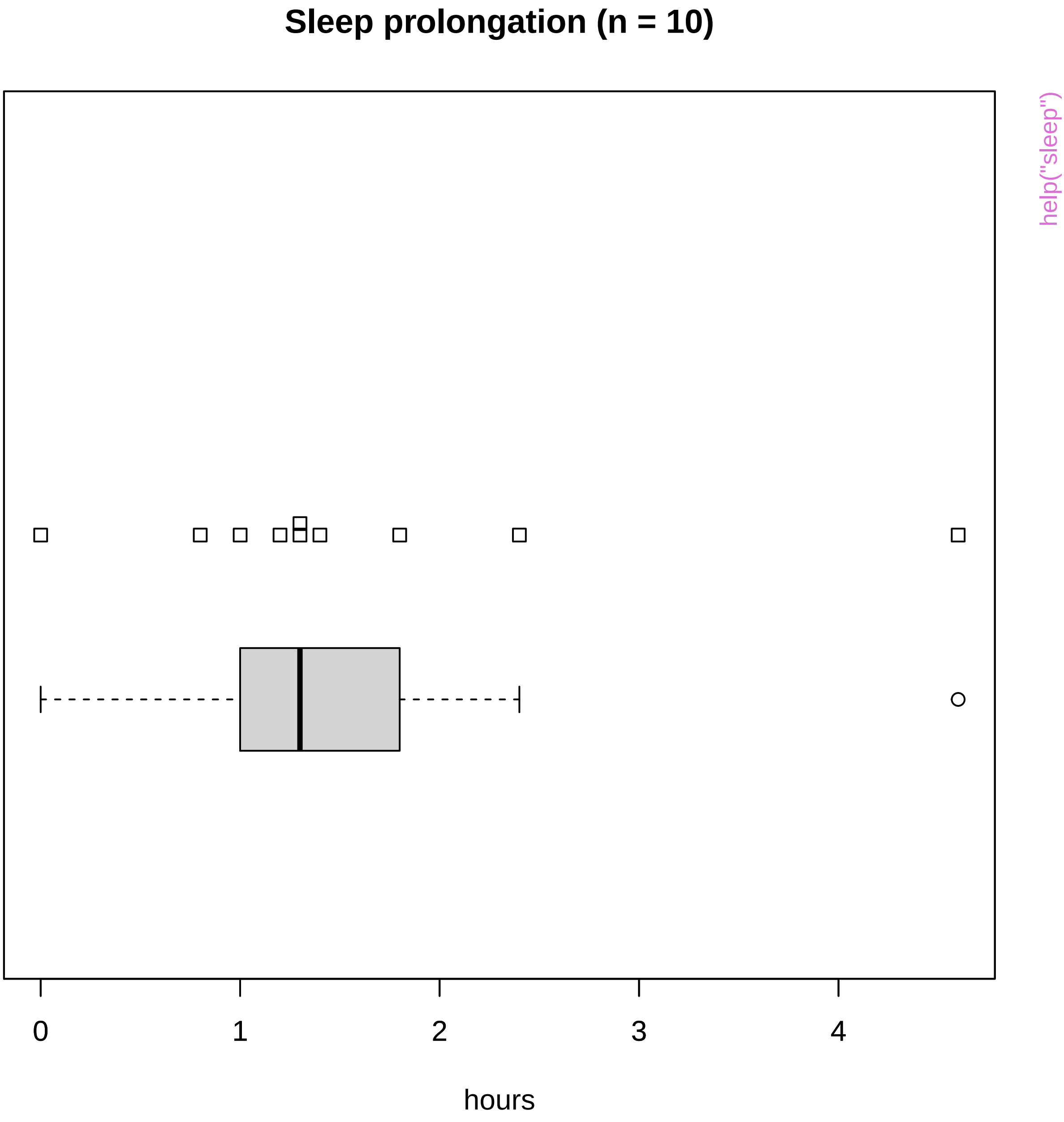
pressure data: Vapor Pressure of Mercury



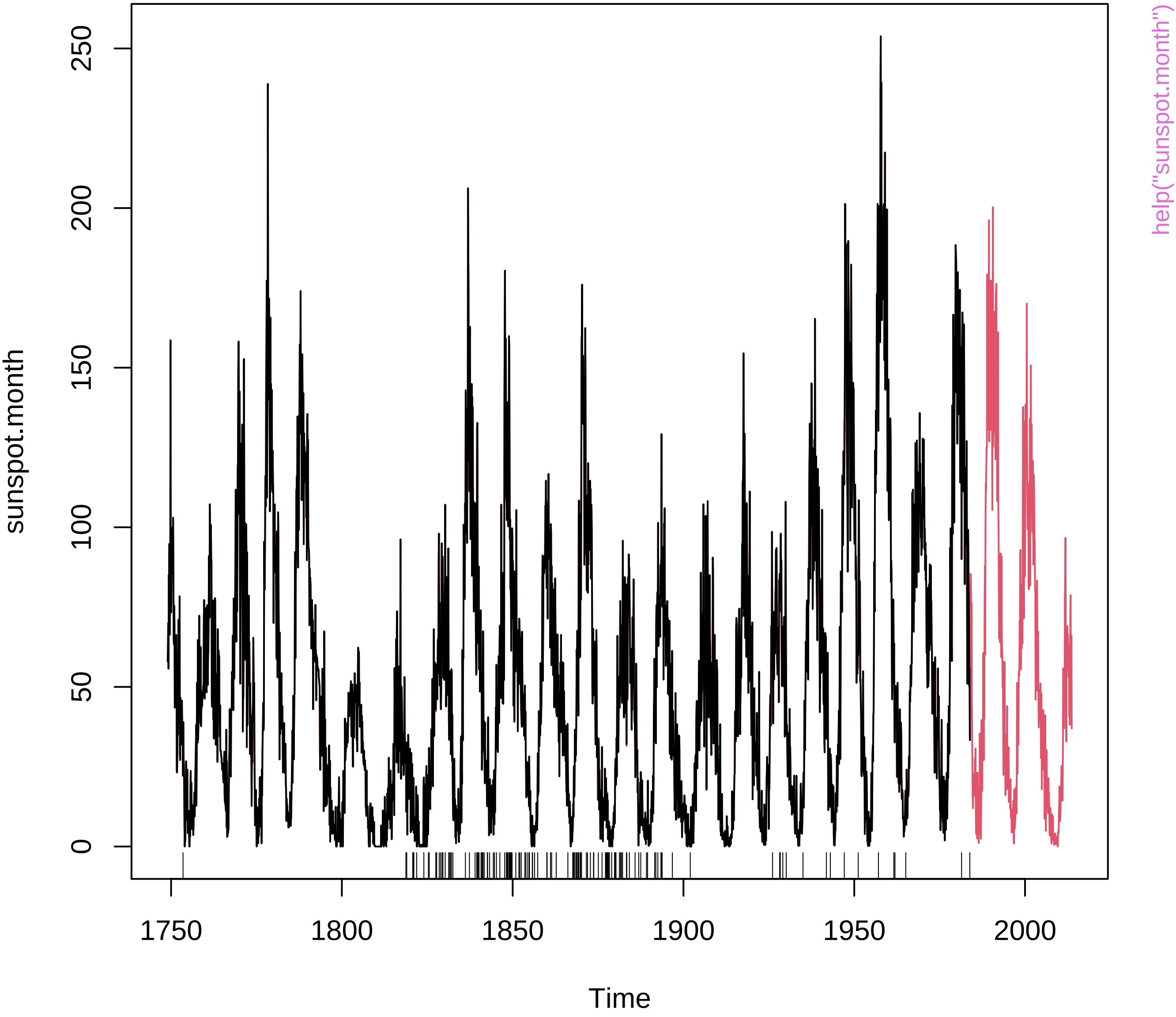

pressure data: Vapor Pressure of Mercury
1e+03
1e+01
1e−01
1e−03
Pressure (mm of Hg)
0
50
100
150
200
250
300
350
Temperature (deg C)
help("pressure")

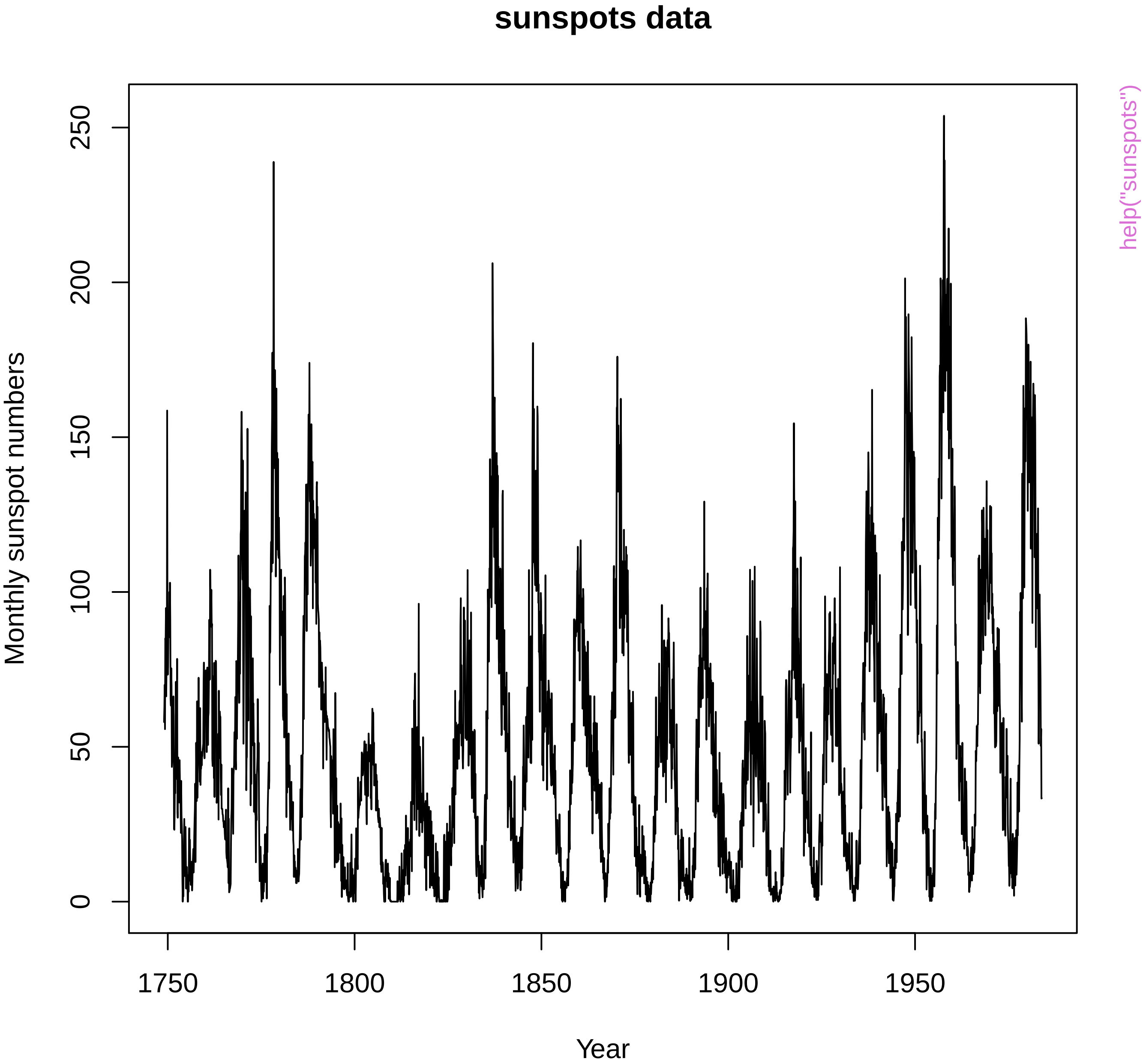
Fiji Earthquakes, N = 1000

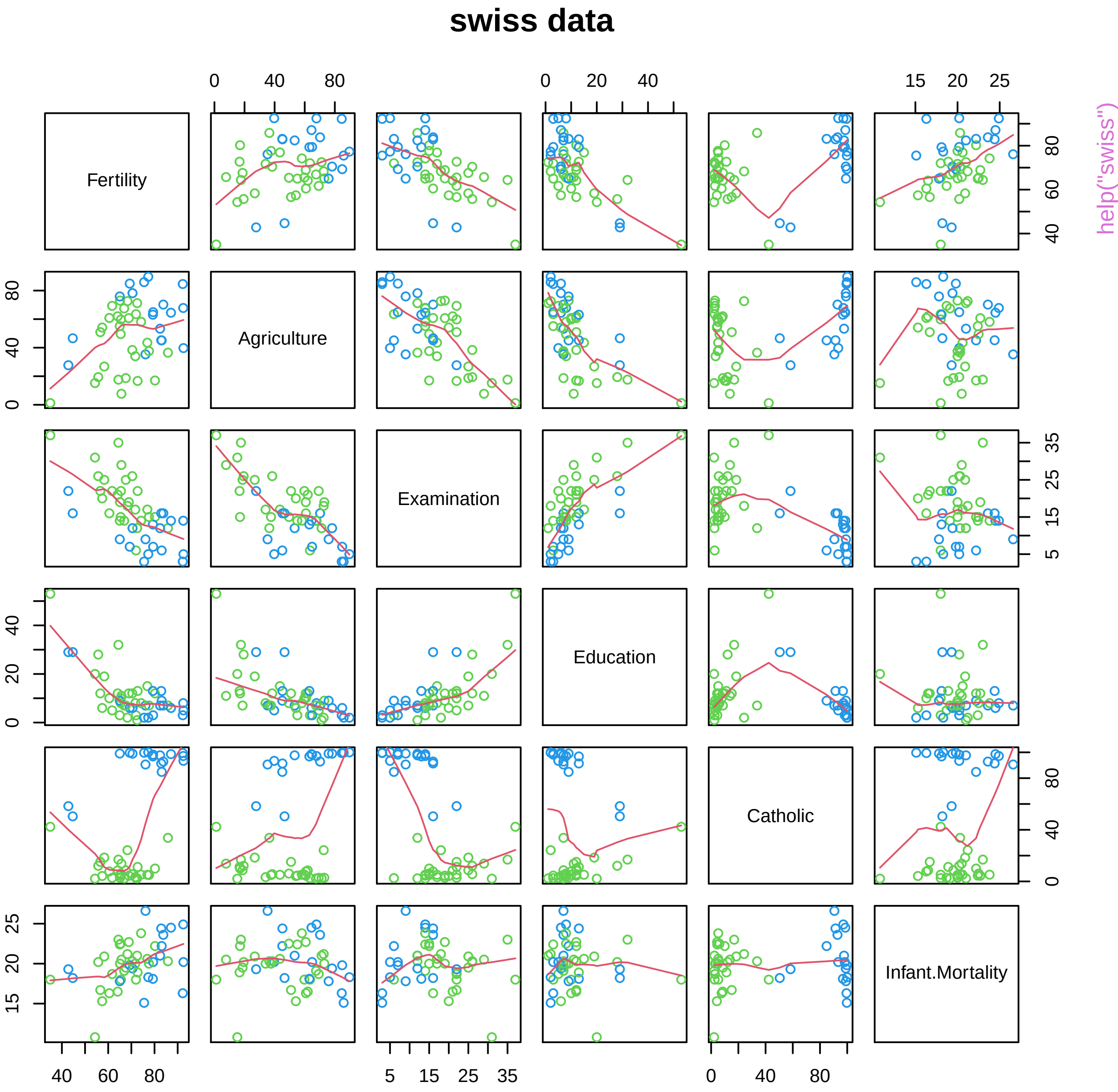


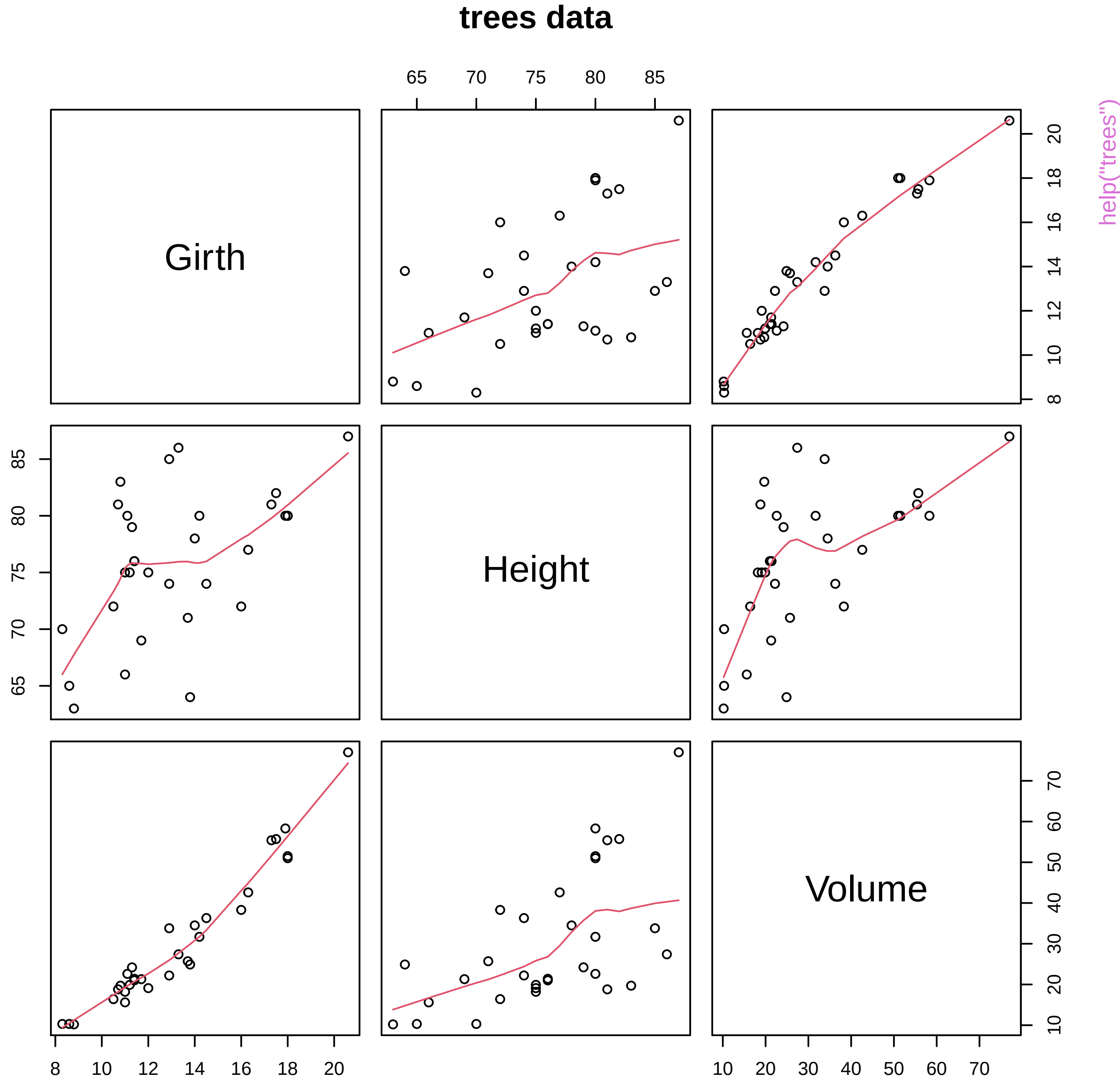

Sleep prolongation (n = 10)
0
1
2
3
4
hours
help("sleep")

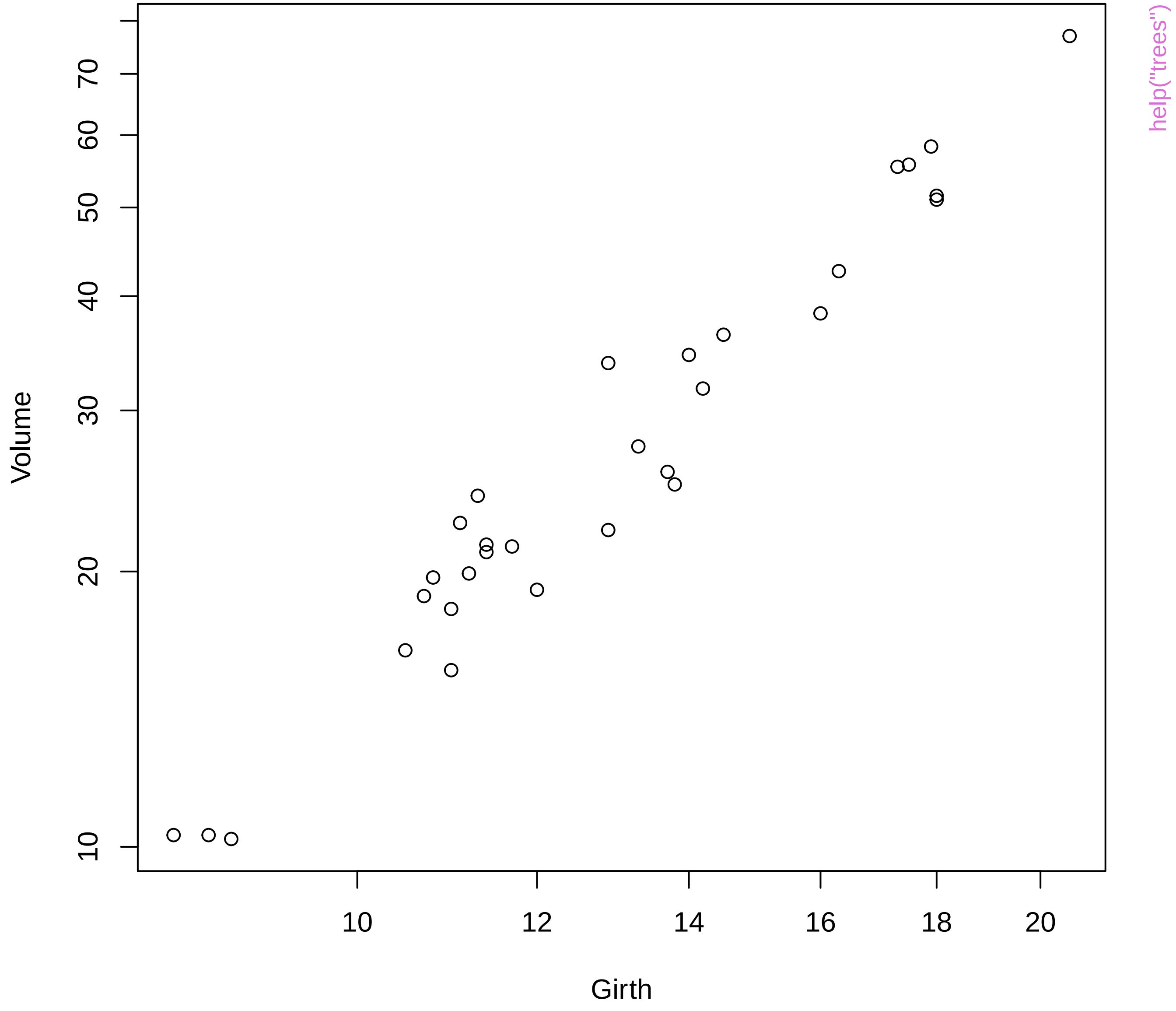
sunspot.month & sunspots [package'datasets']

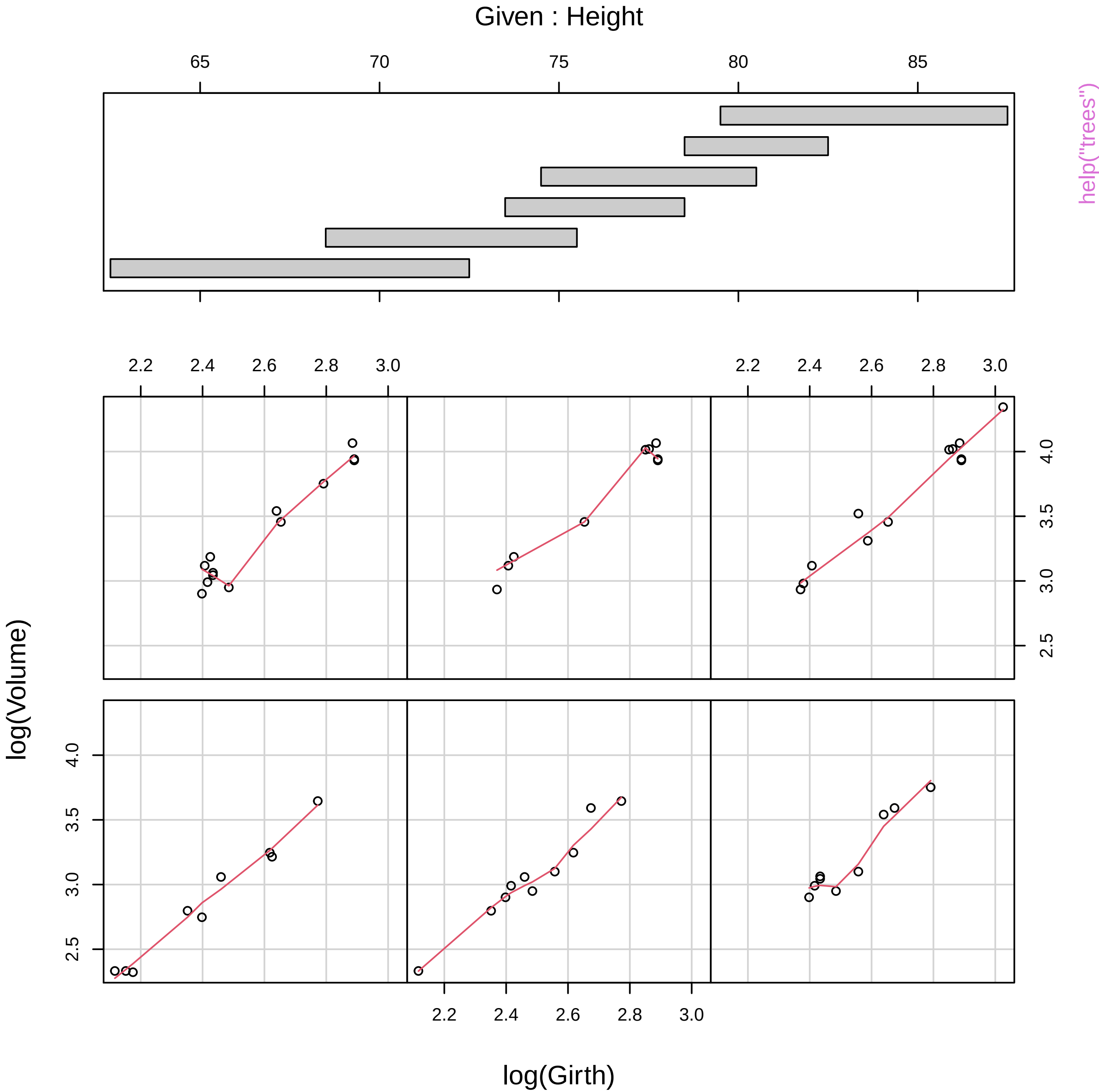


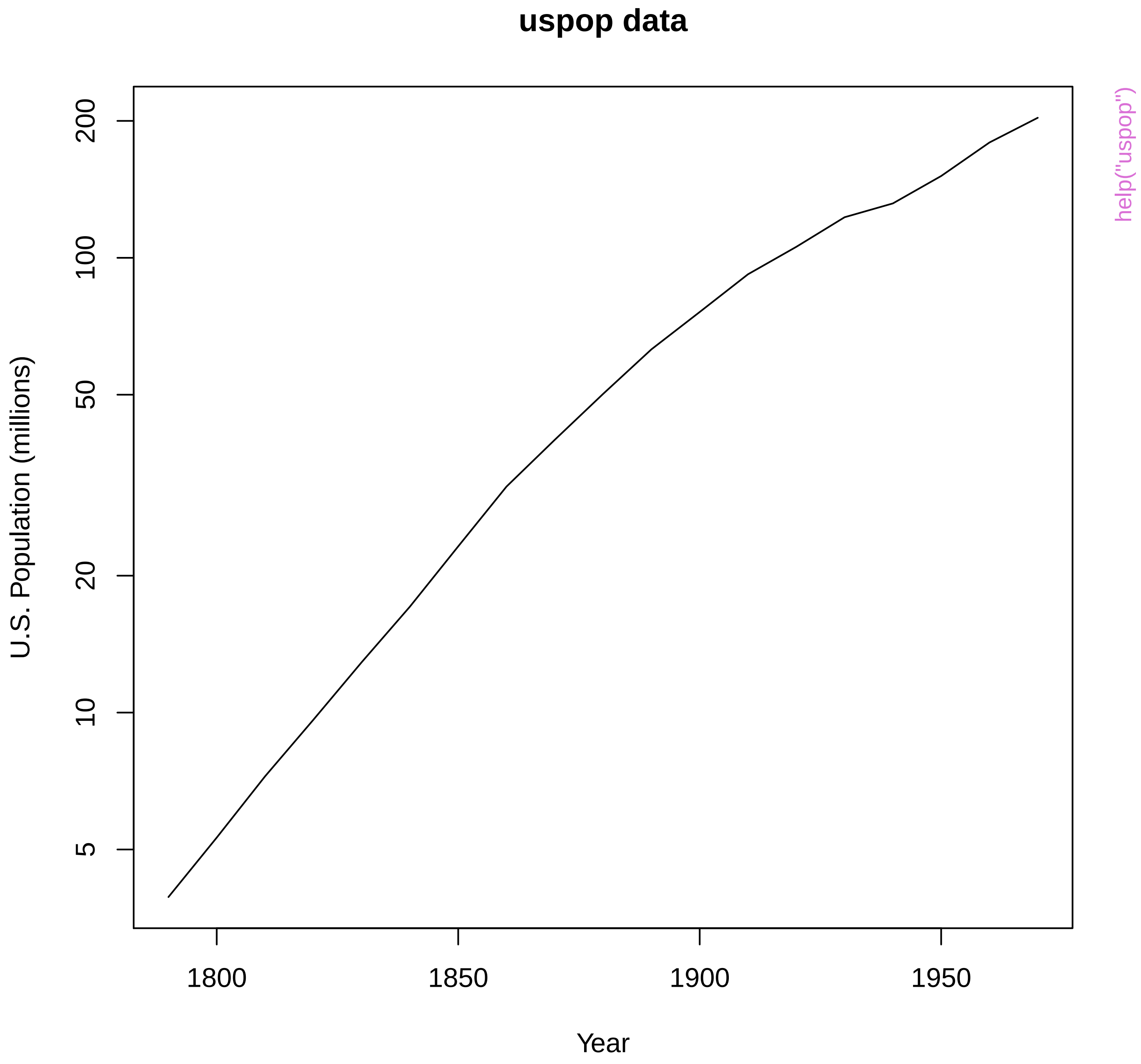

sunspots data
Monthly sunspot numbers
0
50
100
150
200
250
1750
1800
1850
1900
1950
Year
help("sunspots")


swiss data
Fertility
Agriculture
Examination
Education
Catholic
Infant.Mortality
help("swiss")
0
40
80
0
20
40
15
20
25
40
60
80
0
40
80
5
15
25
35
0
40
80
0
20
40
5
15
25
35
0
40
80
15
20
25

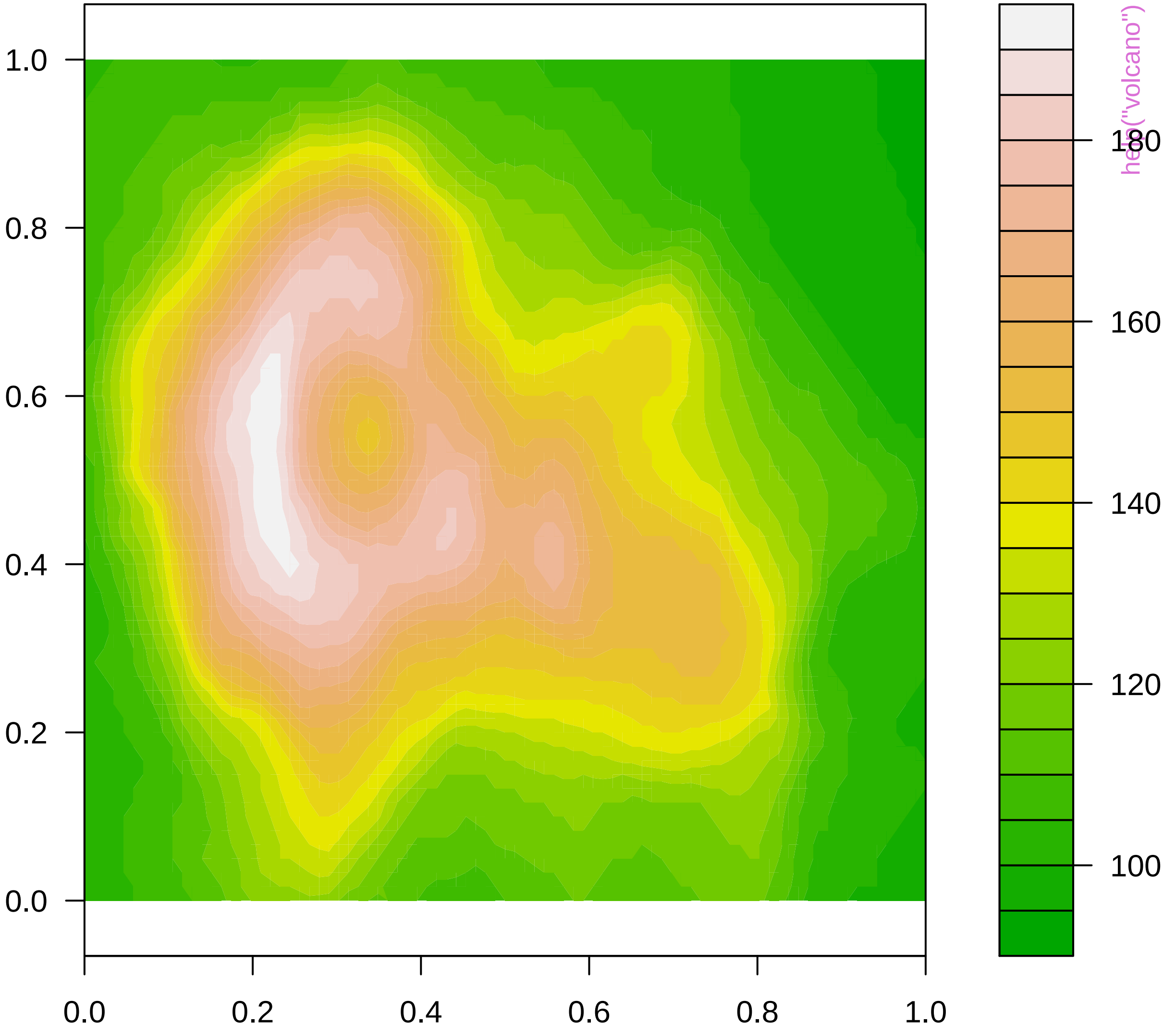

trees data
Girth
Height
Volume
65
70
75
80
85
20
18
16
14
12
10
8
85
80
75
70
65
70
60
50
40
30
20
10
8
10
12
14
16
18
20
10
20
30
40
50
60
70
help("trees")

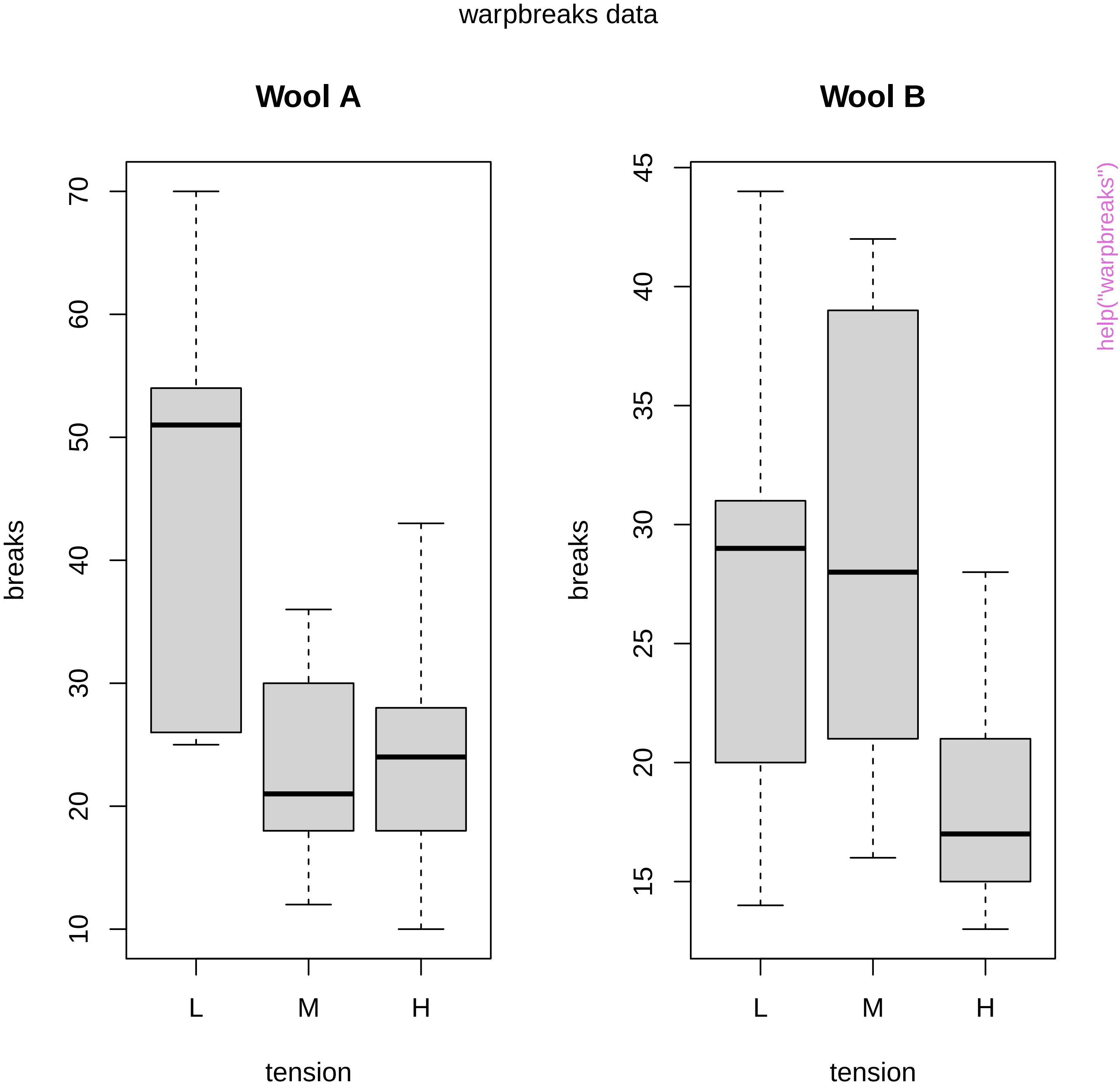

Volume
10
20
30
40
50
60
70
10
12
14
16
18
20
Girth
help("trees")

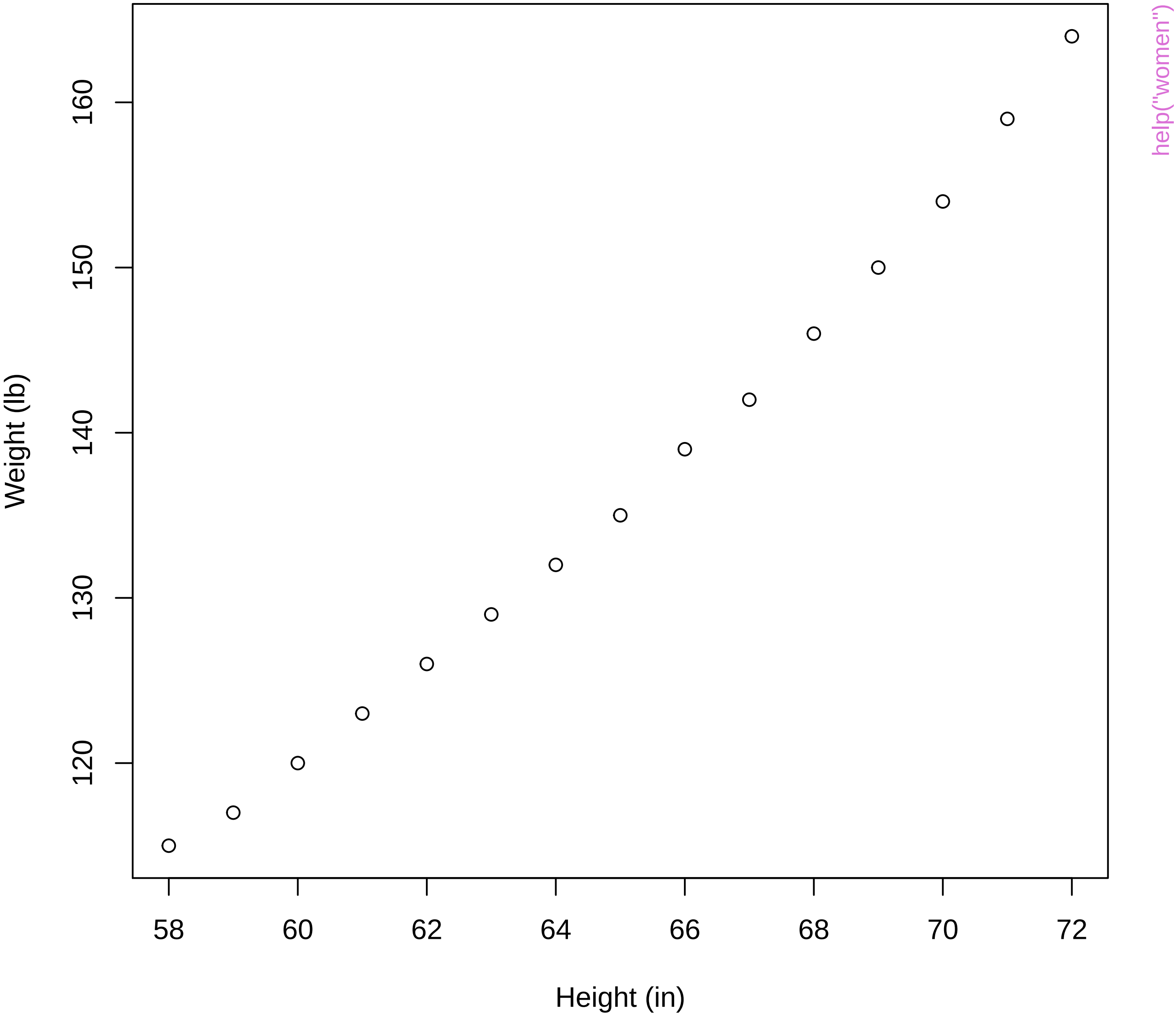

Given : Height
65
70
75
80
85
2.2
2.4
2.6
2.8
3.0
4.0
3.5
3.0
2.5
log(Volume)
log(Girth)
help("trees")


uspop data
U.S. Population (millions)
200
100
50
20
10
5
1800
1850
1900
1950
Year
help("uspop")

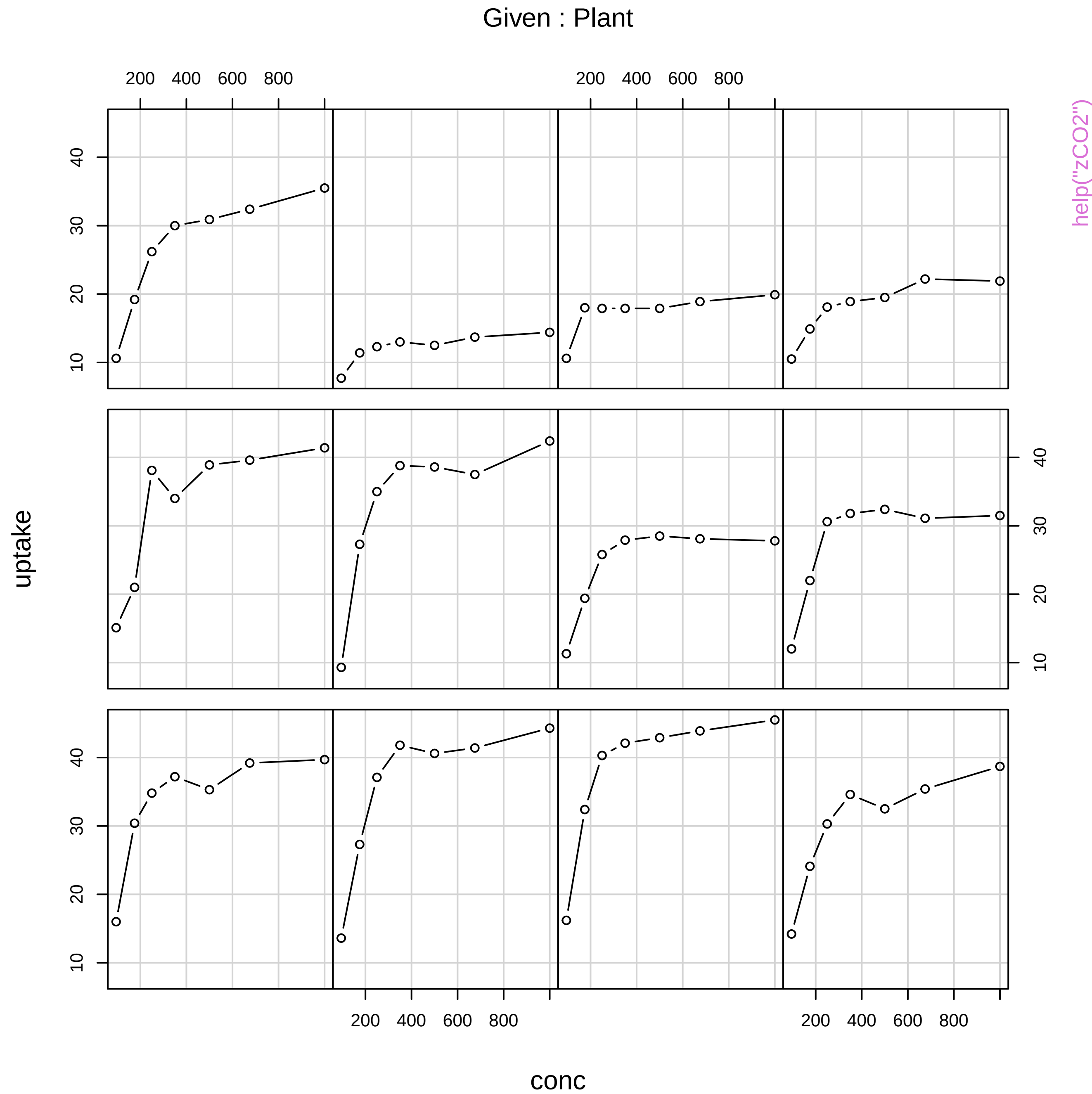
volcano data: filled contour map




warpbreaks data
Wool A
Wool B
breaks
breaks
10
20
30
40
50
60
70
15
20
25
30
35
40
45
L
M
H
L
M
H
tension
tension
help("warpbreaks")



women data: American women aged 30−39


Given : Plant
200
400
600
800
40
30
20
10
uptake
conc
help("zCO2")