Multiple Comparison Procedures To A Control

For AN(C)OVA Models

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Contents

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Basic Information

Automatic statistics for the file:

File
litter.csv

Your selection for the encoding: UTF-8
Your selection for the decimal character: .
Observations (rows with at least one non-missing value): 74
Variables (columns with at least one non-missing value): 4
Variables considered continuous: 2

Variables considered continuous
weight
number

Variables considered categorical: 2

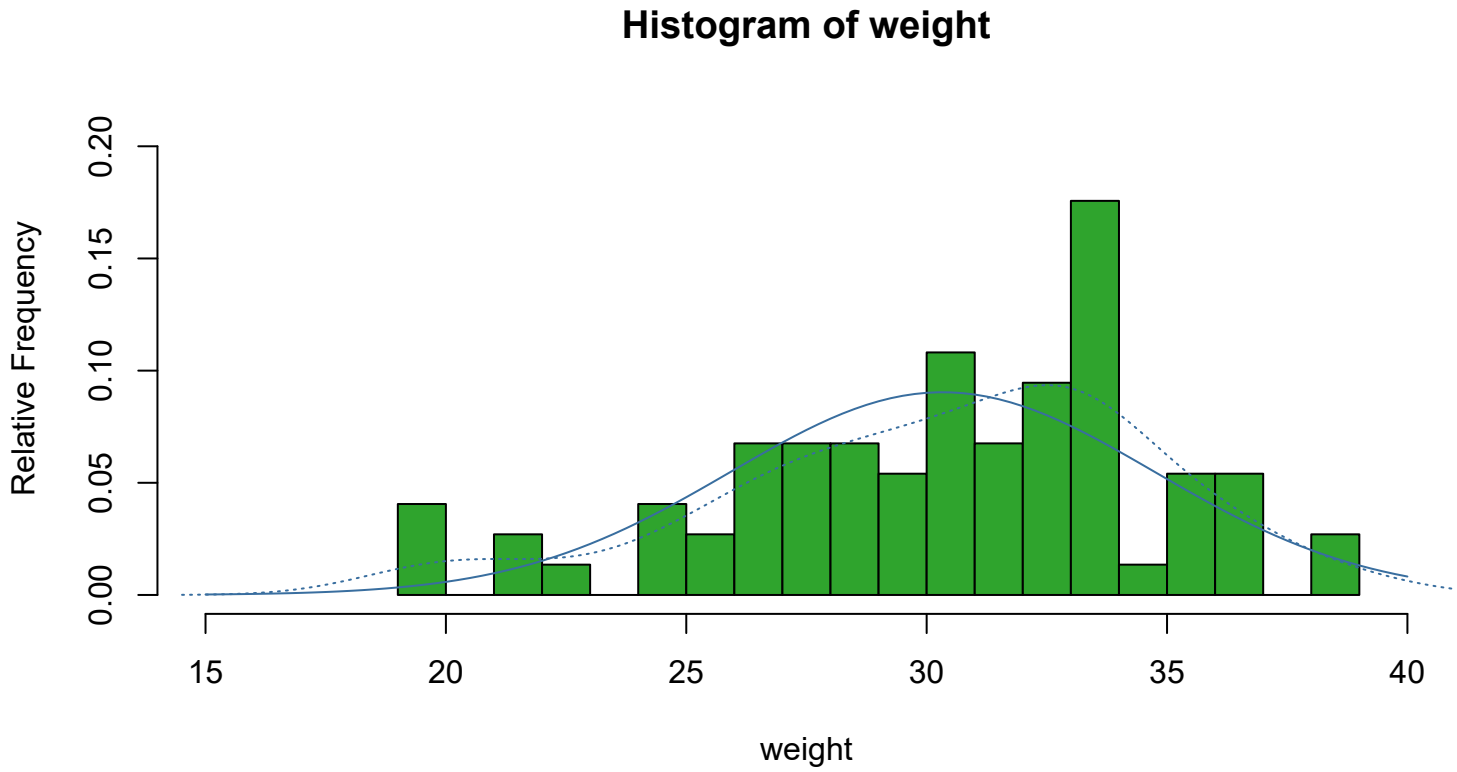
Variables considered categorical
dose
gesttime

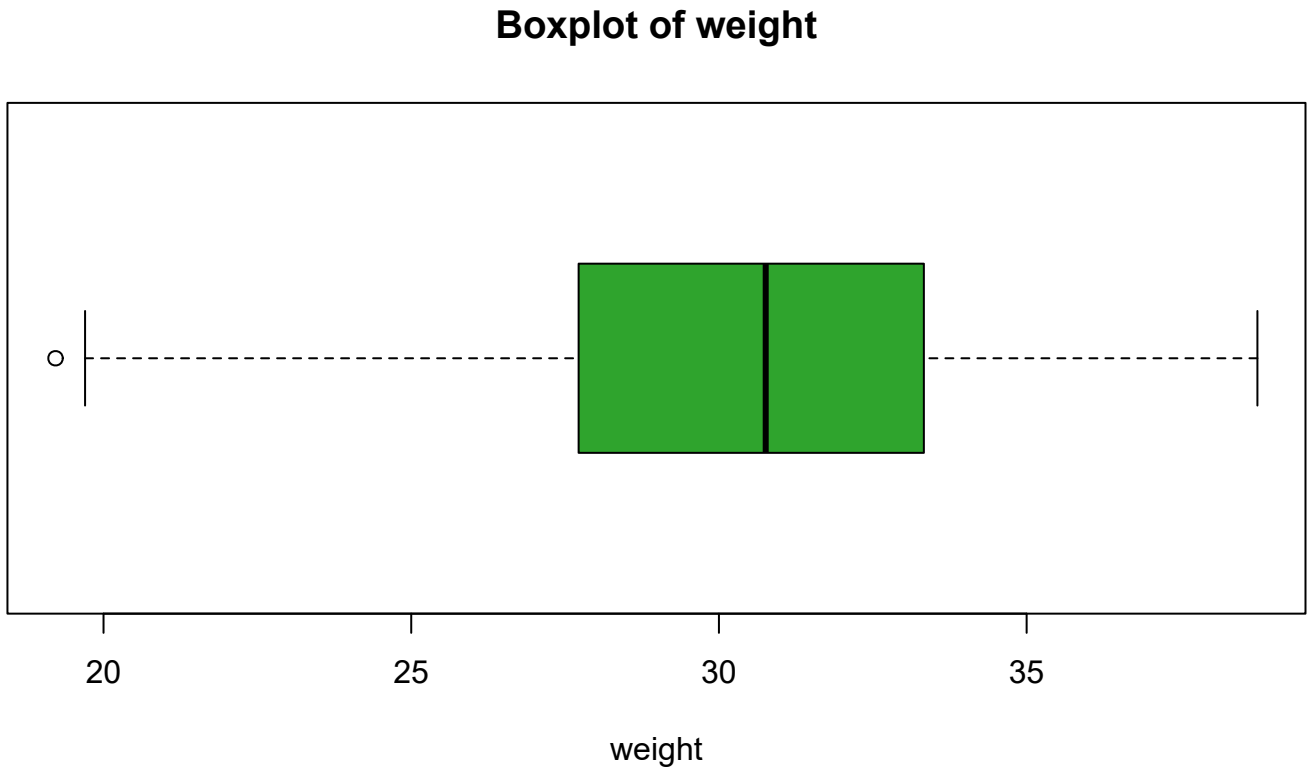
Model Information

You defined the following linear model: weight~dose+gesttime+number
You are interested in the factor: dose
You are interested in pairwise comparisons to the control factor level: 0

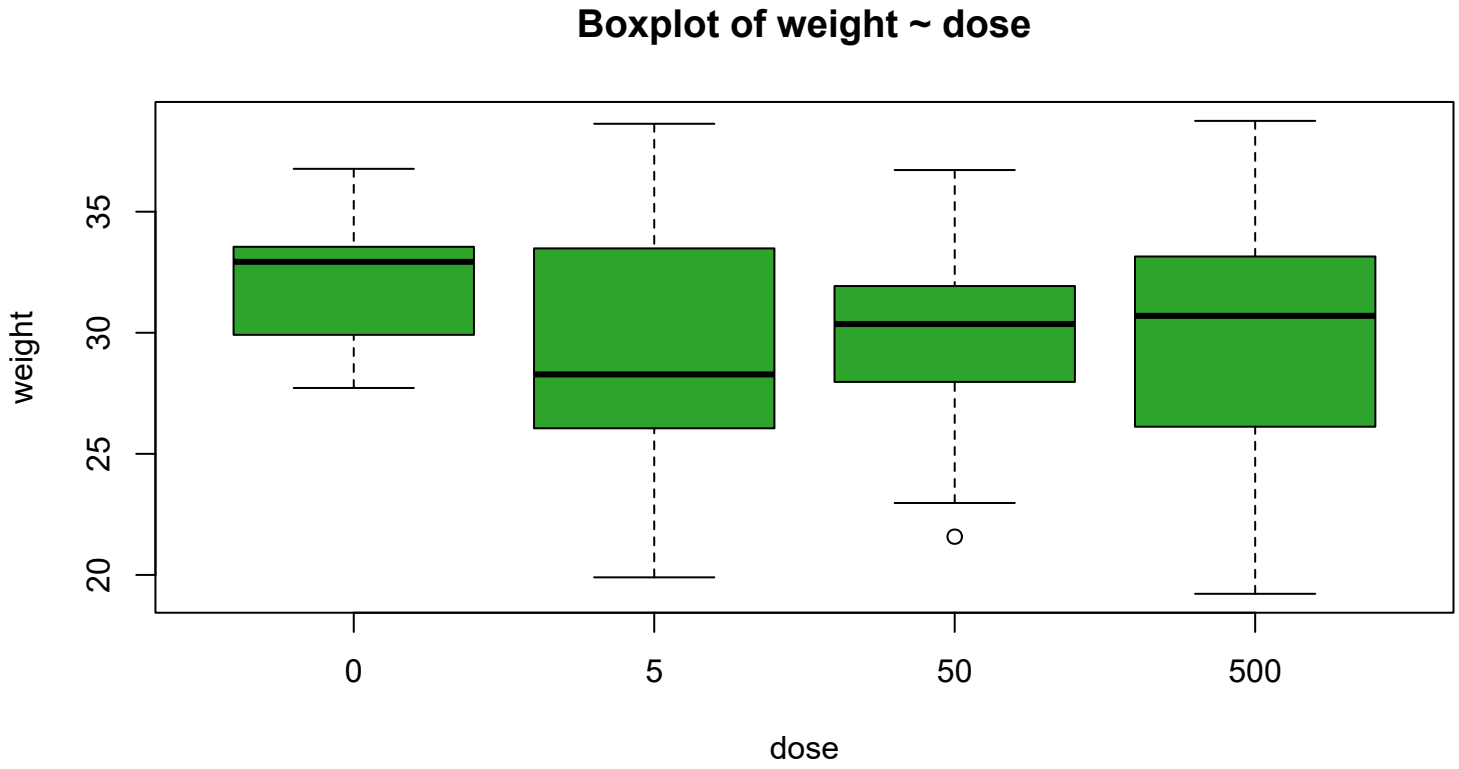
Descriptive Plots

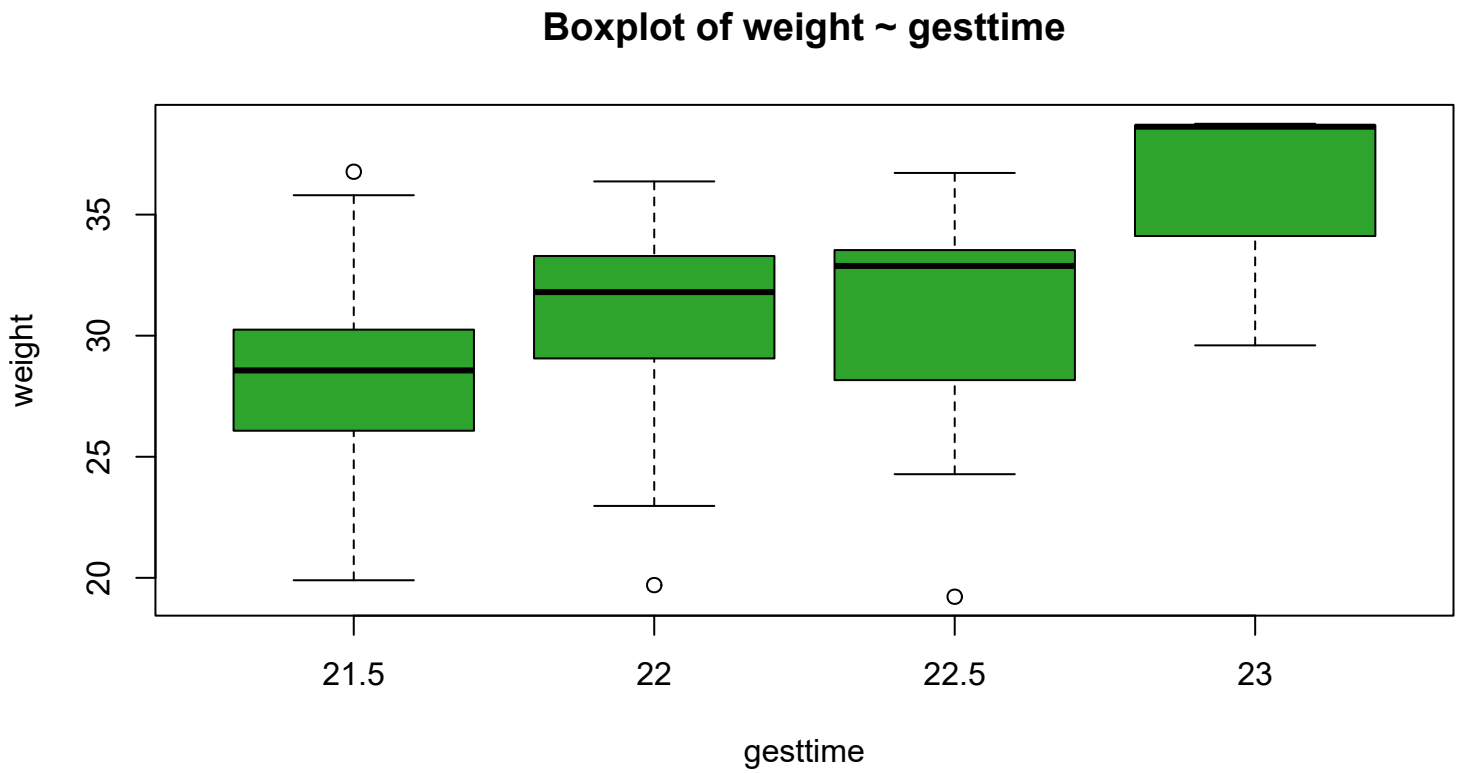
Dependent Variable



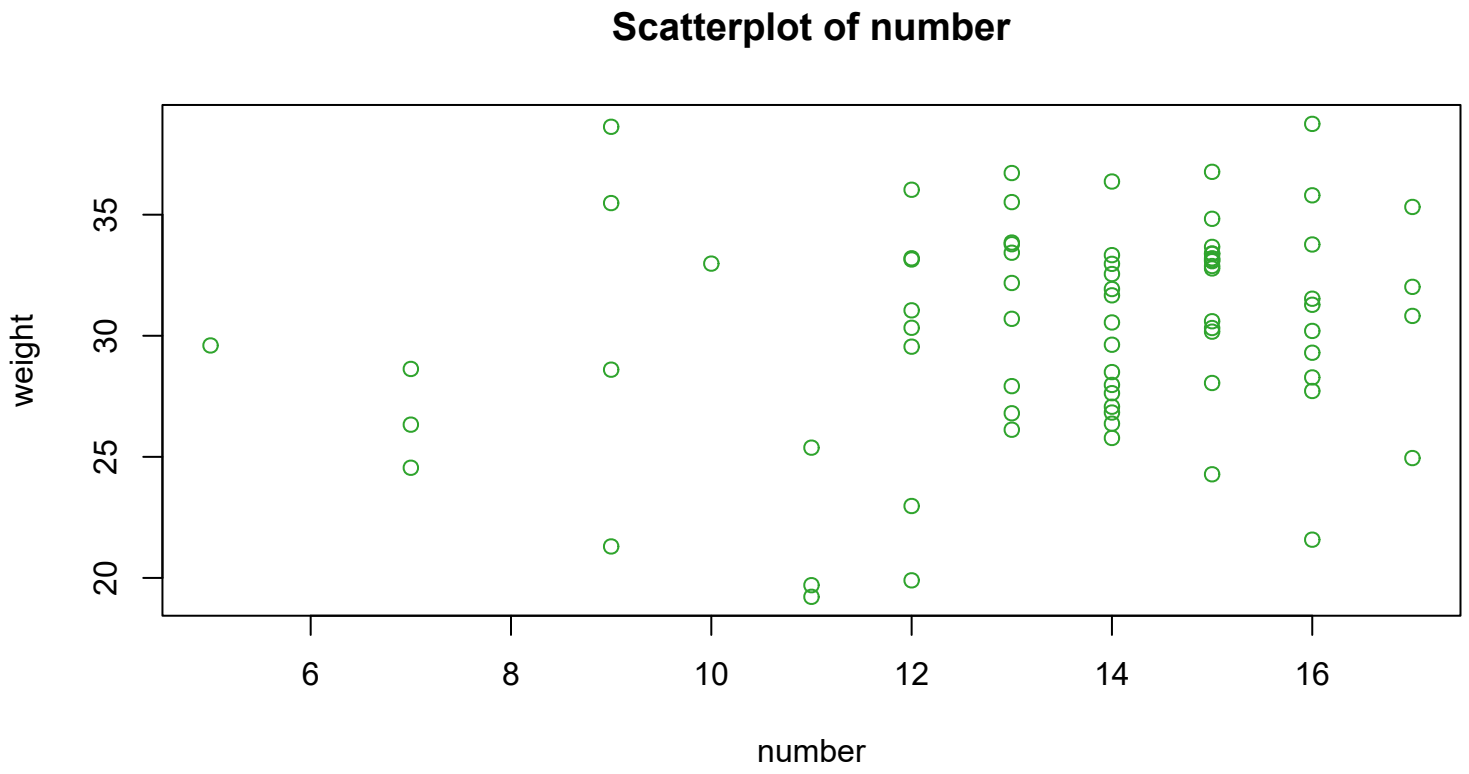

Boxplot of weight
20
25
30
35
weight

Dependent Against Categorical Factors




Boxplot of weight ~ gesttime
weight
20
25
30
35
21.5
22
22.5
23
gesttime

Dependent against Covariates



Interaction Plot for Factors

Note: The more parallel the lines, the less likely is the significance of the interaction of the factors.

Analysis of variance

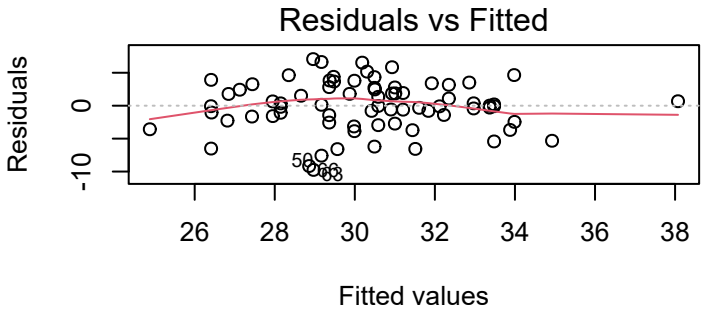
Effect of the separate expressions of the given variables (Parameter Estimates)

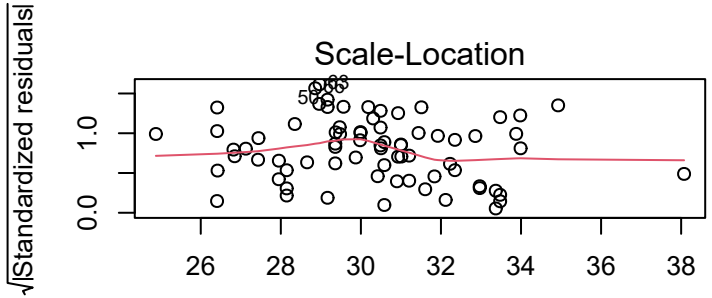
Variable	Value	Std.Error	T.value	P.value	sign. level[1]	Significance at 5 percent error
(Intercept)	24.86	2.60	9.57	<0.001	***	Intercept Significant.
dose1	1.93	0.77	2.50	0.015	*	Significant. A Difference between the effect of dose1 and its reference.
dose2	-1.06	0.81	-1.31	0.194		Not Significant. No difference between the effect of dose2 and its reference.
dose3	-0.34	0.86	-0.39	0.694		Not Significant. No difference between the effect of dose3 and its reference.
gesttime1	-3.52	0.94	-3.74	<0.001	***	Significant. A Difference between the effect of gesttime1 and its reference.
gesttime2	-1.08	0.89	-1.22	0.227		Not Significant. No difference between the effect of gesttime2 and its reference.
gesttime3	-0.97	0.90	-1.08	0.286		Not Significant. No difference between the effect of gesttime3 and its reference.
number	0.51	0.20	2.59	0.012	*	Significant. A Difference between the effect of number and its reference.

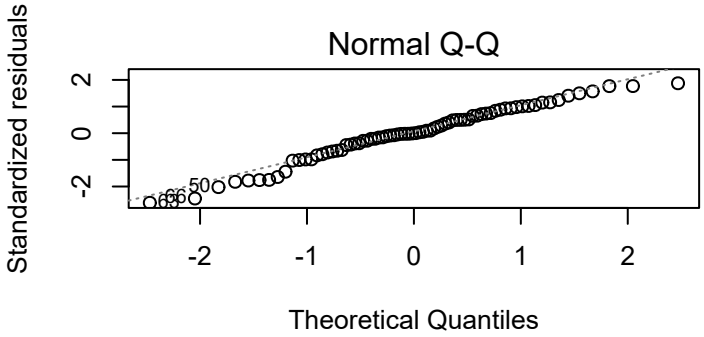
[1] '***': sign. to 0.1% error. '**': sign. to 1% error. '*': sign. to 5% error. ' . ': sign. to 10% error. ' ': not sign. ' - ': no statement.

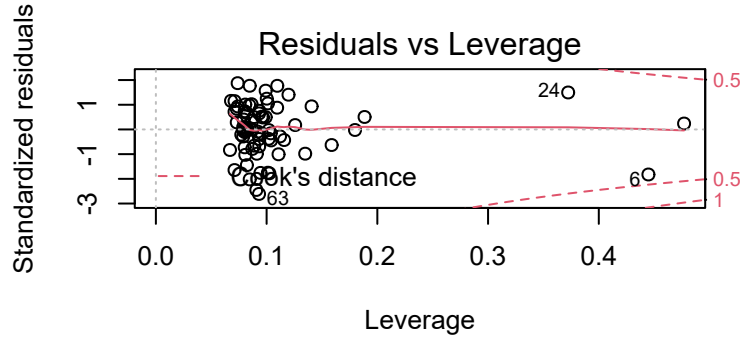
Total influence of factors (ANOVA Type III)

Variable	Sum.Sq	Df	F.value	P.value	Interpretation (5% error)
(Intercept)	1406.03	1	91.50	<0.001	Intercept significantly different from zero.
dose	100.40	3	2.18	0.099	There exist significant differences between the levels of factor 2.
gesttime	226.18	3	4.91	0.004	There exist significant differences between the levels of factor 3.
number	102.89	1	6.70	0.012	There exist significant differences between the levels of factor 4.
Residuals	1014.23	66			










```
     Simultaneous Tests for General Linear Hypotheses

Multiple Comparisons of Means: Dunnett Contrasts


Fit: lm(formula = modelfunction, data = df_factorized)

Linear Hypotheses:
             Estimate Std. Error t value Pr(<t)
5 - 0 >= 0     -2.988      1.282  -2.331 0.0303 *
50 - 0 >= 0    -2.273      1.316  -1.728 0.1087
```

```
500 - 0 >= 0   -2.468      1.312  -1.881 0.0812 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)


     Simultaneous Confidence Intervals

Multiple Comparisons of Means: Dunnett Contrasts


Fit: lm(formula = modelfunction, data = df_factorized)

Quantile = 2.1135
95% family-wise confidence level


Linear Hypotheses:
             Estimate lwr     upr
5 - 0 >= 0   -2.9883     -Inf -0.2793
50 - 0 >= 0  -2.2729     -Inf  0.5075
500 - 0 >= 0 -2.4681     -Inf  0.3051
```

References

Fox, John, and Sanford Weisberg. 2019. *An R Companion to Applied Regression*. Third. Thousand Oaks CA: Sage. https://socialsciences.mcmaster.ca/jfox/Books/Companion/.

Gross, Juergen, and Uwe Ligges. 2015. *Nortest: Tests for Normality*. https://CRAN.R-project.org/package=nortest.

Madsen, Jacob H. 2018. *DDoutlier: Distance & Density-Based Outlier Detection*. https://CRAN.R-project.org/package=DDoutlier.

R Core Team. 2019. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Zeileis, Achim, and Torsten Hothorn. 2002. "Diagnostic Checking in Regression Relationships." *R News* 2 (3): 7–10. https://CRAN.R-project.org/doc/Rnews/.