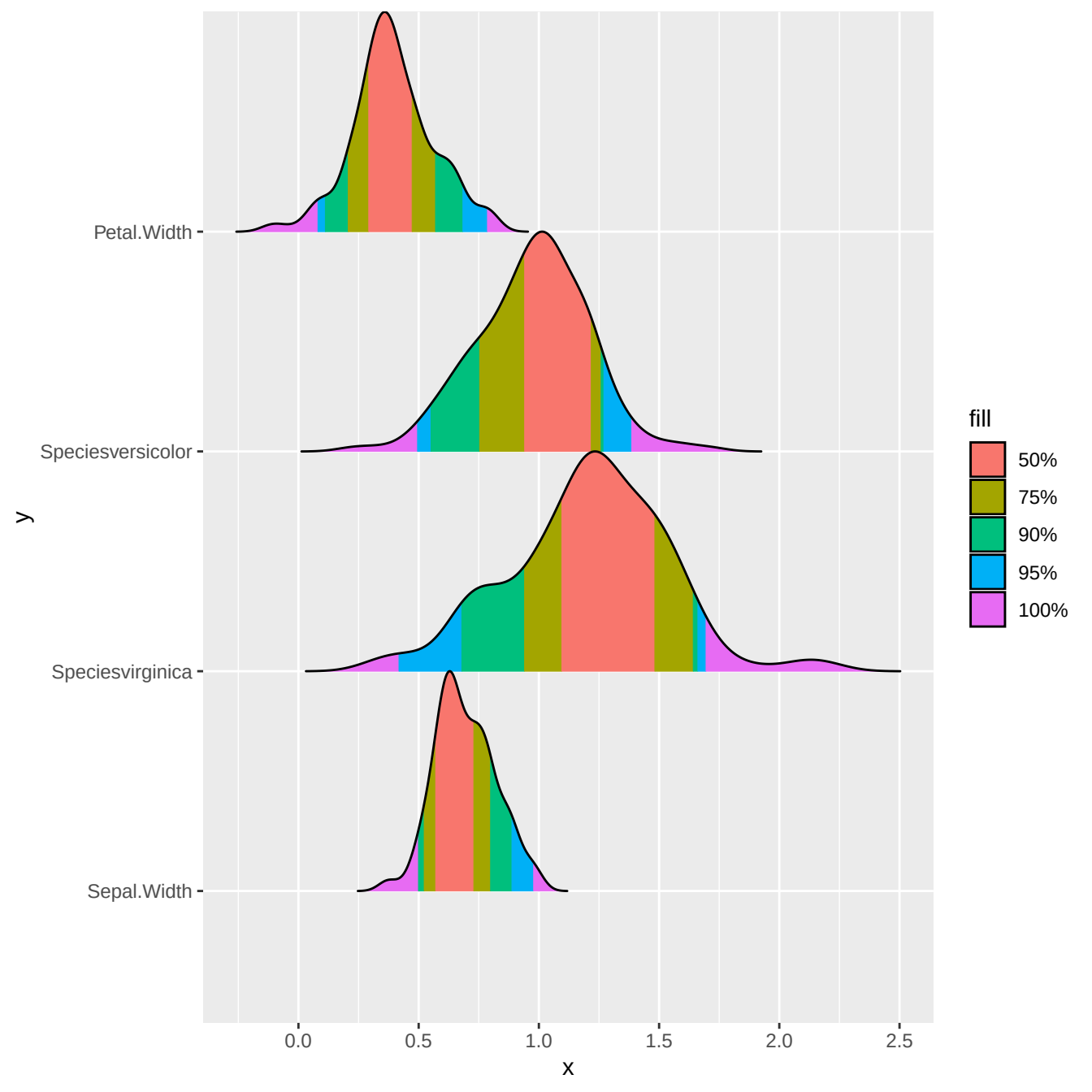
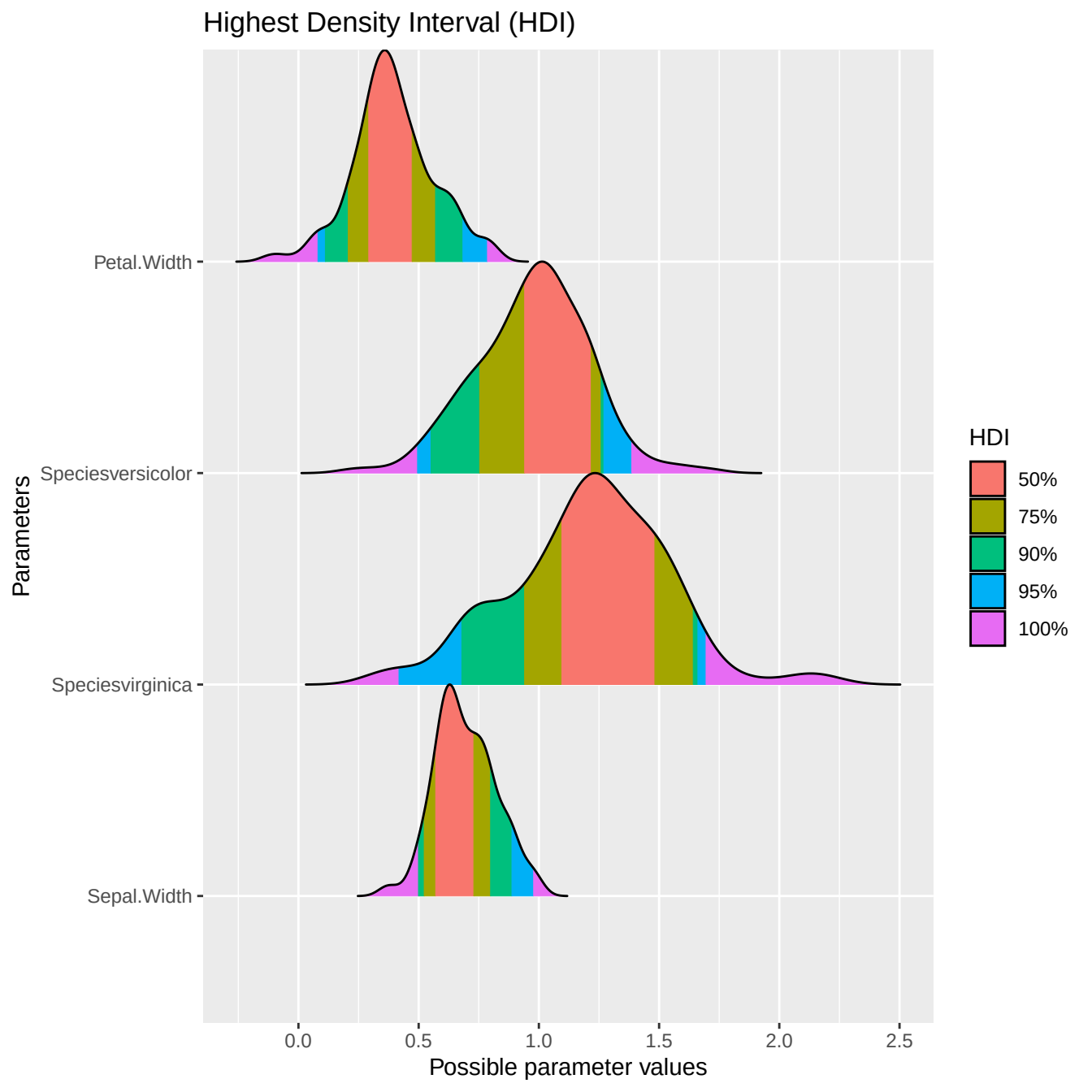
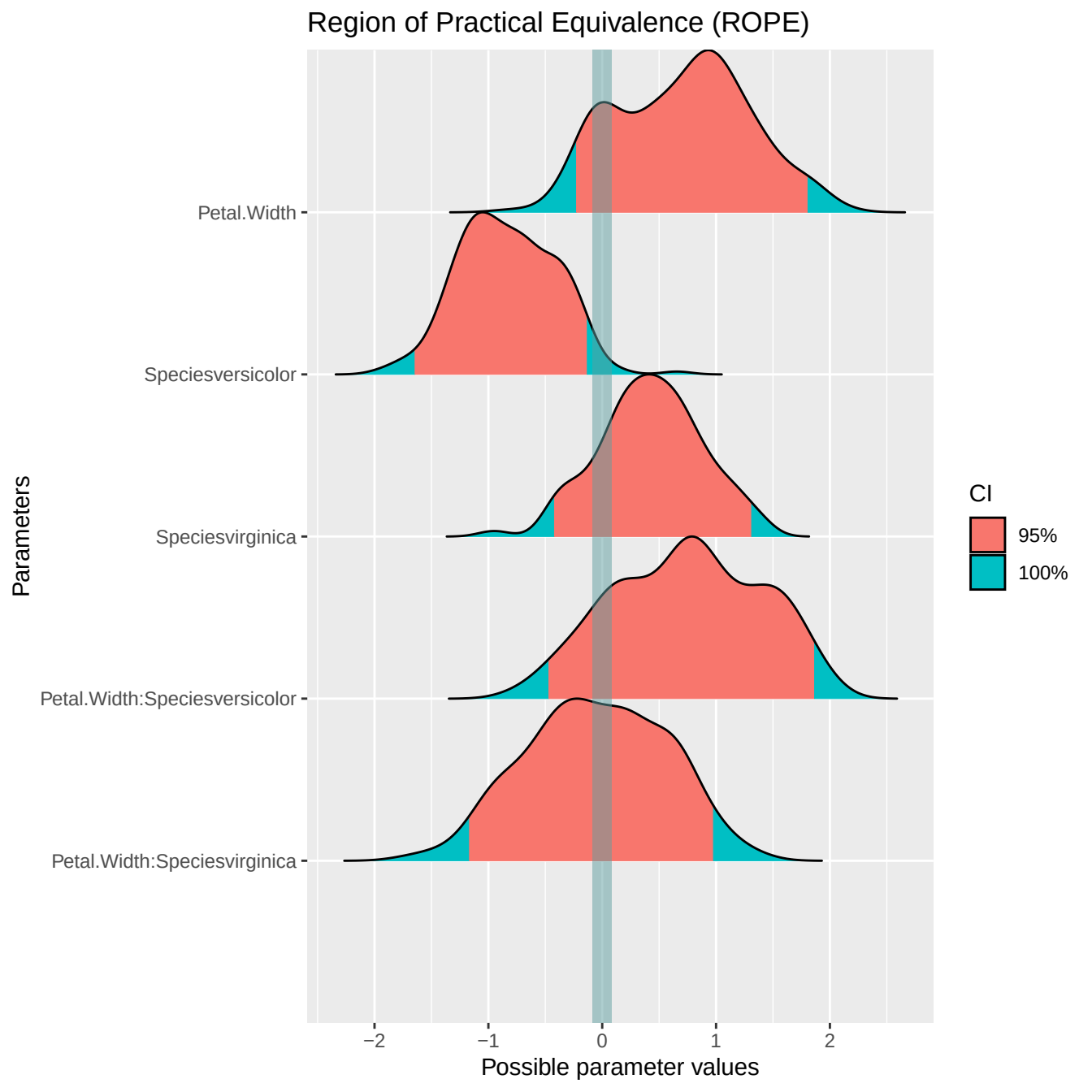
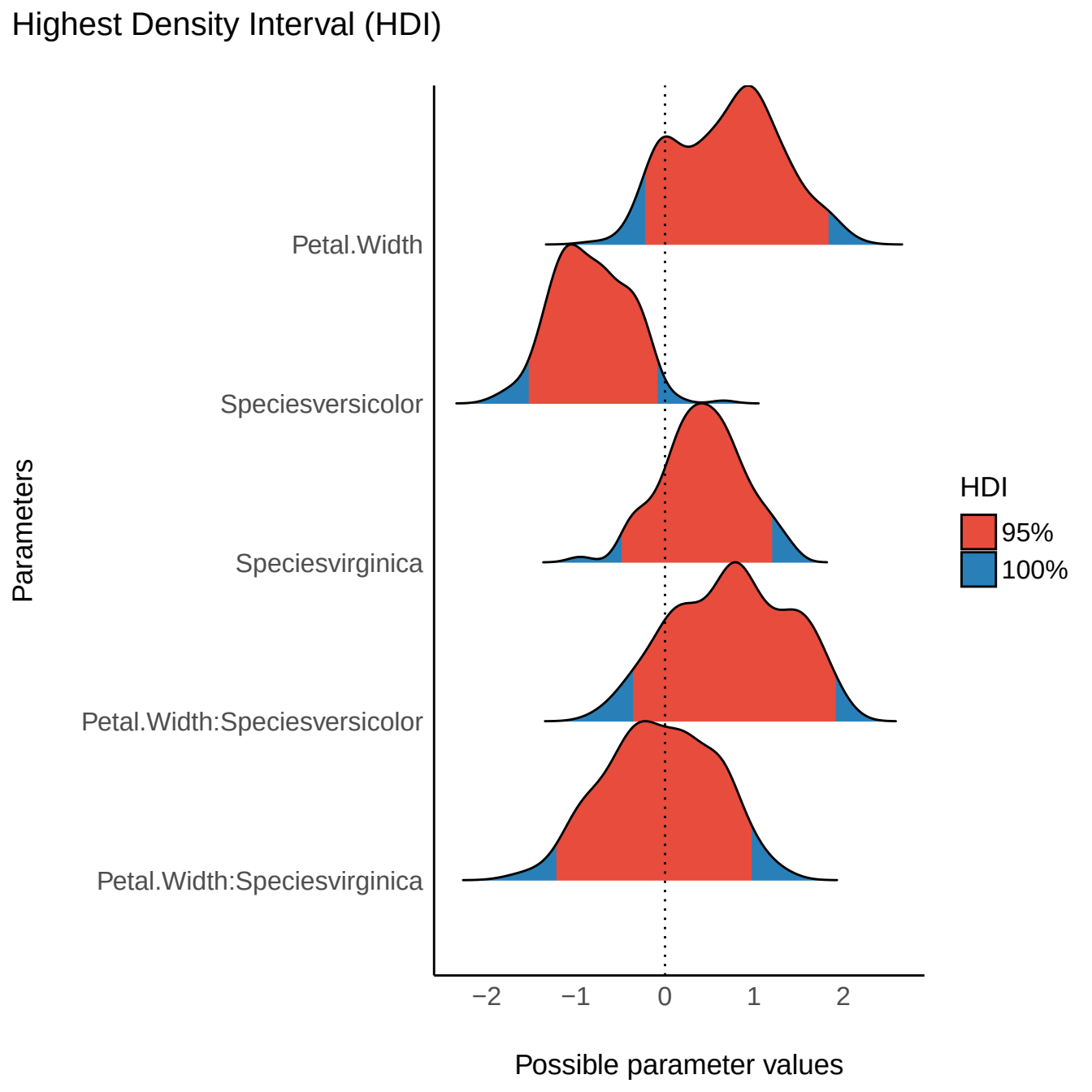
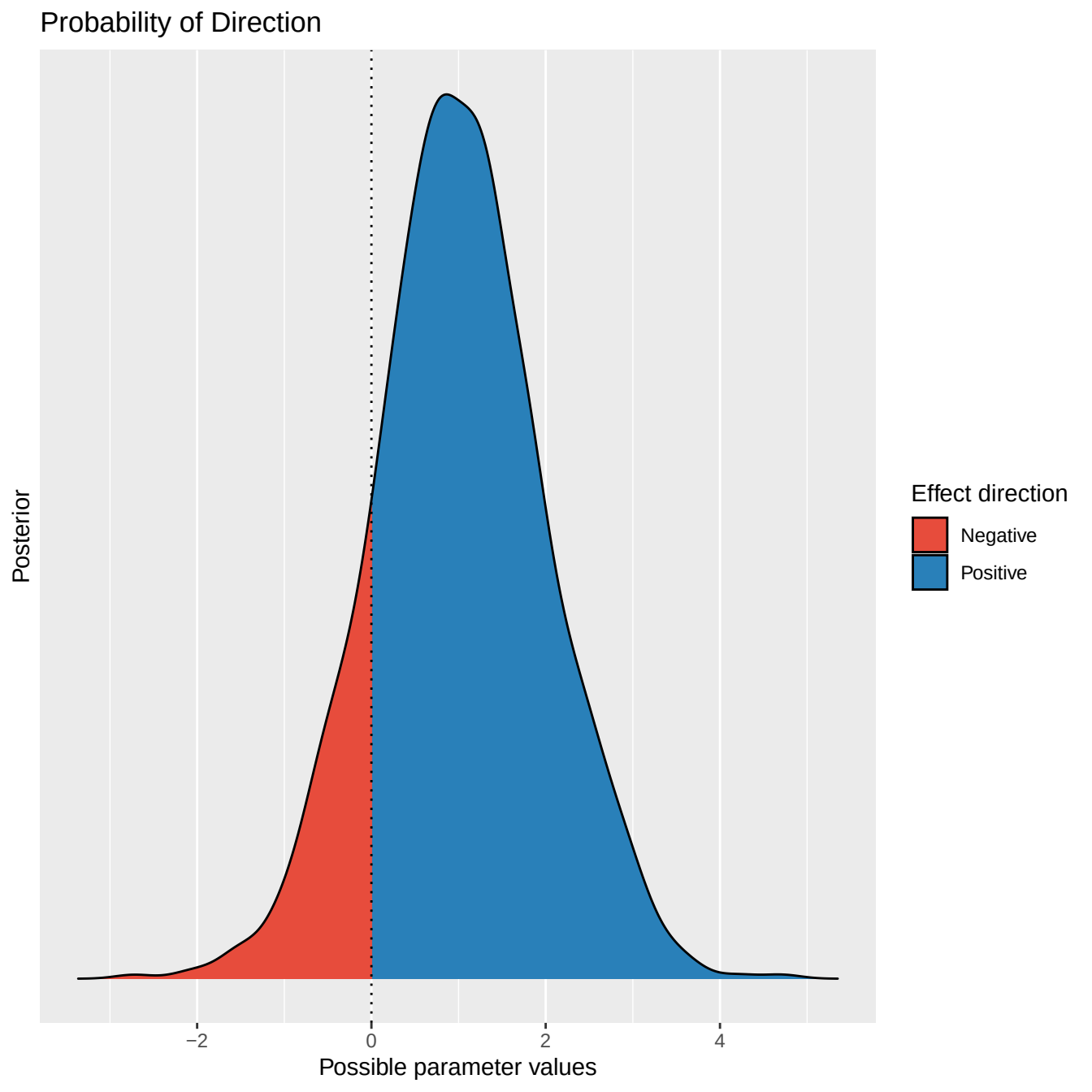

Petal.Width
Speciesversicolor
Speciesvirginica
Sepal.Width
y
0.0
0.5
1.0
1.5
2.0
2.5
x
fill
50%
75%
90%
95%
100%

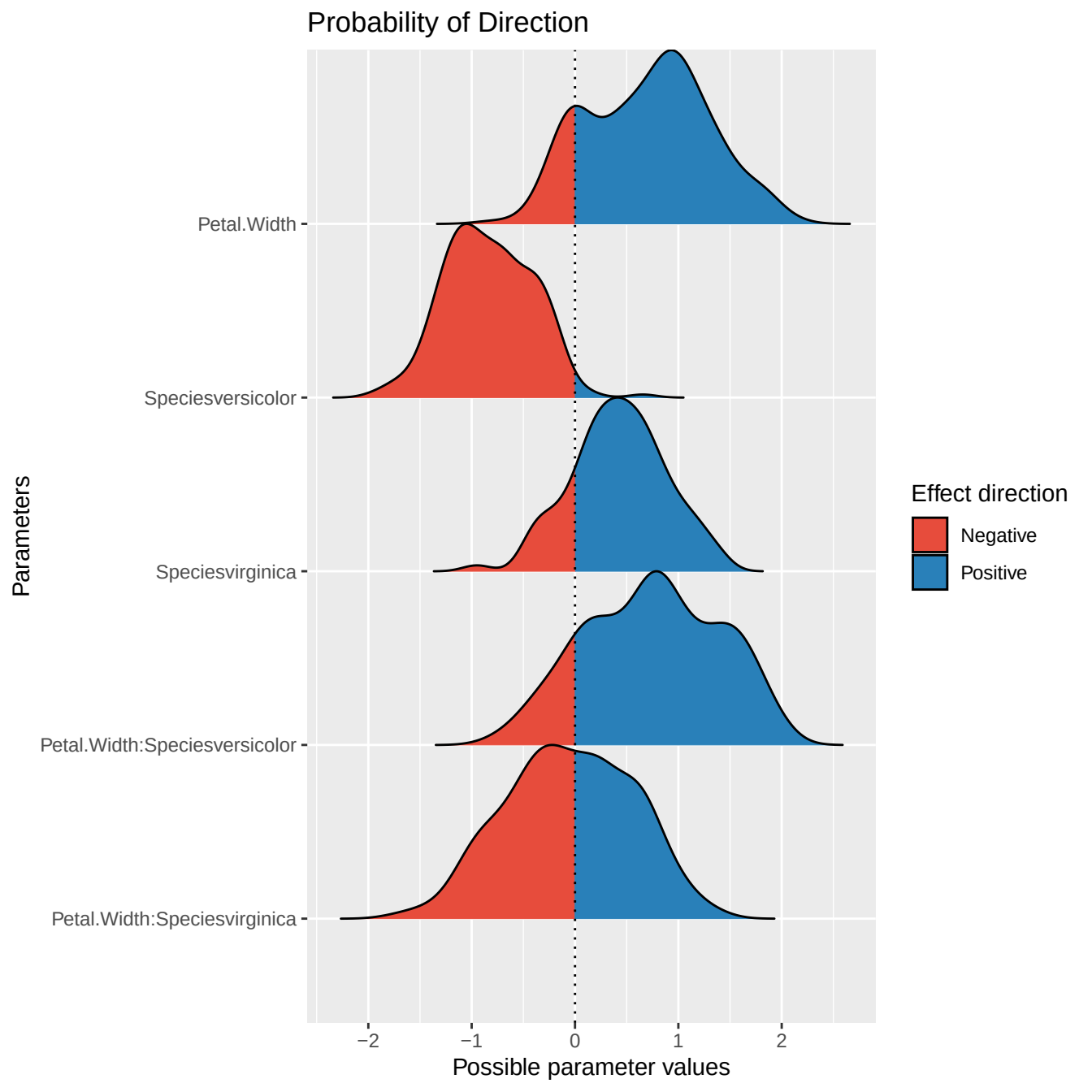

Highest Density Interval (HDI)
Petal.Width
Speciesversicolor
Speciesvirginica
Sepal.Width
Parameters
0.0
0.5
1.0
1.5
2.0
2.5
Possible parameter values
HDI
50%
75%
90%
95%
100%

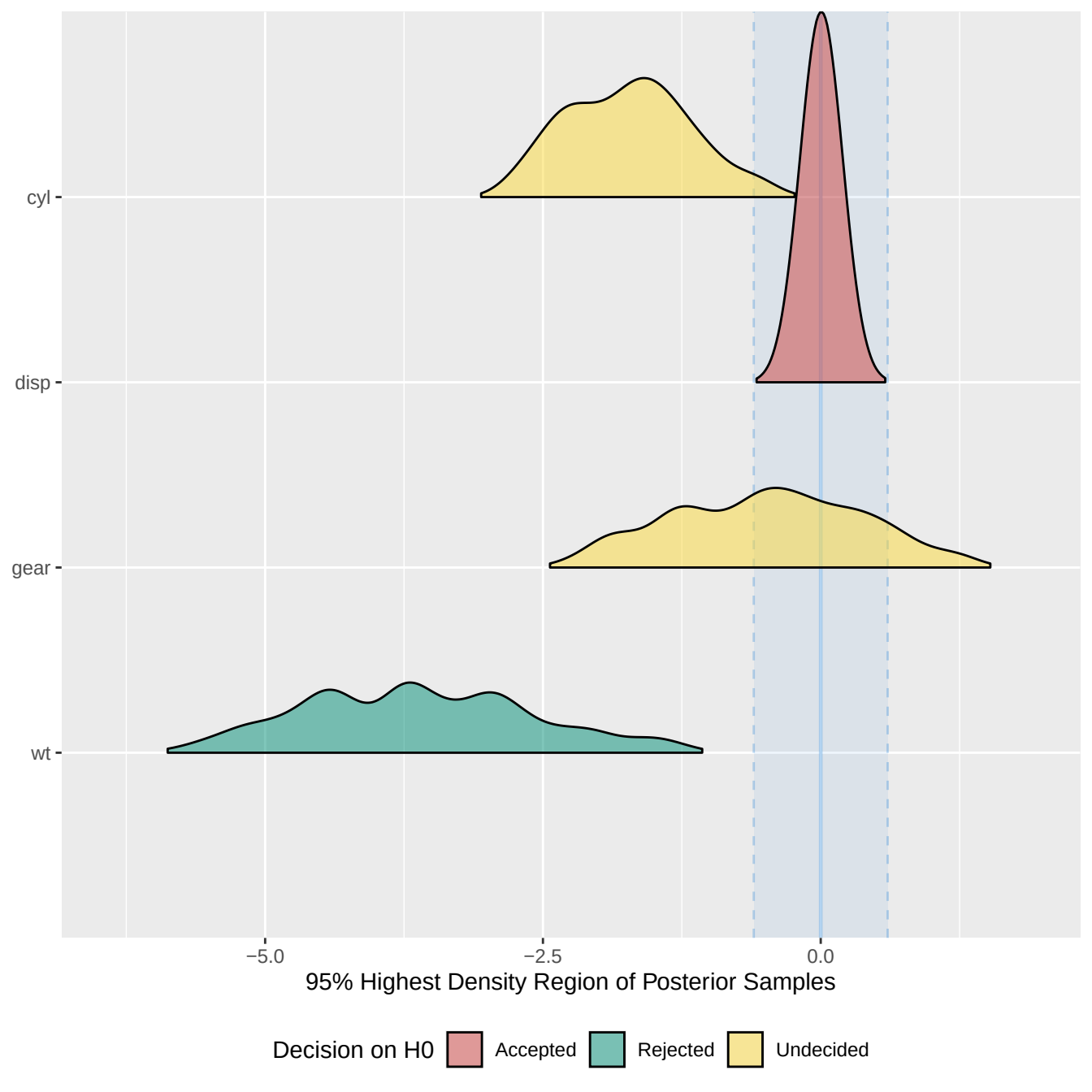
Petal.Length
6
4
2
value
epal.Width
Petal.Width
Sepal.Length
name
Species
setosa
versicolor
virginica

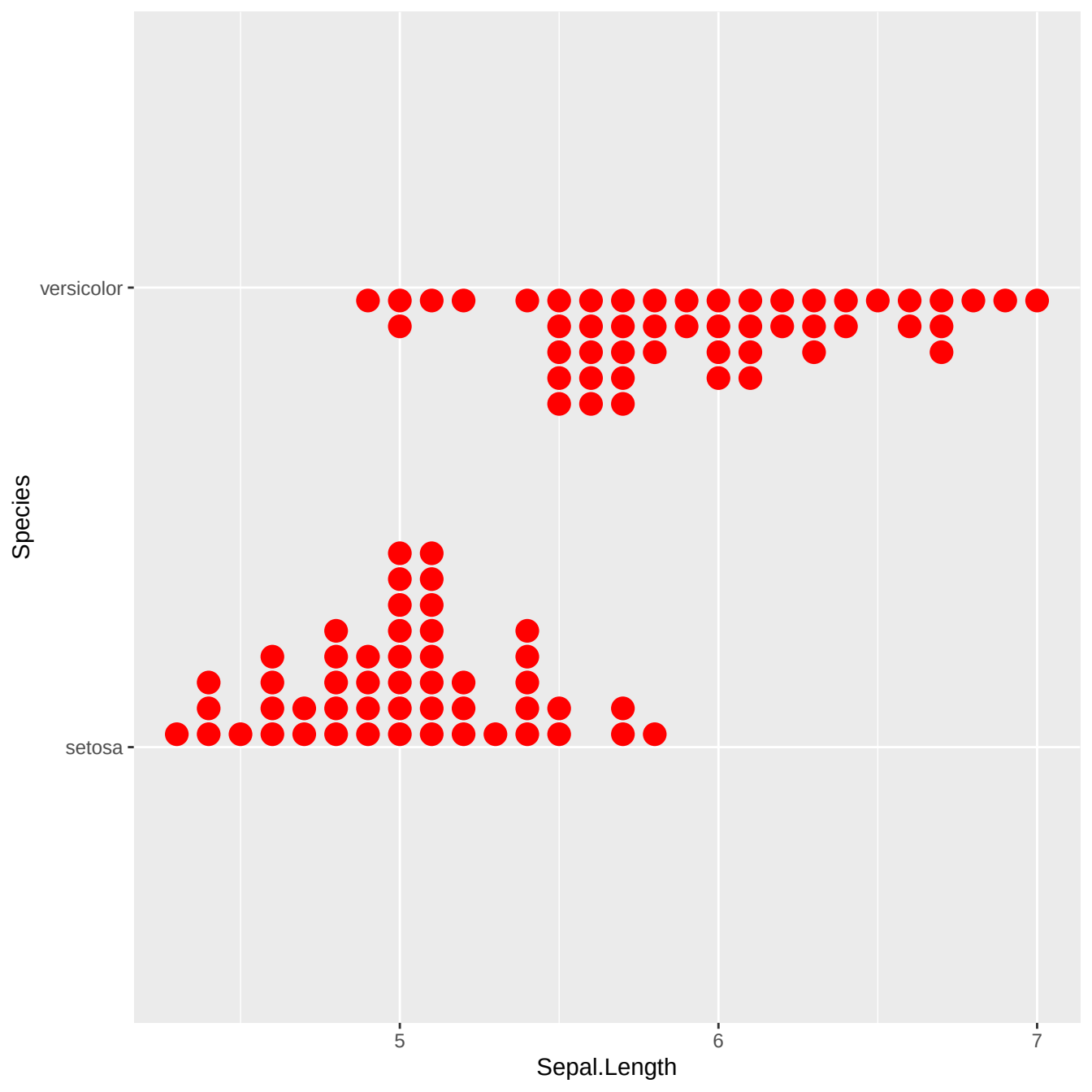

Region of Practical Equivalence (ROPE)
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Parameters
−2
−1
0
1
2
Possible parameter values
CI
95%
100%

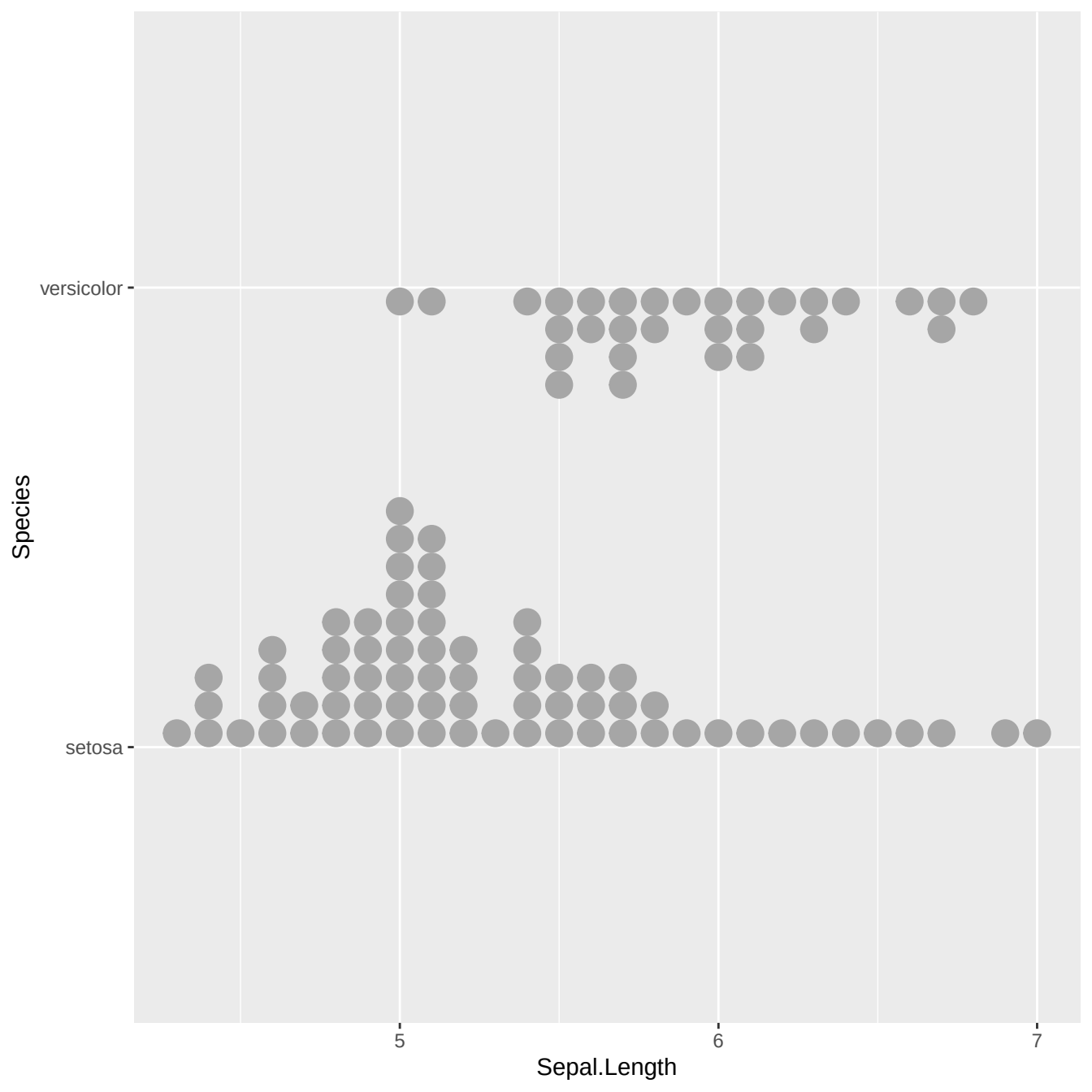

Highest Density Interval (HDI)
Parameters
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
−2
−1
0
1
2
Possible parameter values
HDI
95%
100%

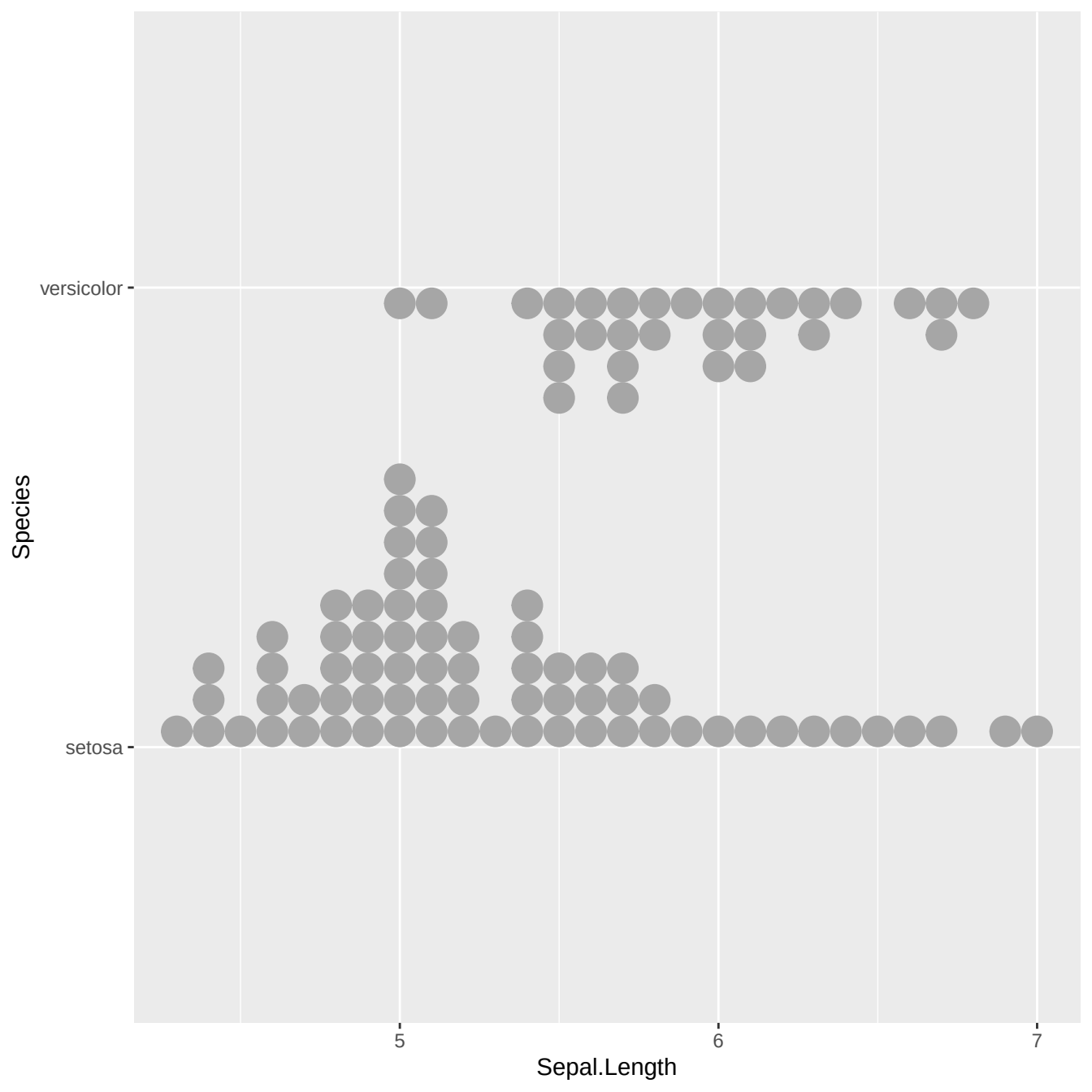

Probability of Direction
Posterior
Possible parameter values
−2
0
2
4
Effect direction
Negative
Positive

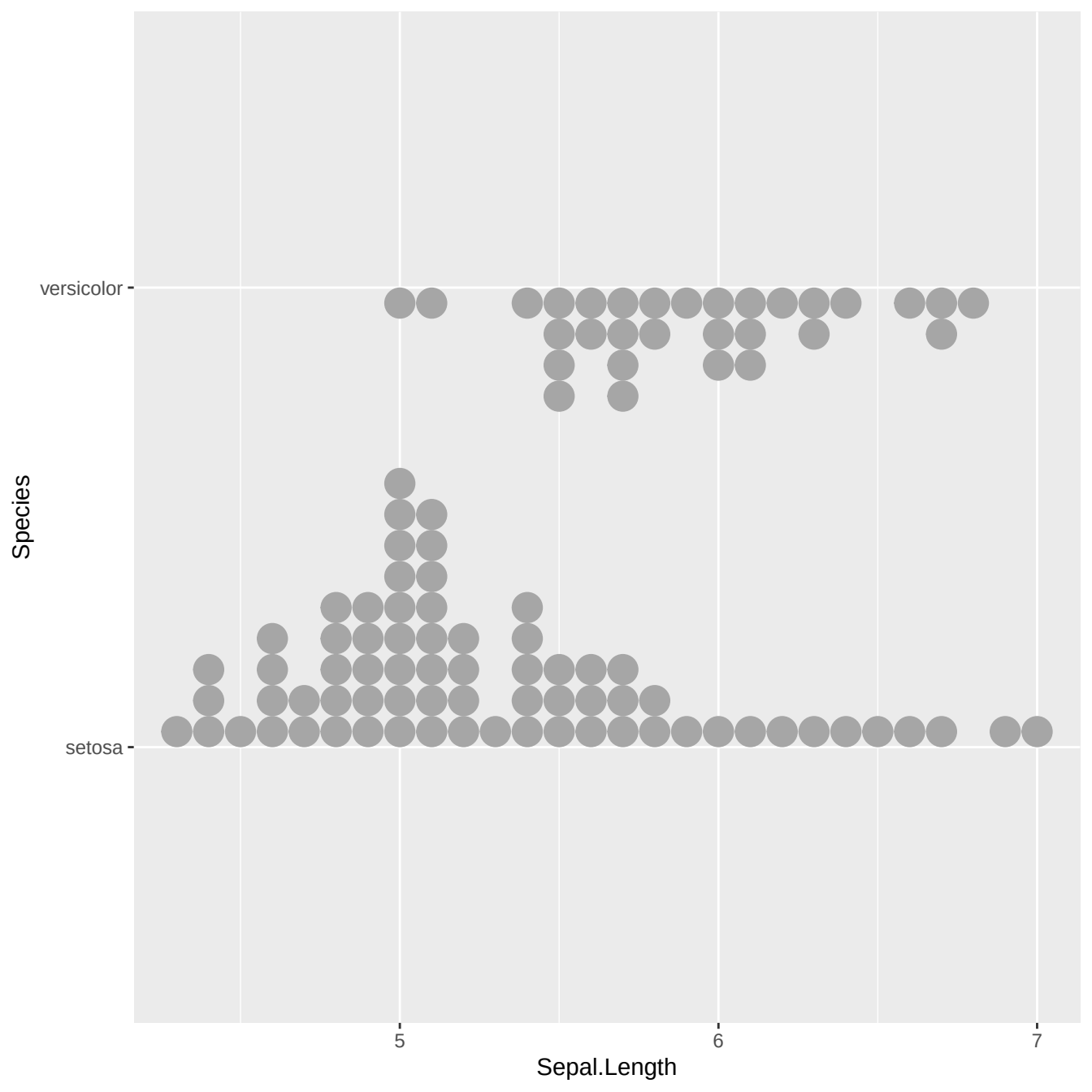

Probability of Direction
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Parameters
−2
−1
0
1
2
Possible parameter values
Effect direction
Negative
Positive

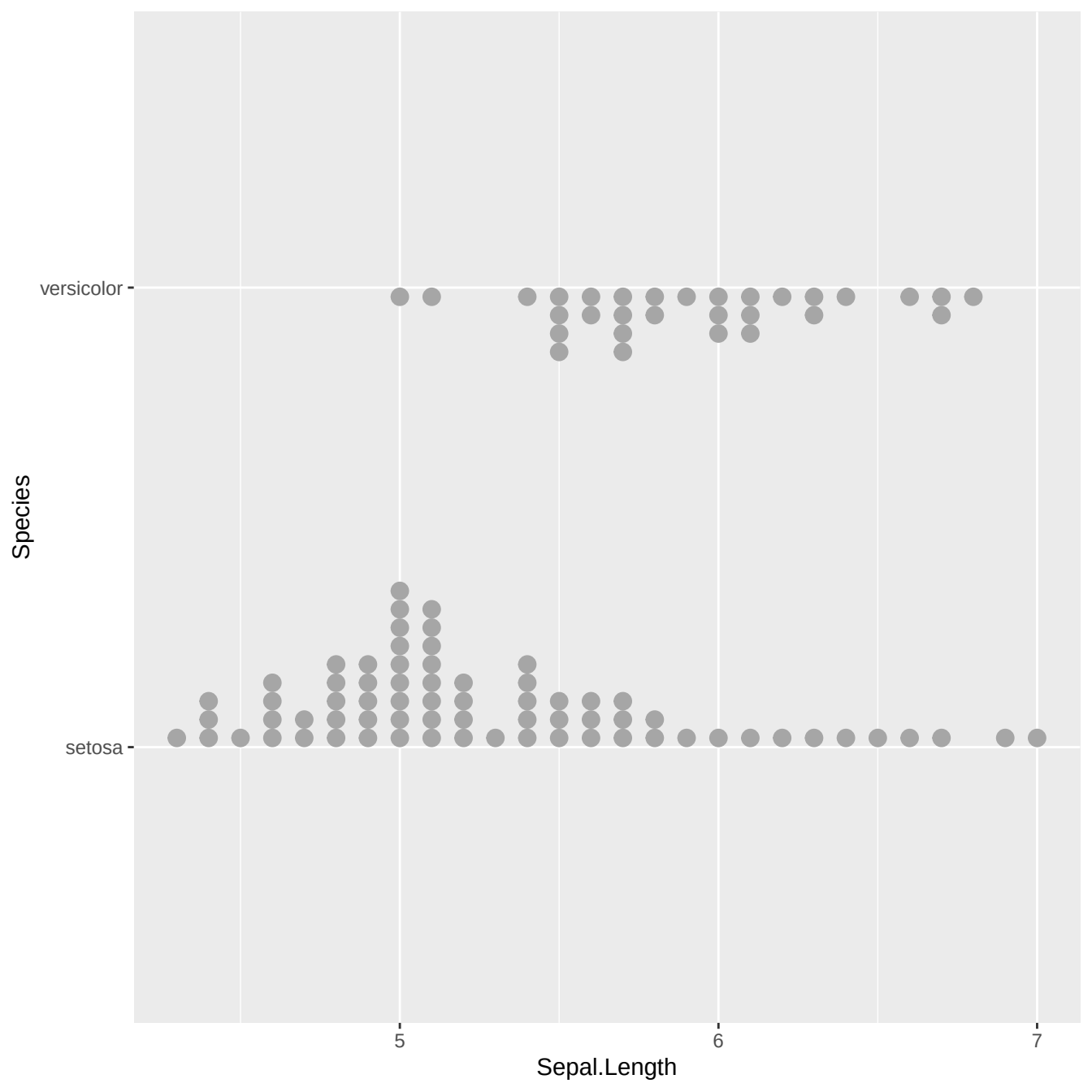

cyl
disp
gear
wt
−5.0
−2.5
0.0
95% Highest Density Region of Posterior Samples
Decision on H0
Accepted
Rejected
Undecided

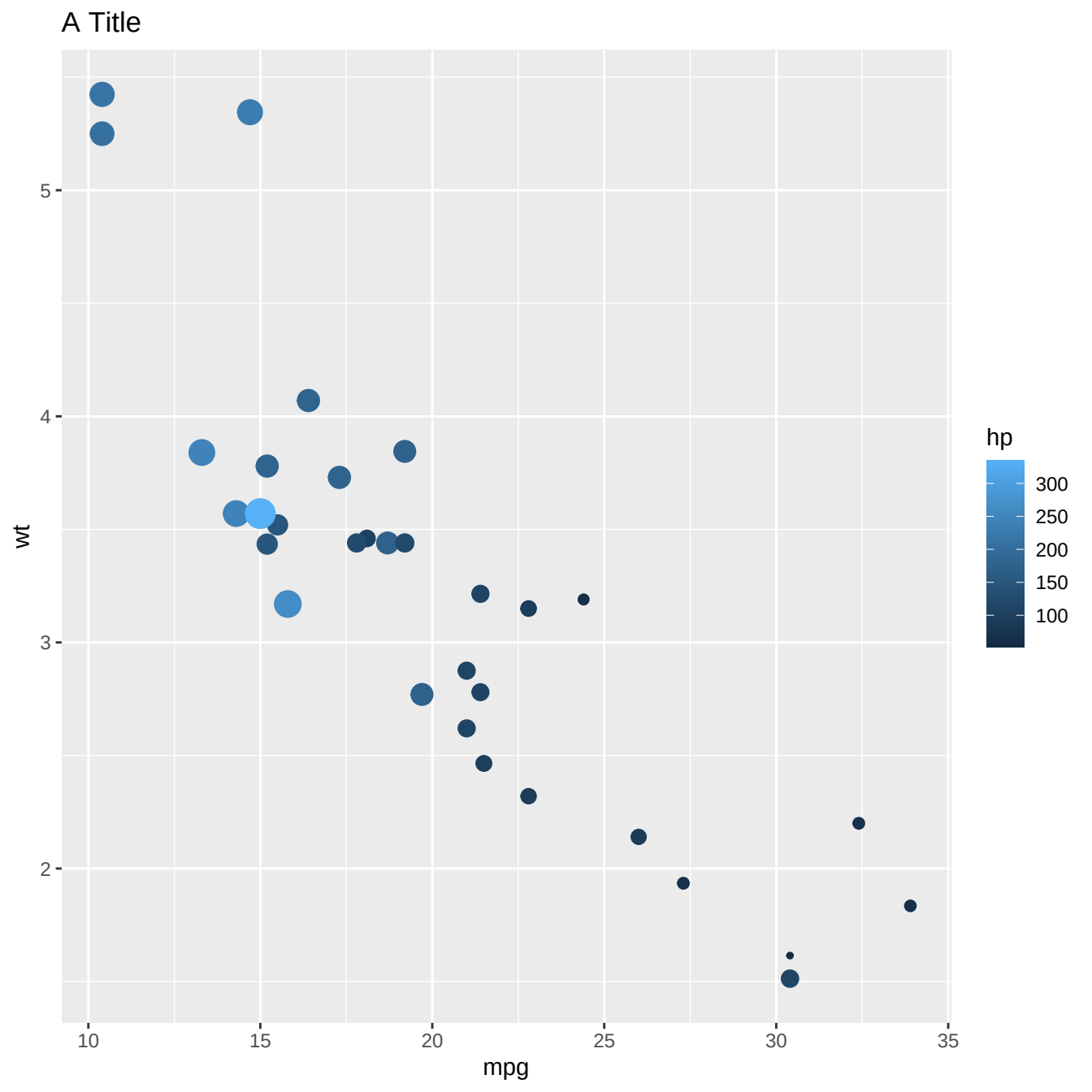

versicolor
setosa
Species
5
6
7
Sepal.Length

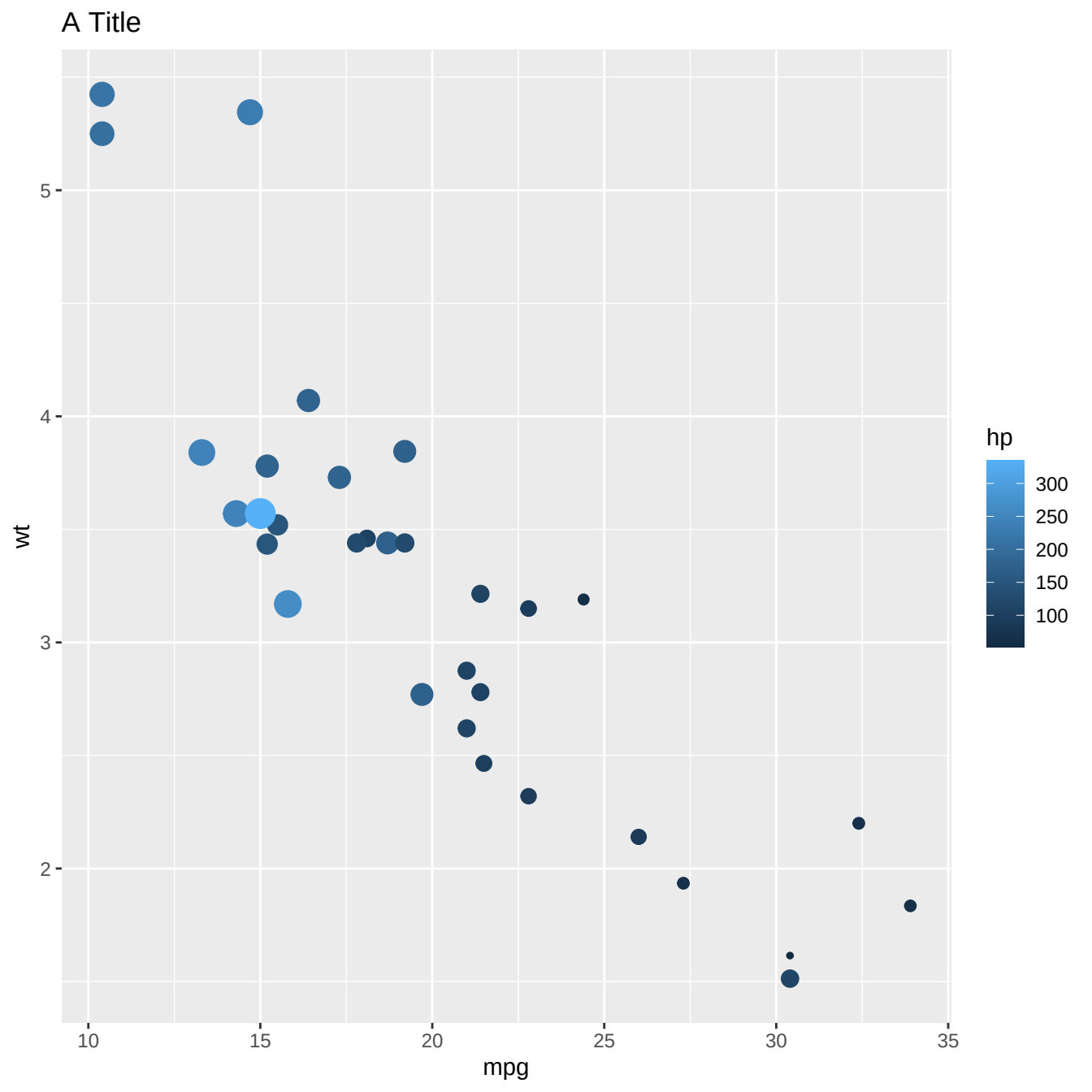

versicolor
setosa
Species
5
6
7
Sepal.Length

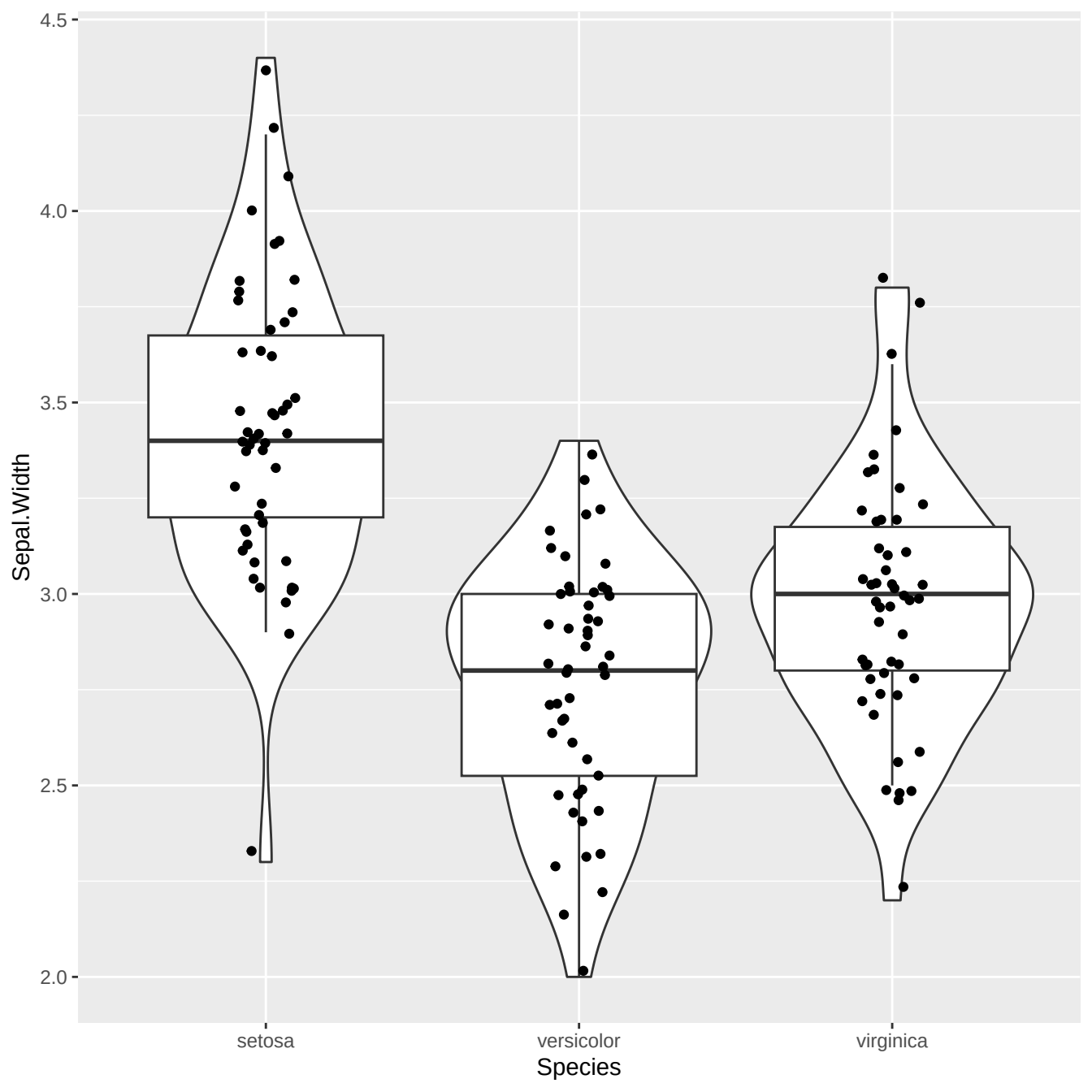

versicolor
setosa
Species
5
6
7
Sepal.Length

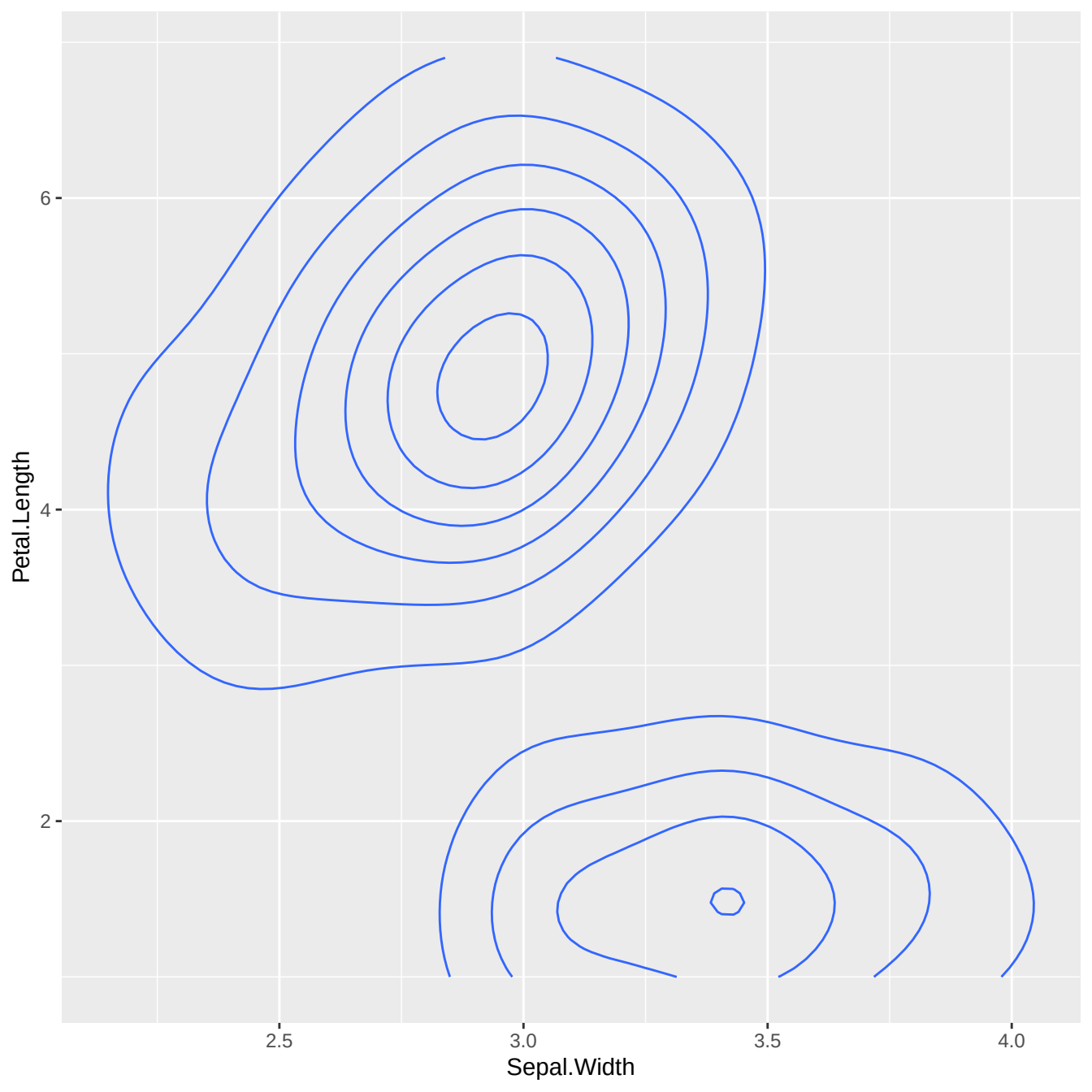

versicolor
setosa
Species
5
6
7
Sepal.Length

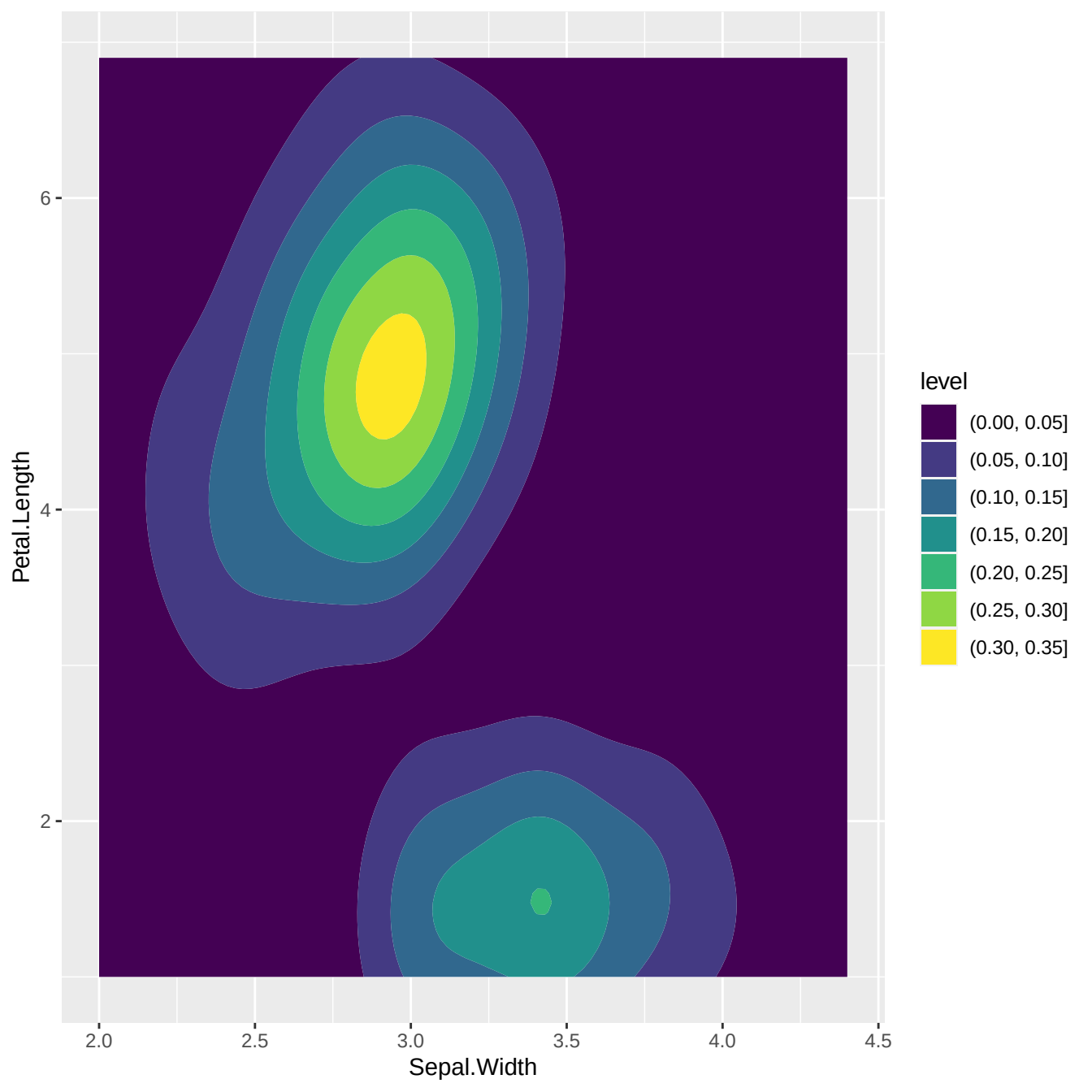

versicolor
setosa
Species
5
6
7
Sepal.Length

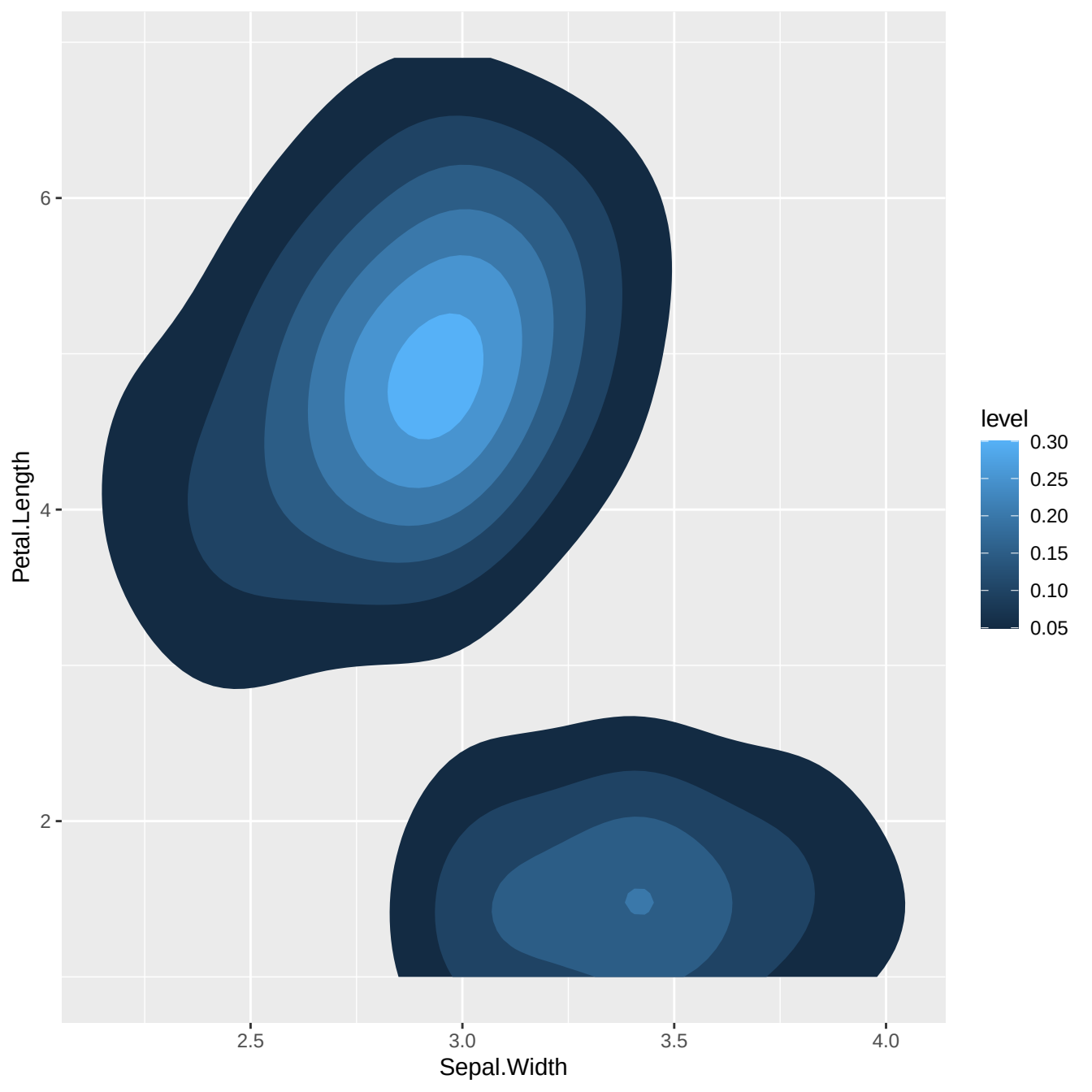

A Title
wt
mpg
hp
300
250
200
150
100
5
4
3
2
10
15
20
25
30
35

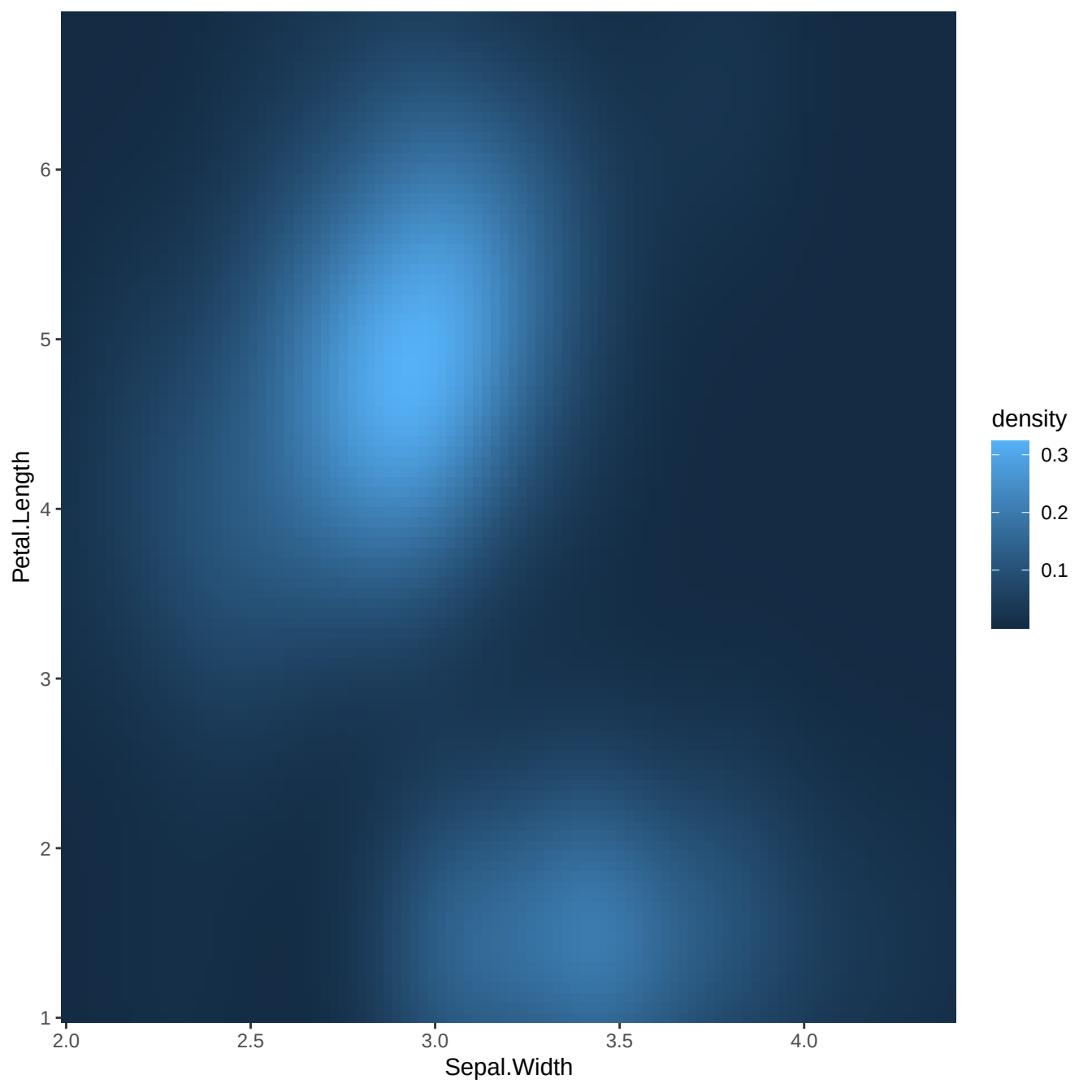

A Title
wt
mpg
hp
300
250
200
150
100
5
4
3
2
10
15
20
25
30
35

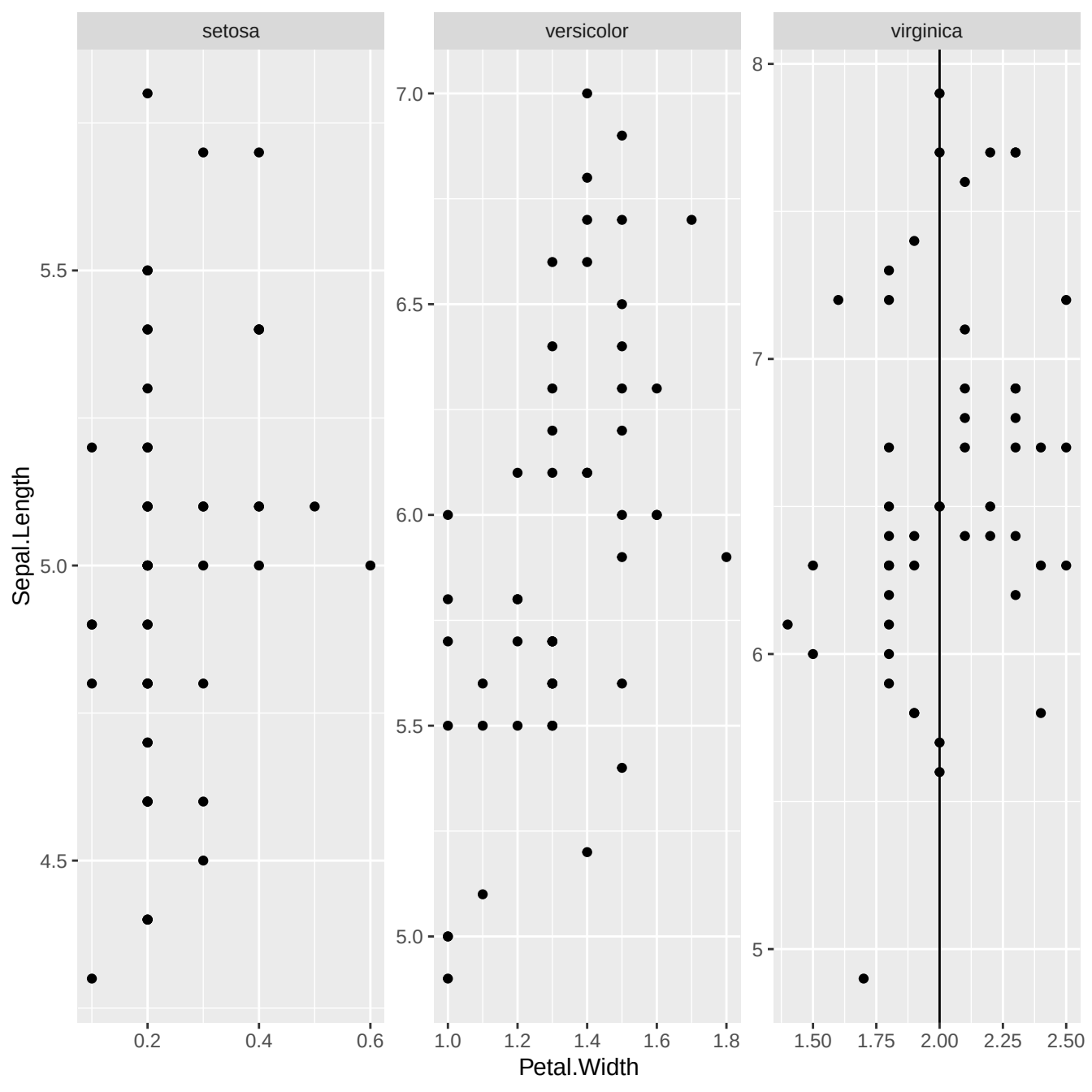

4.5
4.0
3.5
3.0
2.5
2.0
Sepal.Width
setosa
versicolor
virginica
Species

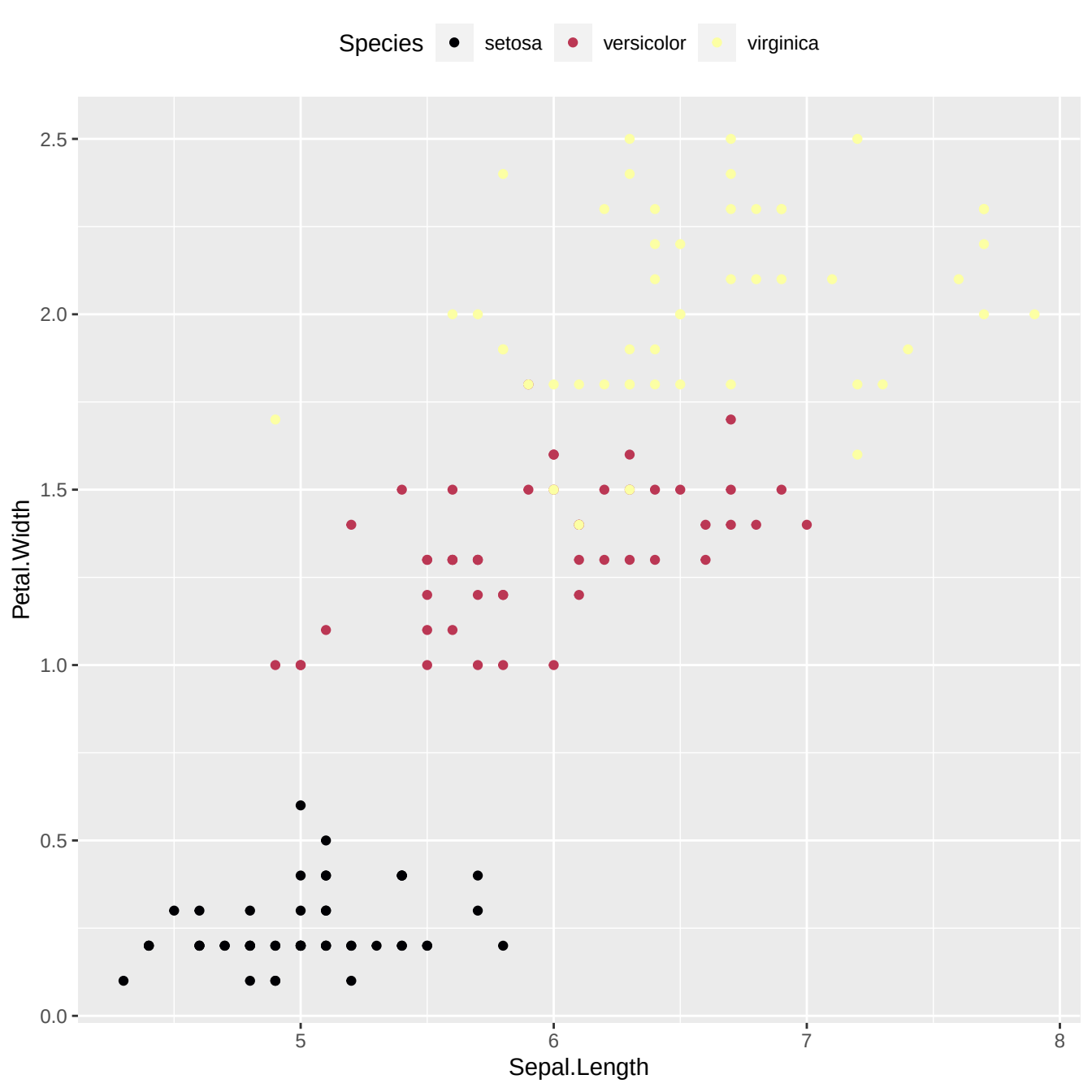

Petal.Length
6
4
2
2.5
3.0
3.5
4.0
Sepal.Width

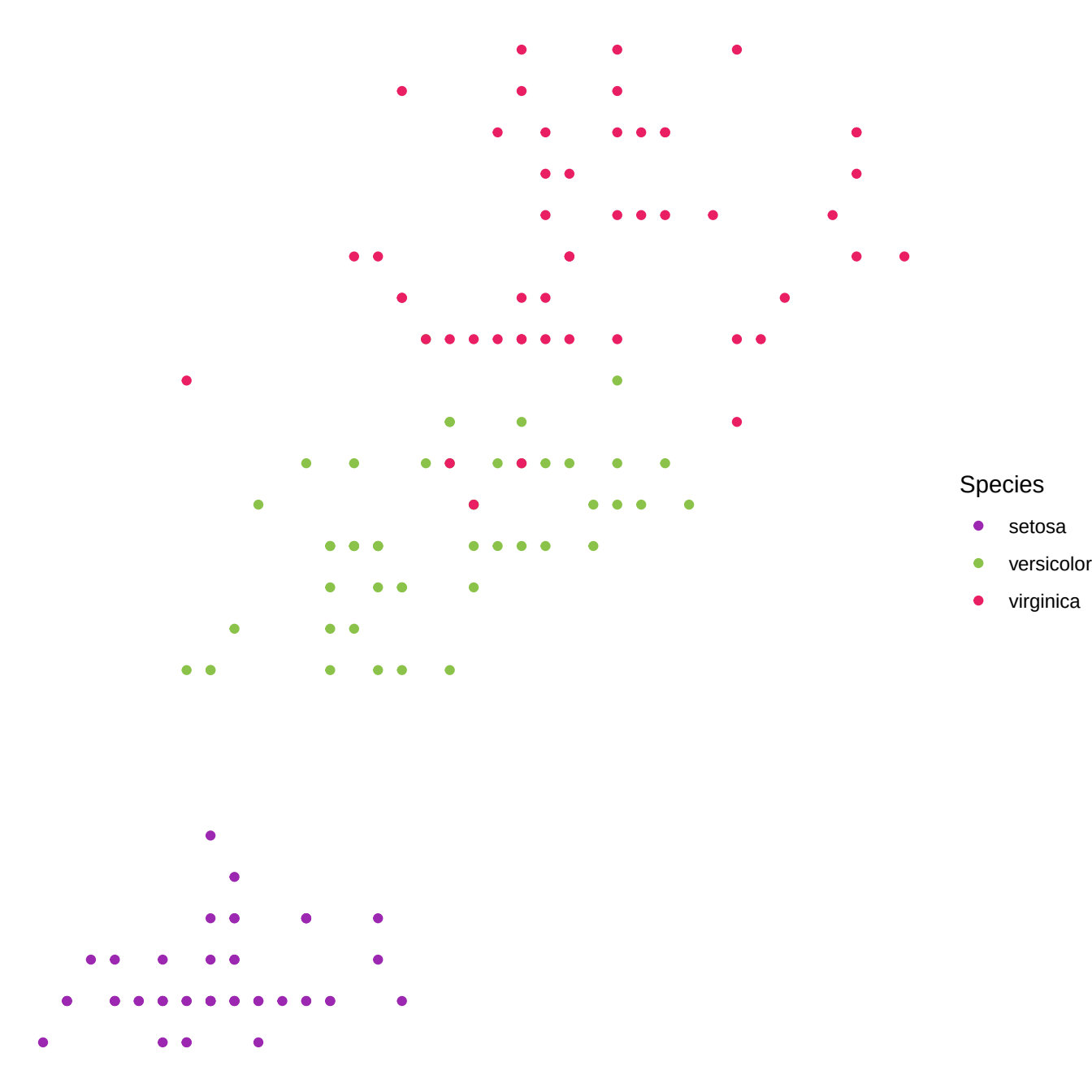

Petal.Length
6
4
2
2.0
2.5
3.0
3.5
4.0
4.5
Sepal.Width
level
(0.00, 0.05]
(0.05, 0.10]
(0.10, 0.15]
(0.15, 0.20]
(0.20, 0.25]
(0.25, 0.30]
(0.30, 0.35]

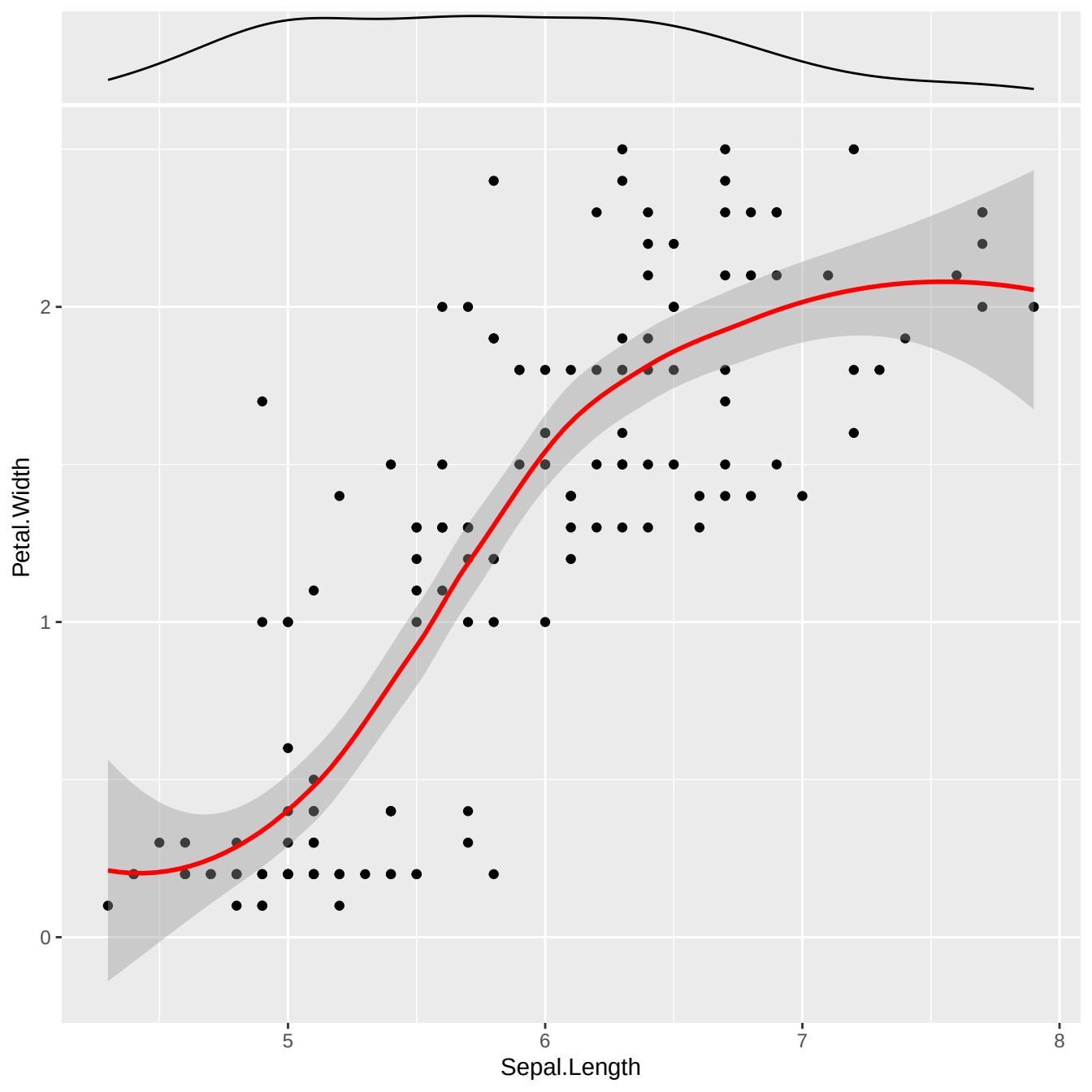

Petal.Length
6
4
2
2.5
3.0
3.5
4.0
Sepal.Width
level
0.30
0.25
0.20
0.15
0.10
0.05

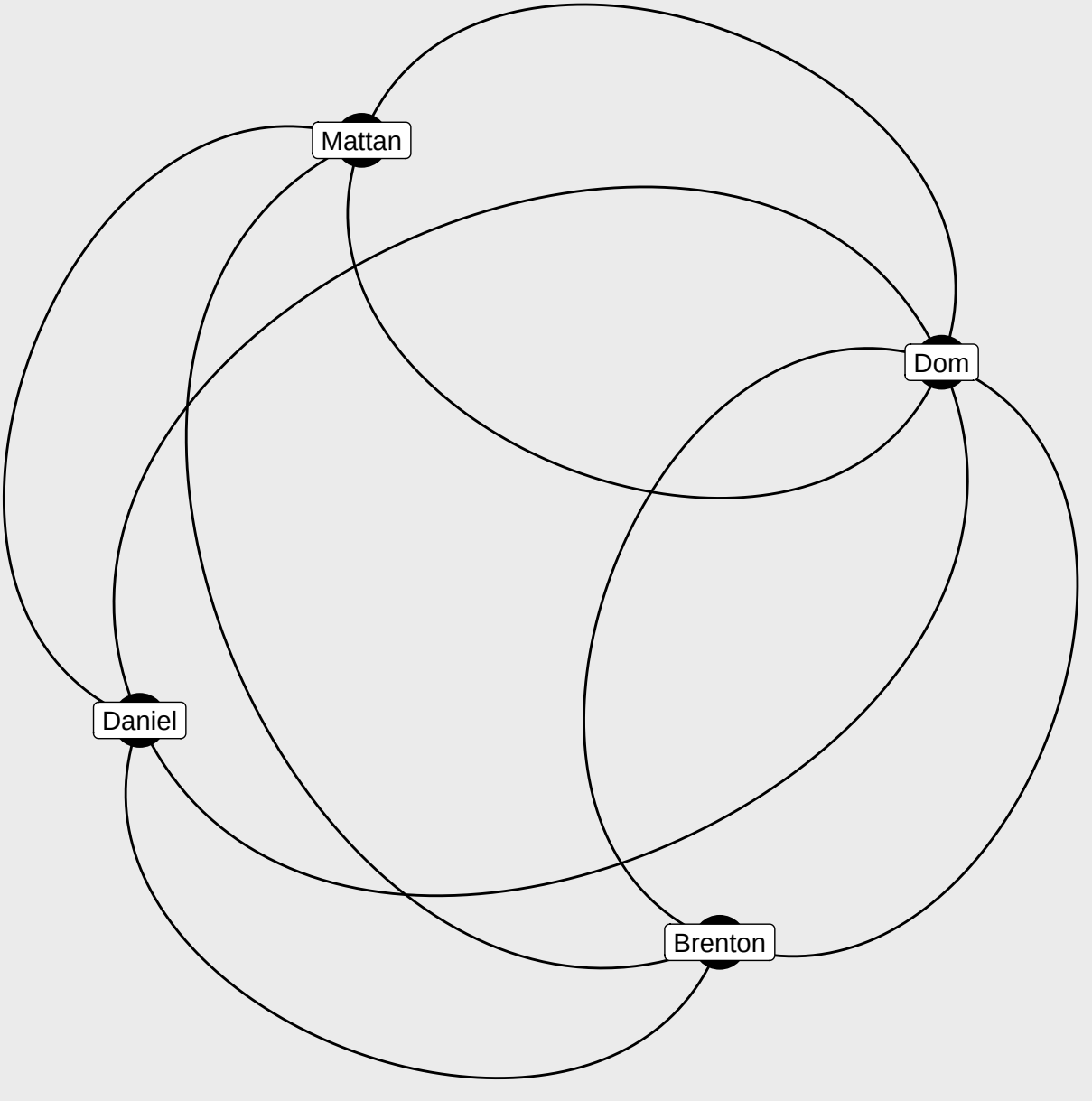

Petal.Length
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
Sepal.Width
density
0.3
0.2
0.1

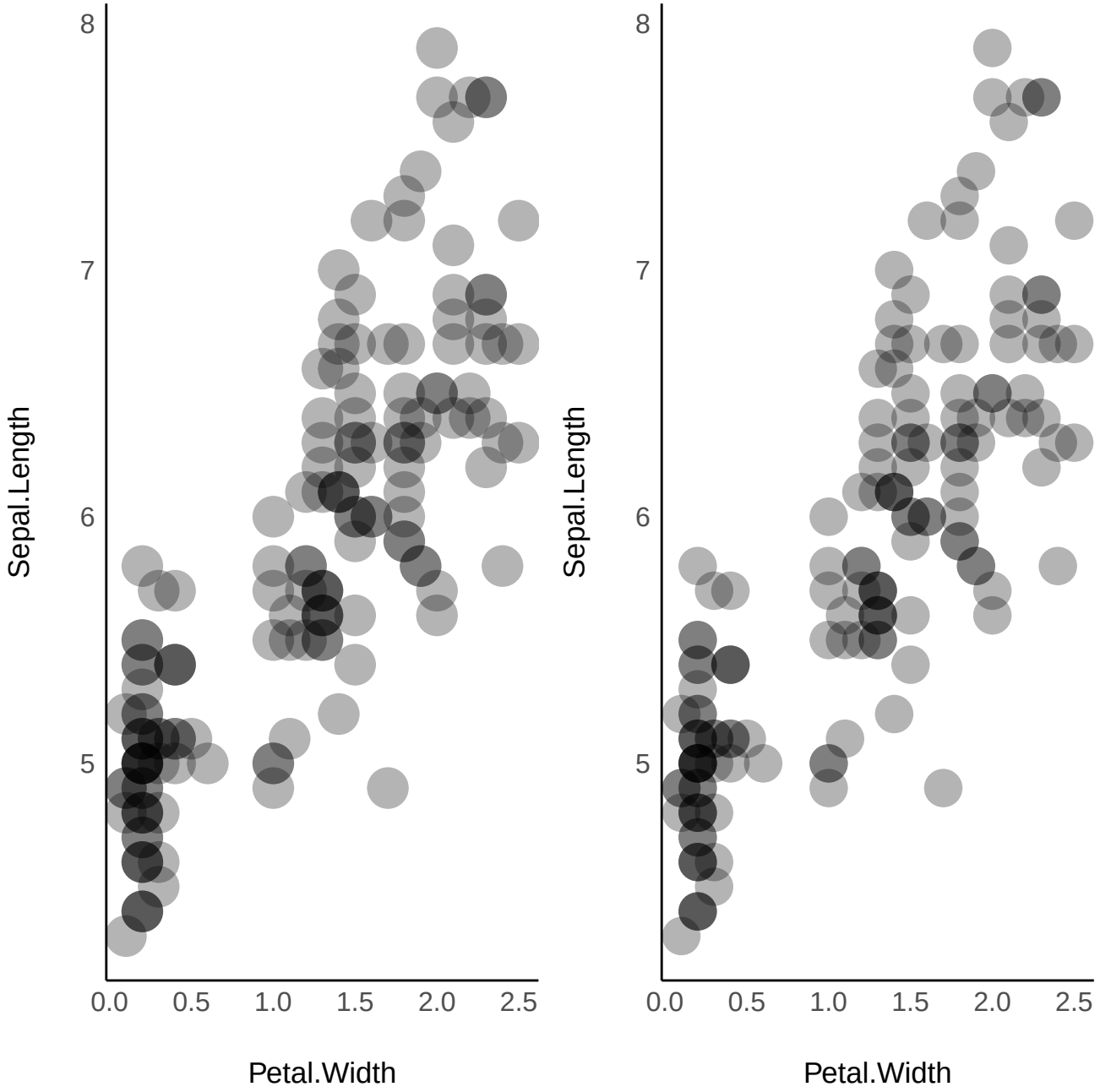

setosa
versicolor
virginica
Sepal.Length
Petal.Width
4.5
5.0
5.5
5.0
5.5
6.0
6.5
7.0
5
6
7
8
0.2
0.4
0.6
1.0
1.2
1.4
1.6
1.8
1.50
1.75
2.00
2.25
2.50

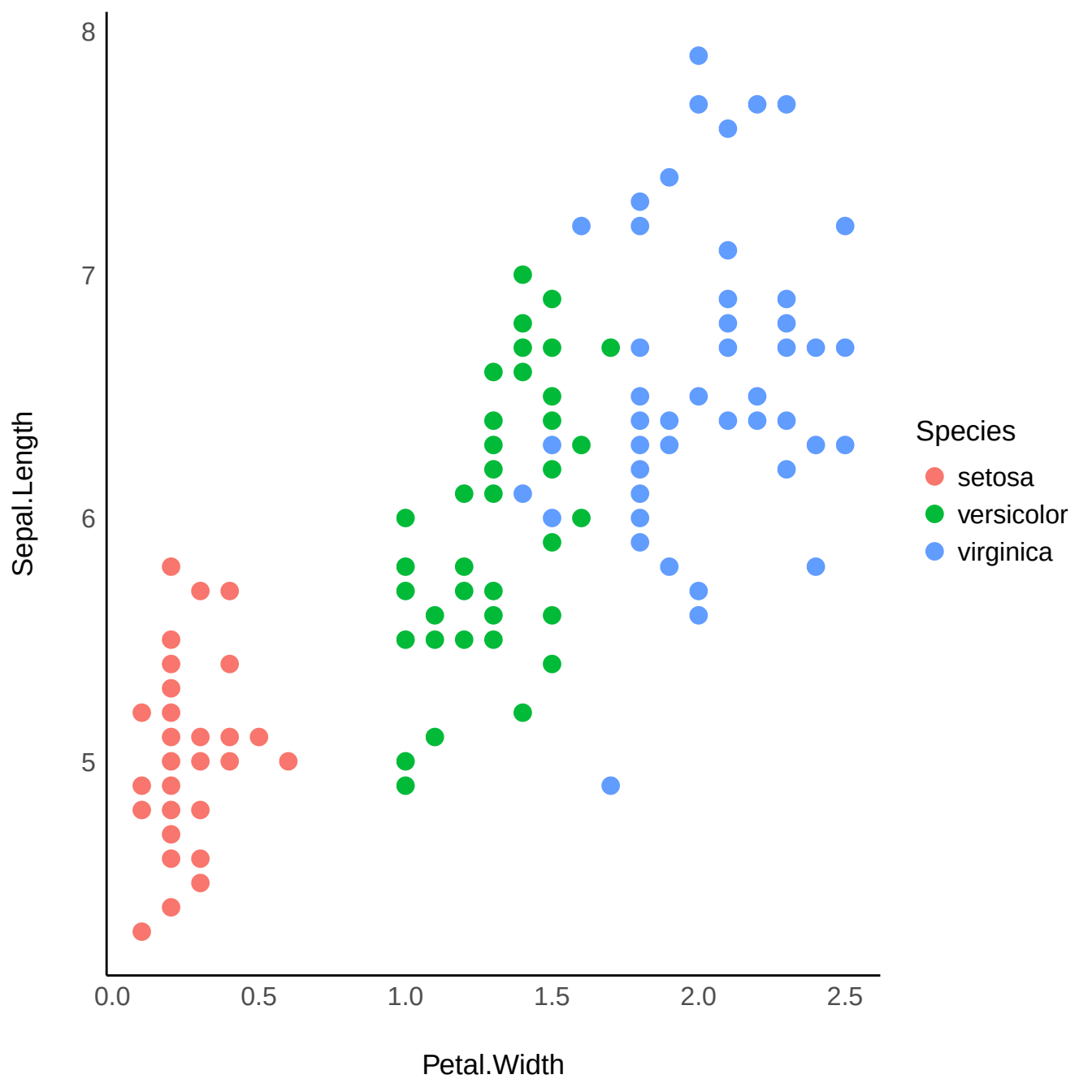

Species
setosa
versicolor
virginica
Petal.Width
Sepal.Length
0.0
0.5
1.0
1.5
2.0
2.5
5
6
7
8

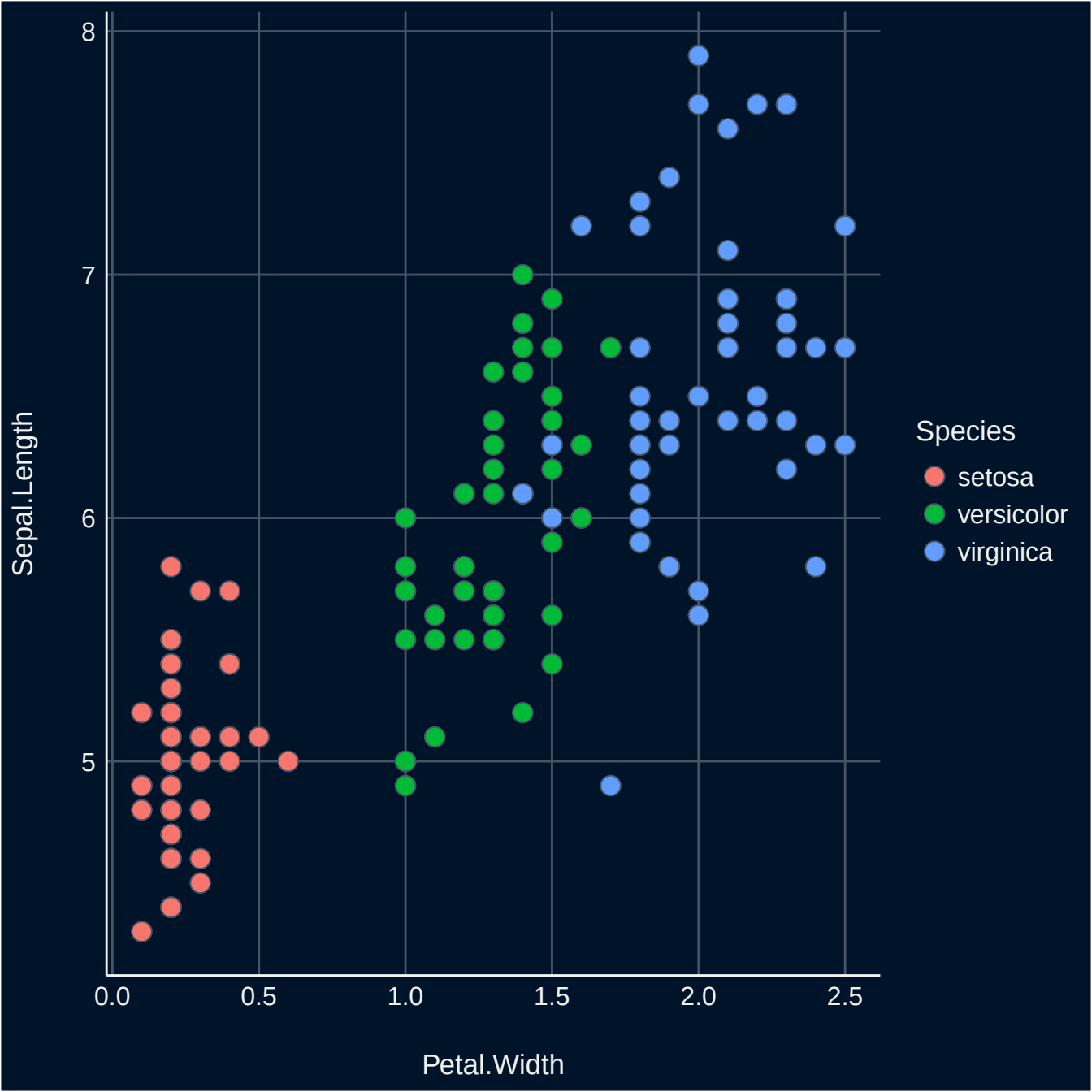

Species
setosa
versicolor
virginica

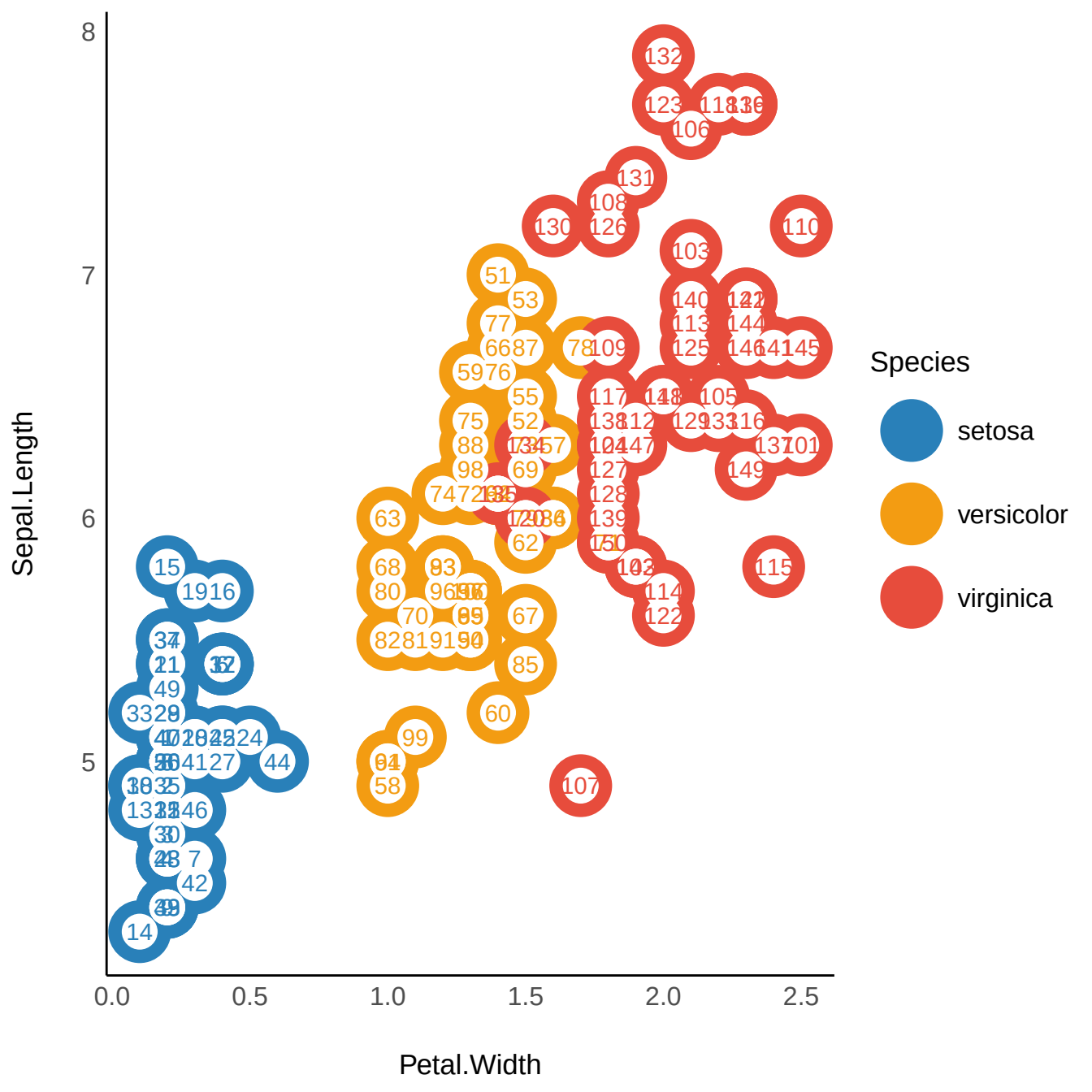

Petal.Width
2
1
0
5
6
7
8
Sepal.Length

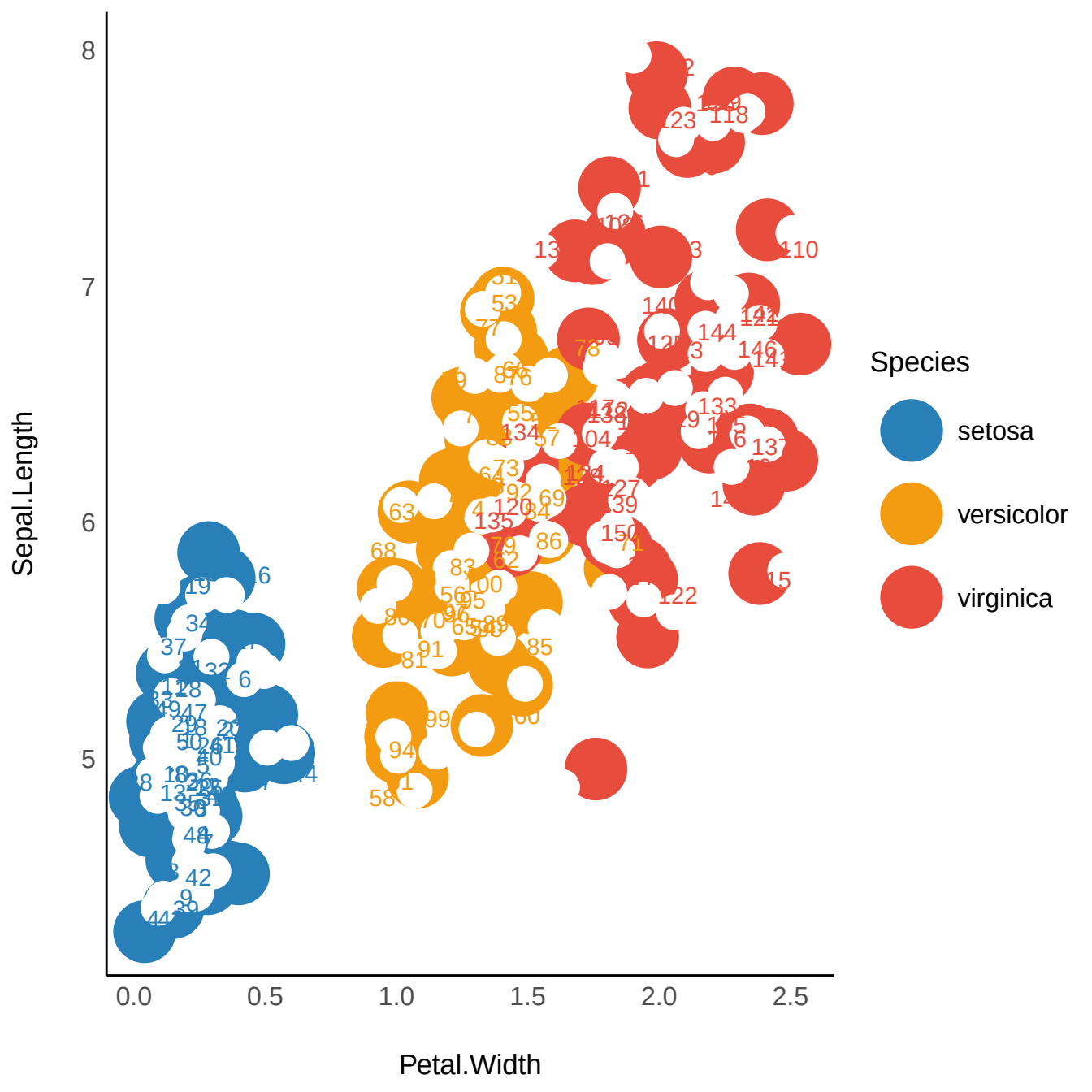

Mattan
Dom
Daniel
Brenton

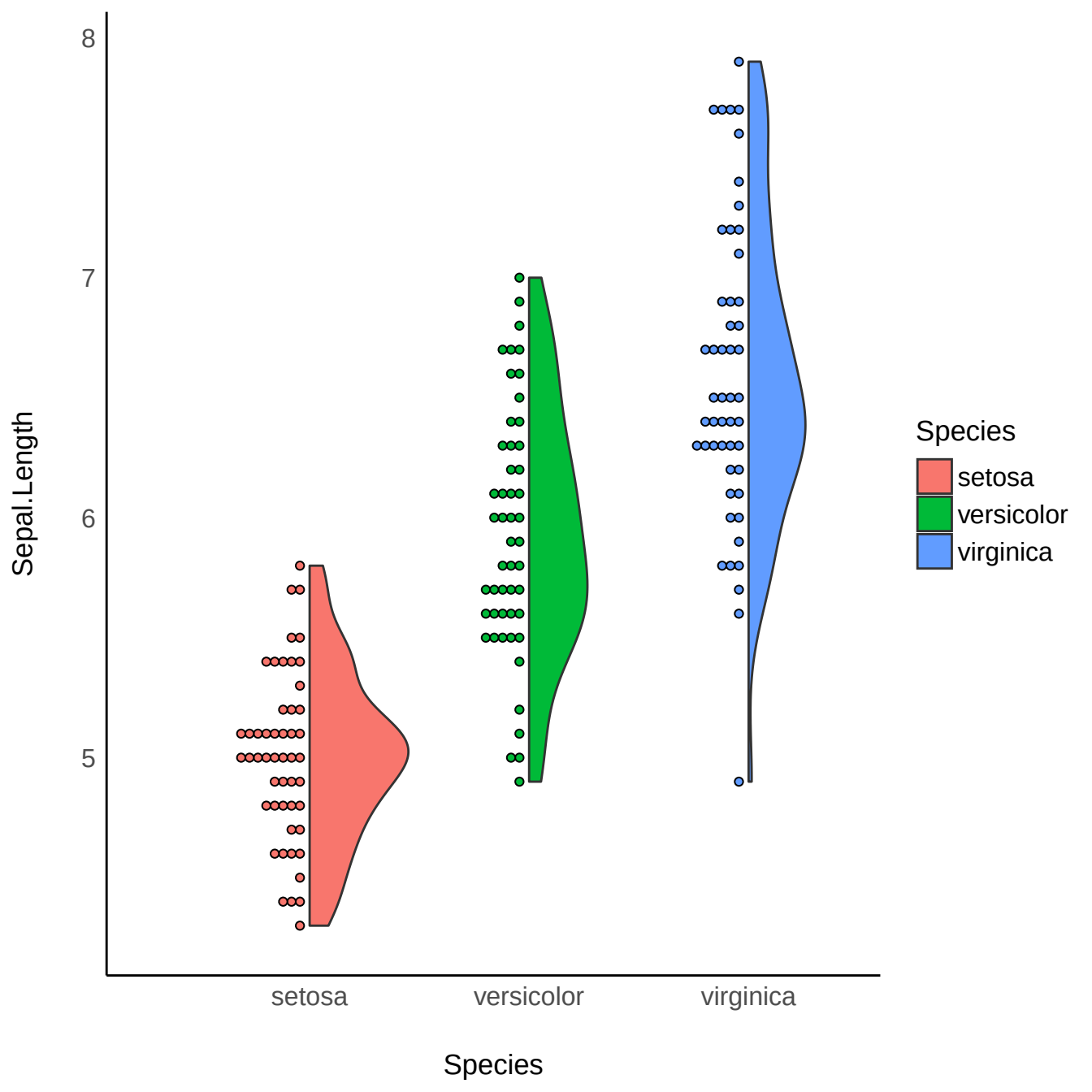

8
7
6
5
Sepal.Length
0.0
0.5
1.0
1.5
2.0
2.5
Petal.Width
8
7
6
5
Sepal.Length
0.0
0.5
1.0
1.5
2.0
2.5
Petal.Width

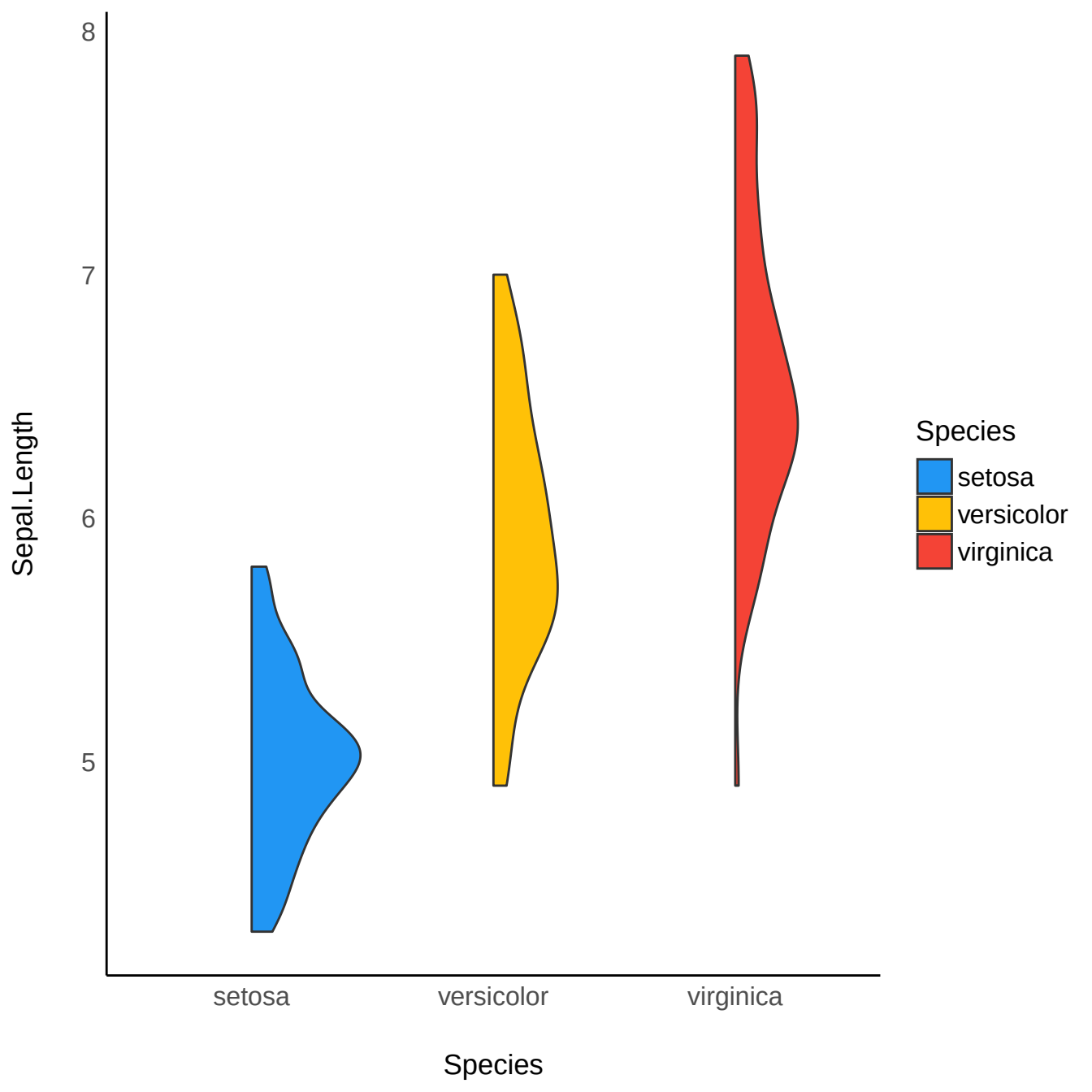

8
7
6
5
Sepal.Length
0.0
0.5
1.0
1.5
2.0
2.5
Petal.Width
Species
setosa
versicolor
virginica

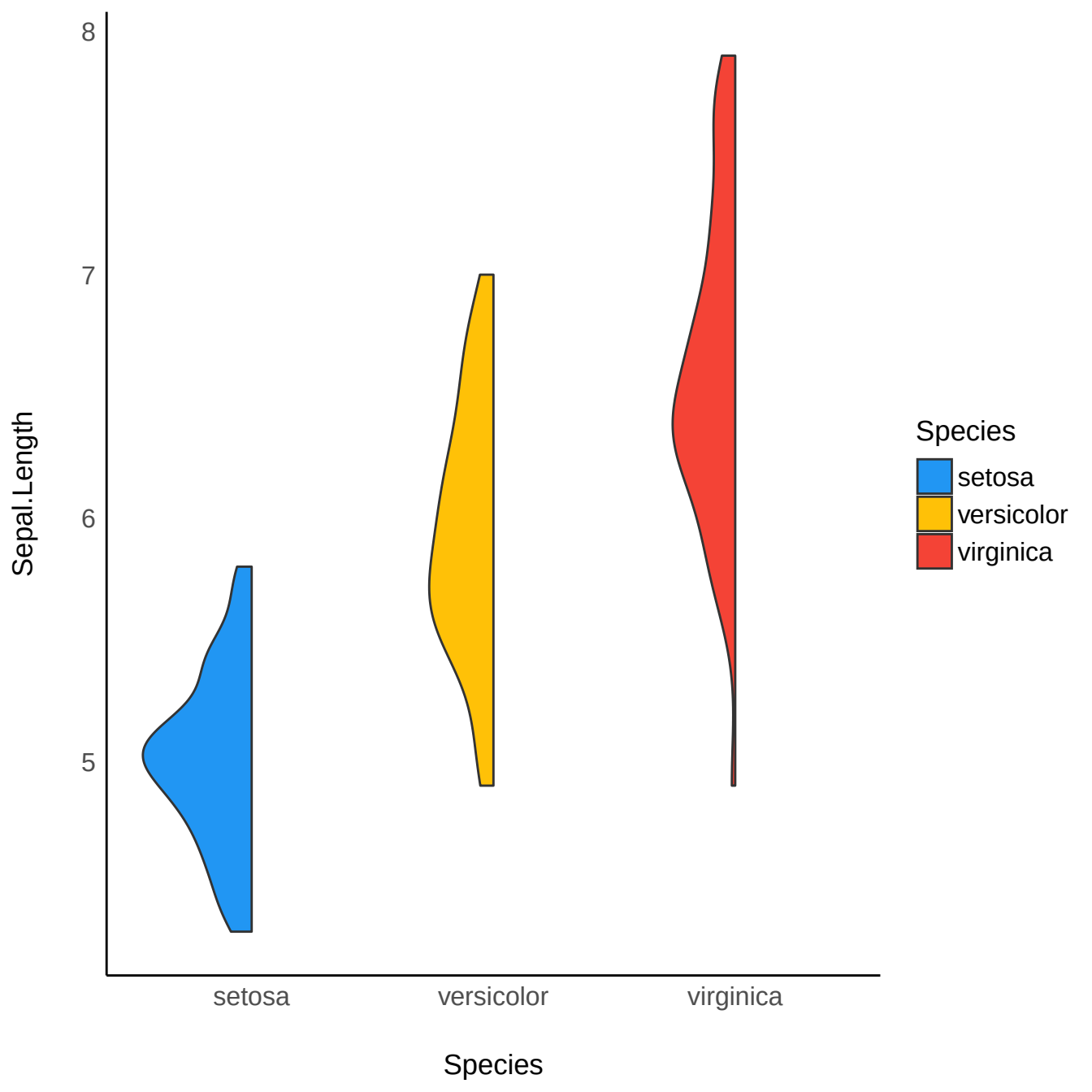

8
7
6
5
Sepal.Length
0.0
0.5
1.0
1.5
2.0
2.5
Petal.Width
Species
setosa
versicolor
virginica

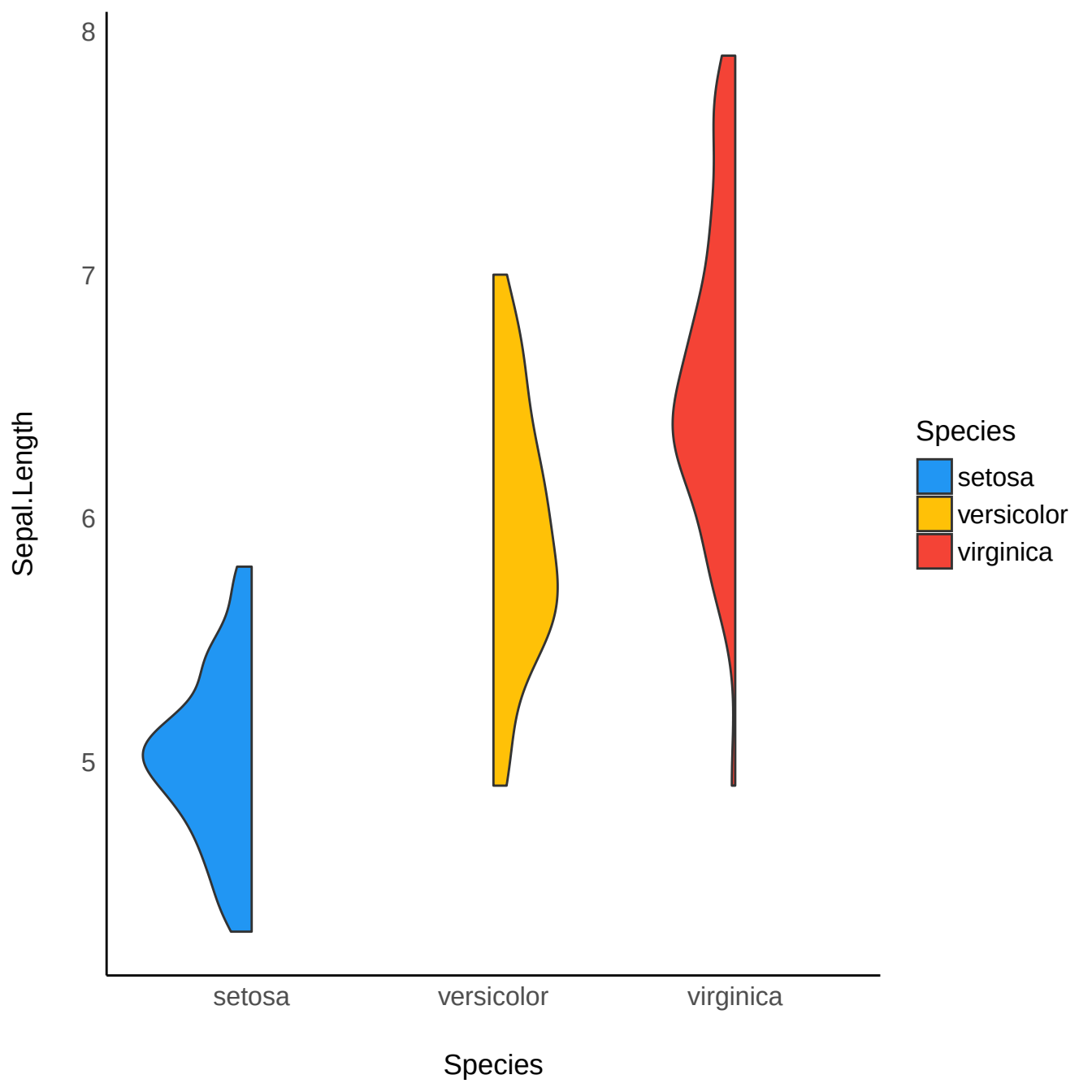

Sepal.Length
Petal.Width
8
7
6
5
0.0
0.5
1.0
1.5
2.0
2.5
Species
setosa
versicolor
virginica

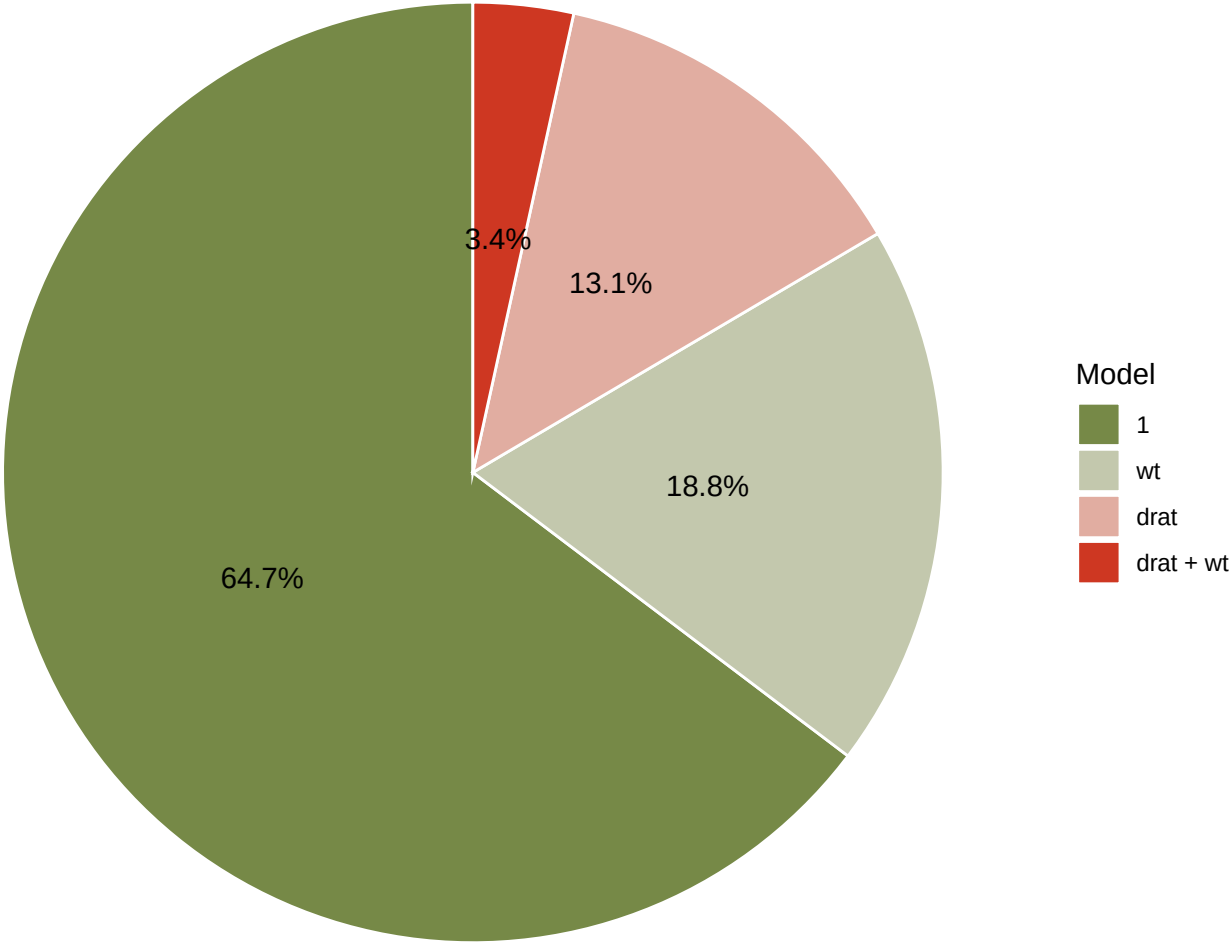

Sepal.Length
8
7
6
5
0.0
0.5
1.0
1.5
2.0
2.5
Petal.Width
Species
setosa
versicolor
virginica

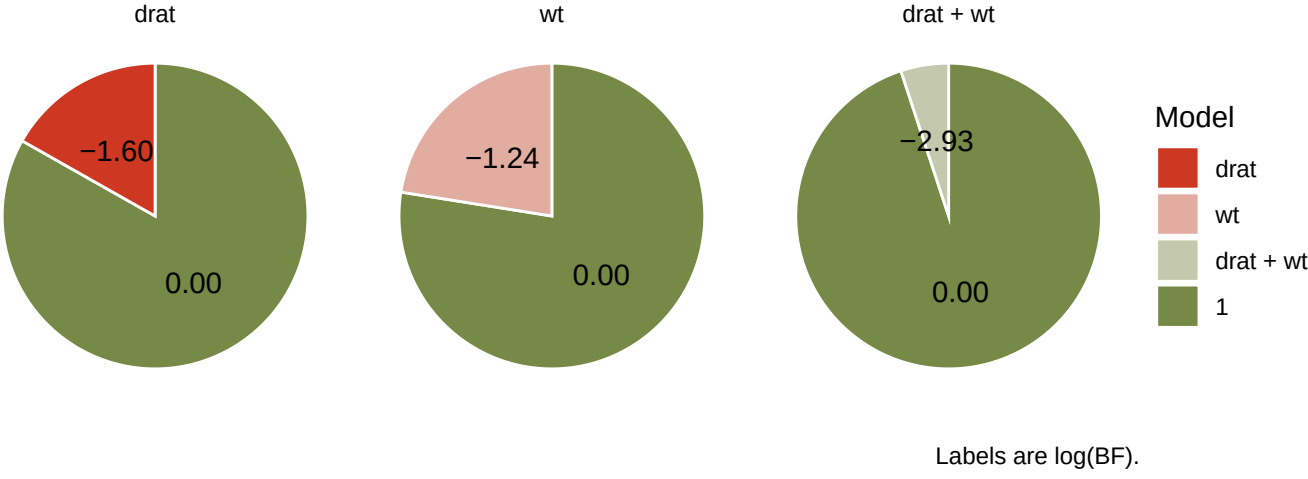

8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica


8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica

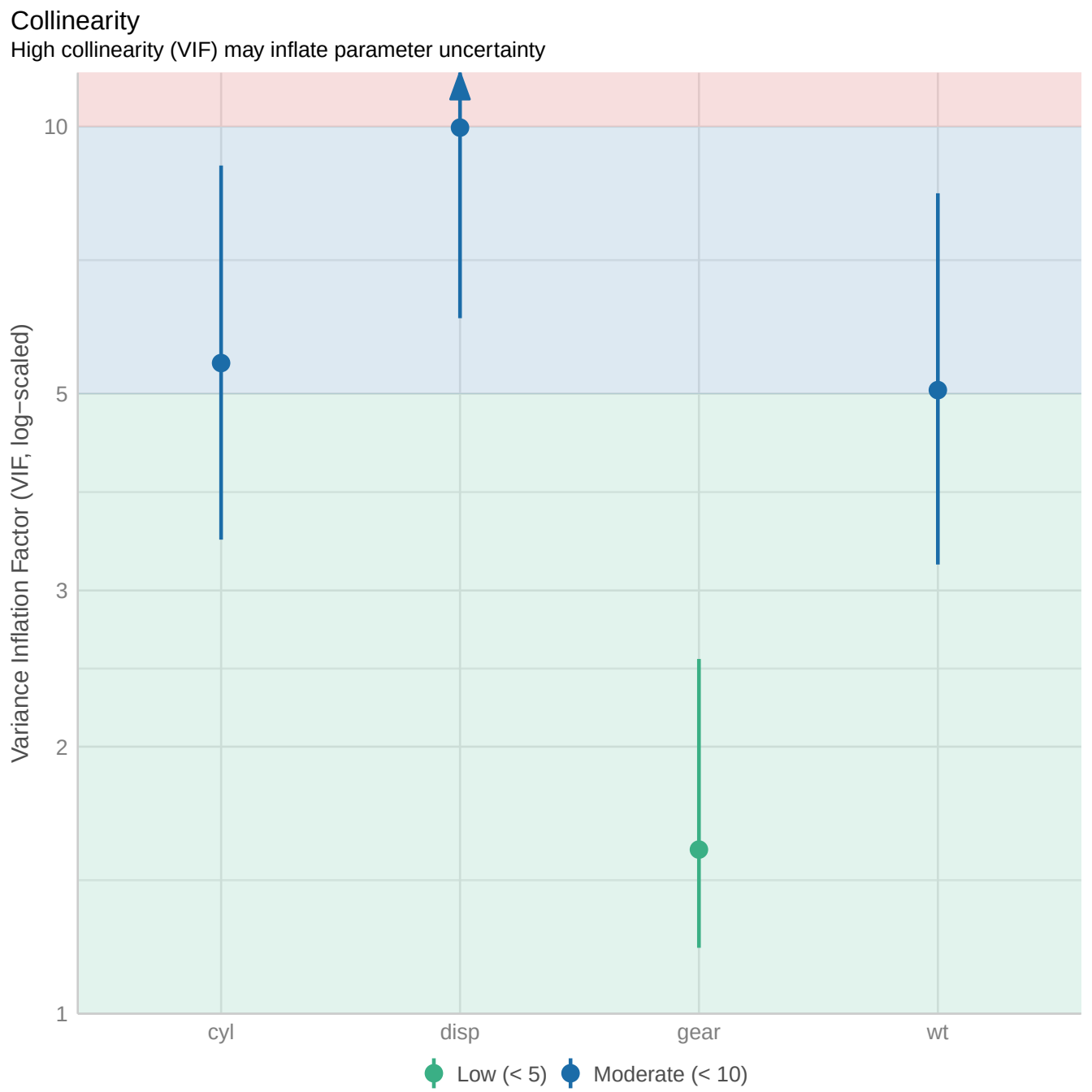

8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica


8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica

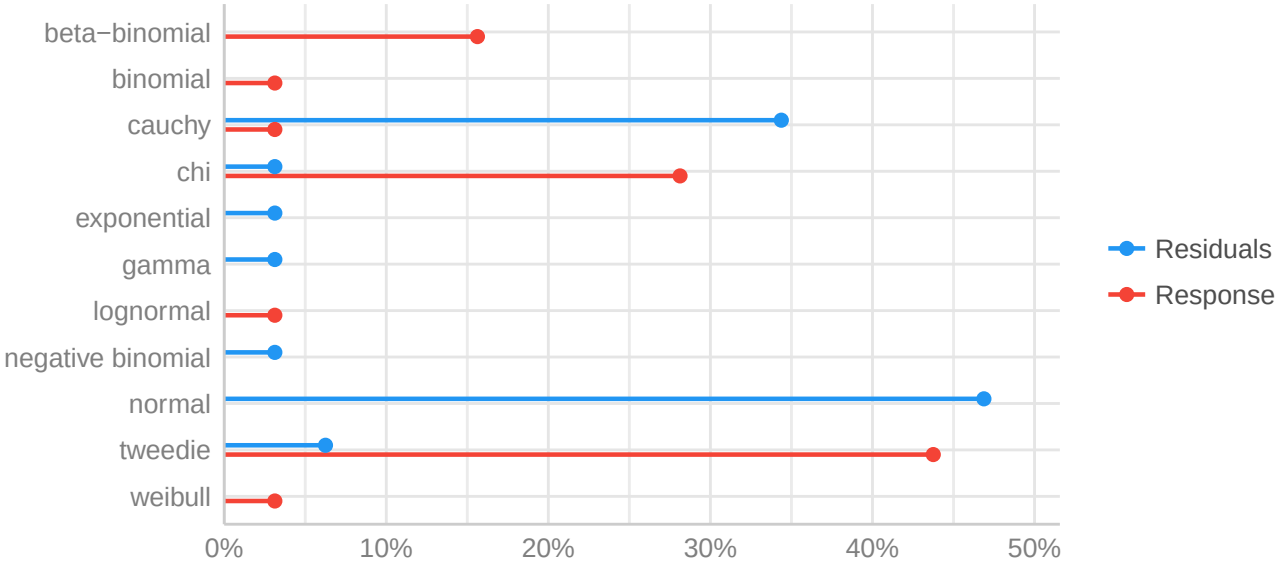

3.4%
13.1%
18.8%
64.7%
Model
1
wt
drat
drat + wt



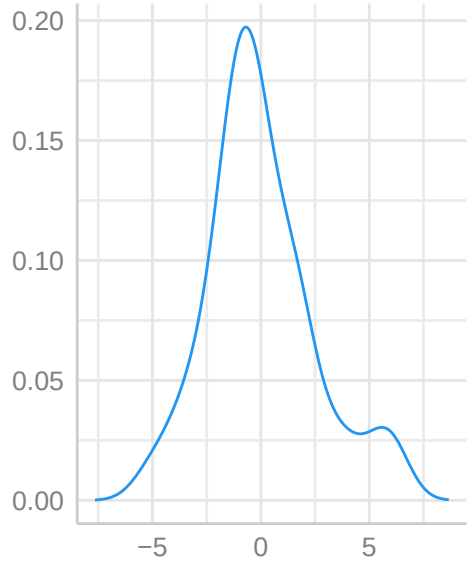
Labels are log(BF).


Collinearity
High collinearity (VIF) may inflate parameter uncertainty
Variance Inflation Factor (VIF, log−scaled)
10
5
3
2
1
cyl
disp
gear
wt
Low (< 5)
Moderate (< 10)

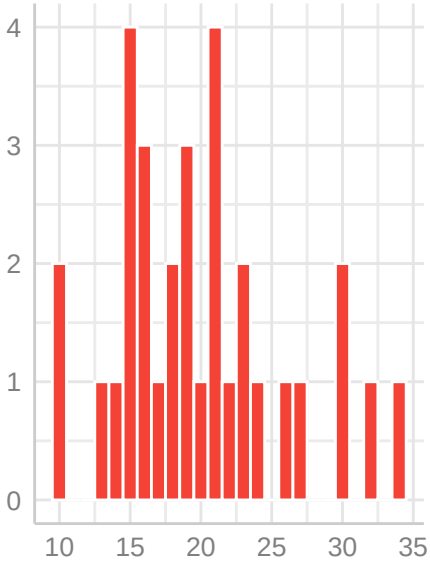
Predicted Distribution of Residuals and Response

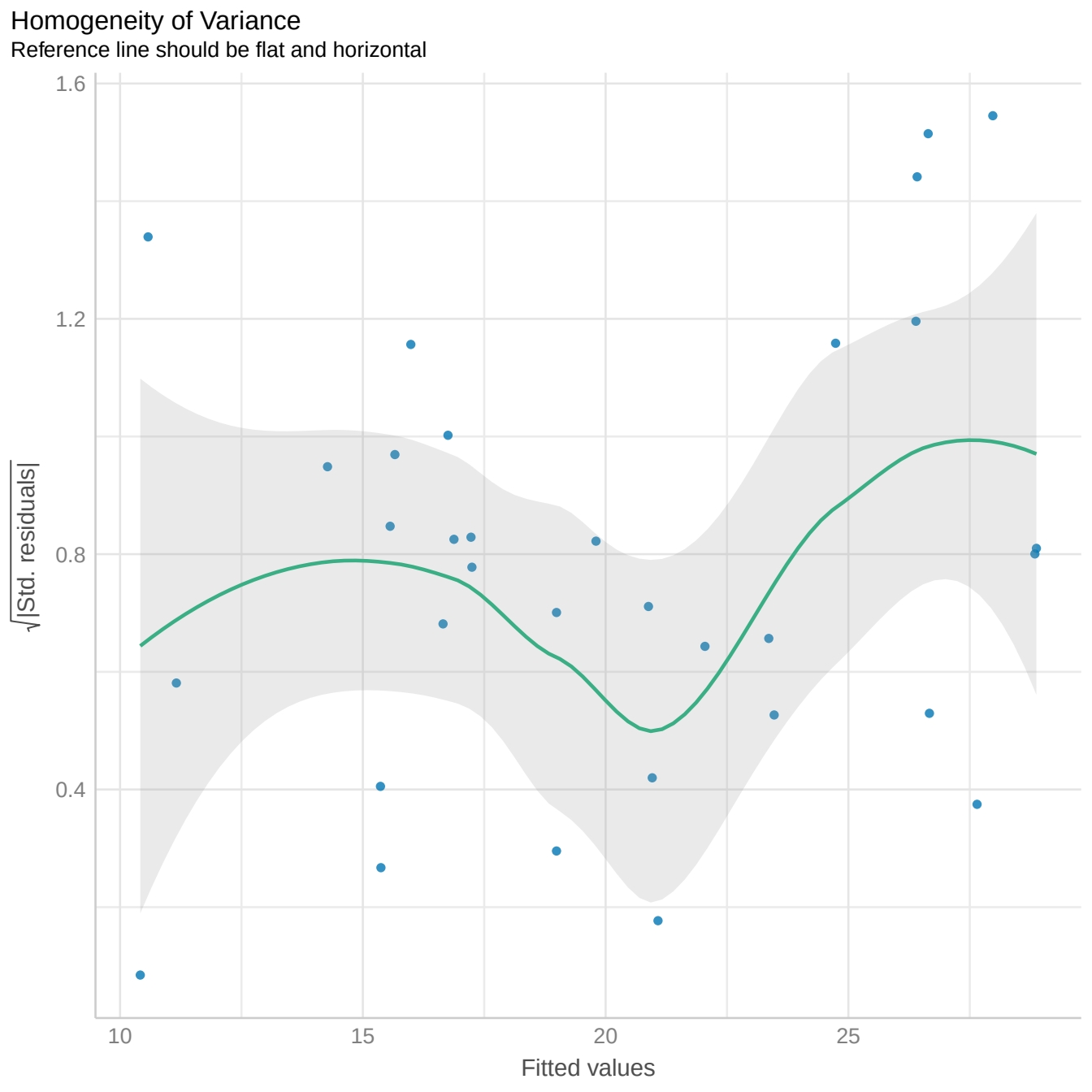


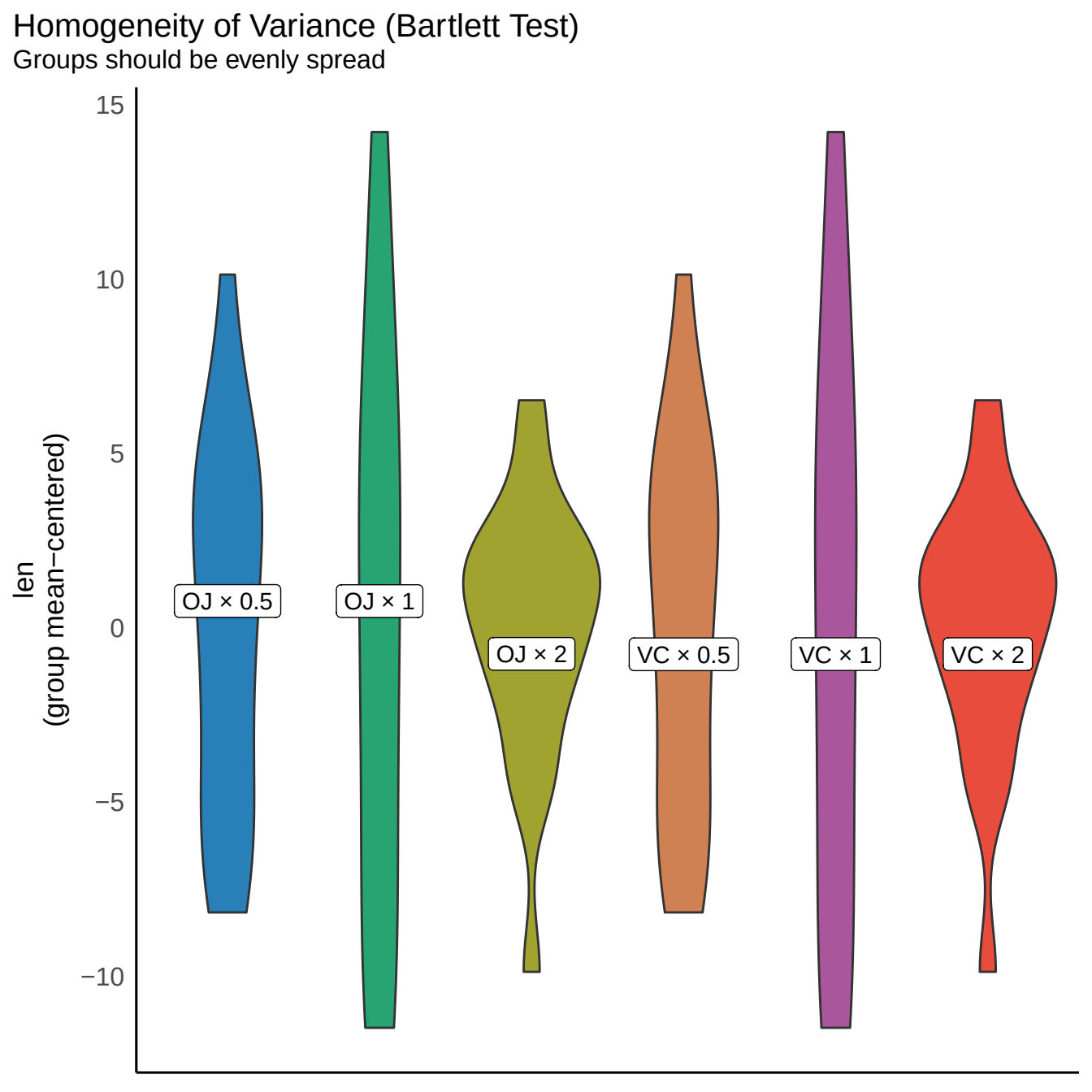
Density of Residuals

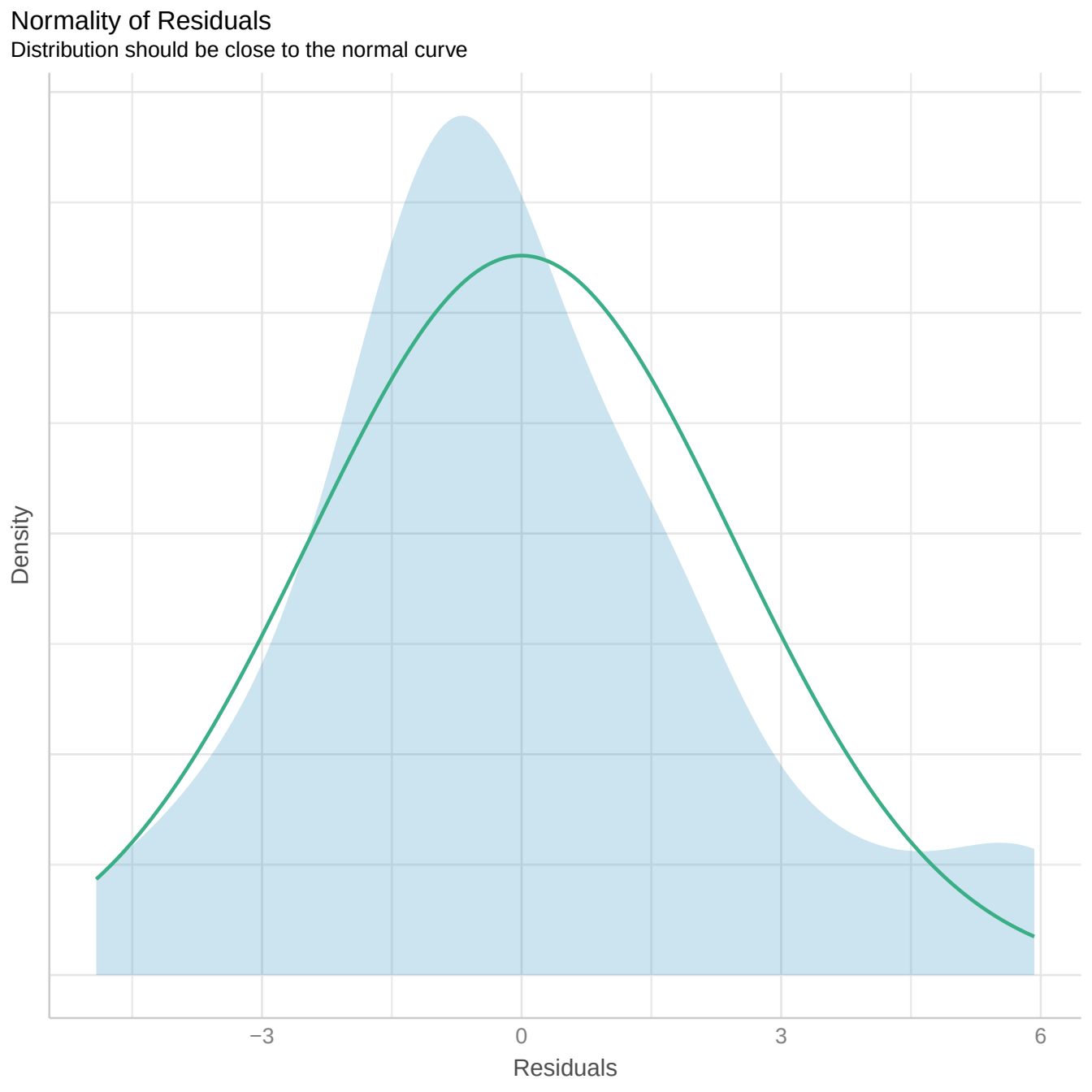


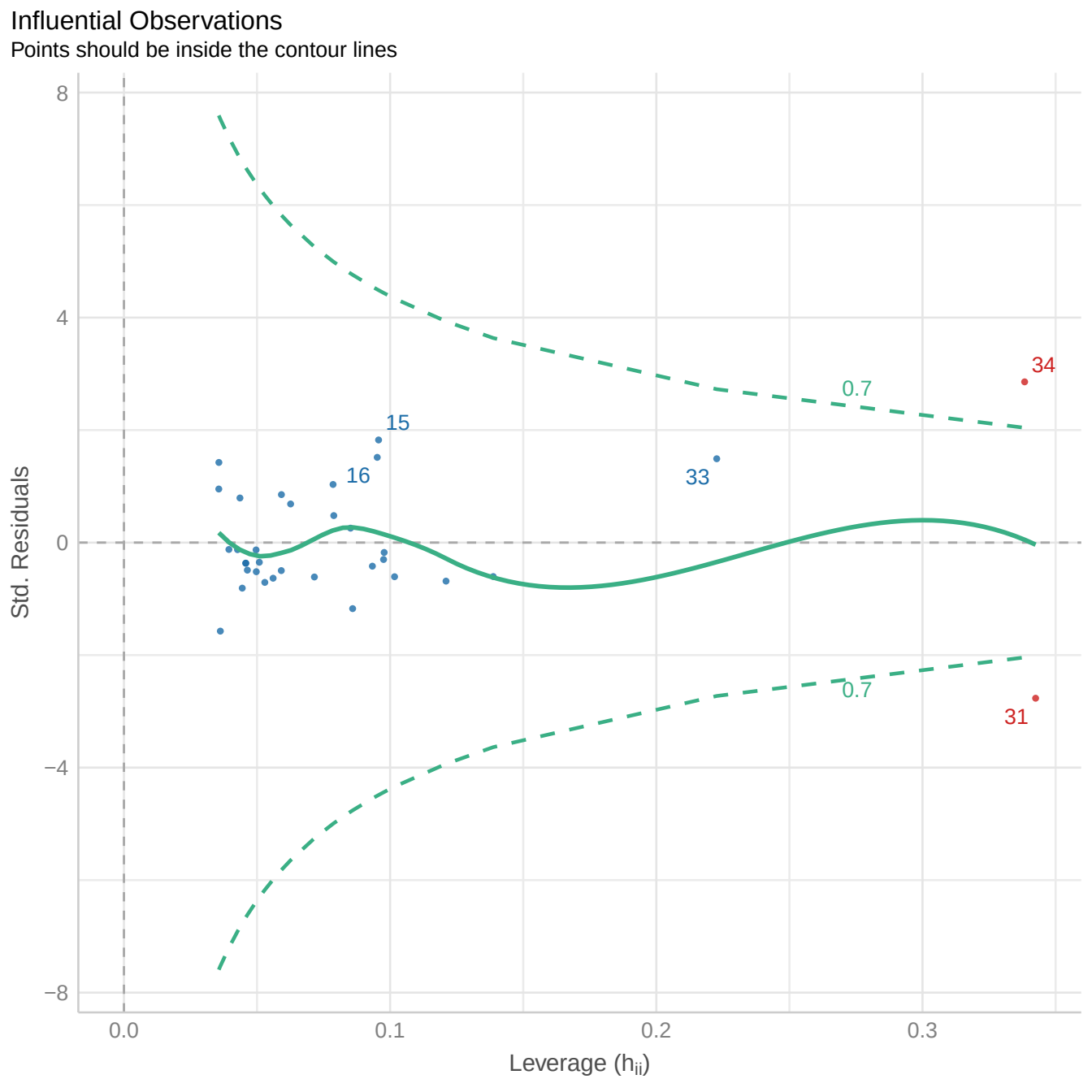
Distribution of Response

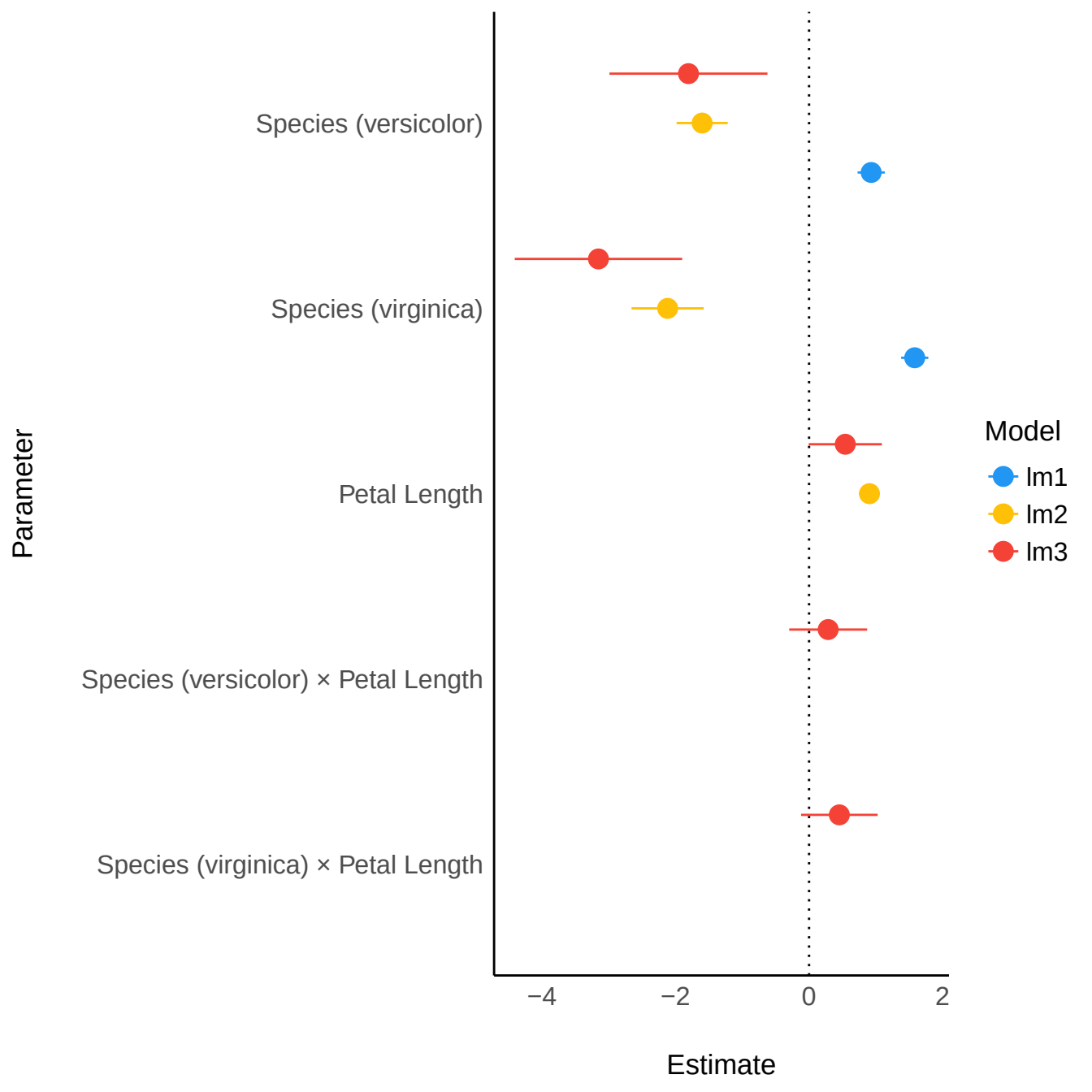



Homogeneity of Variance
Reference line should be flat and horizontal
1.6
1.2
0.8
0.4
√|Std. residuals|
10
15
20
25
Fitted values

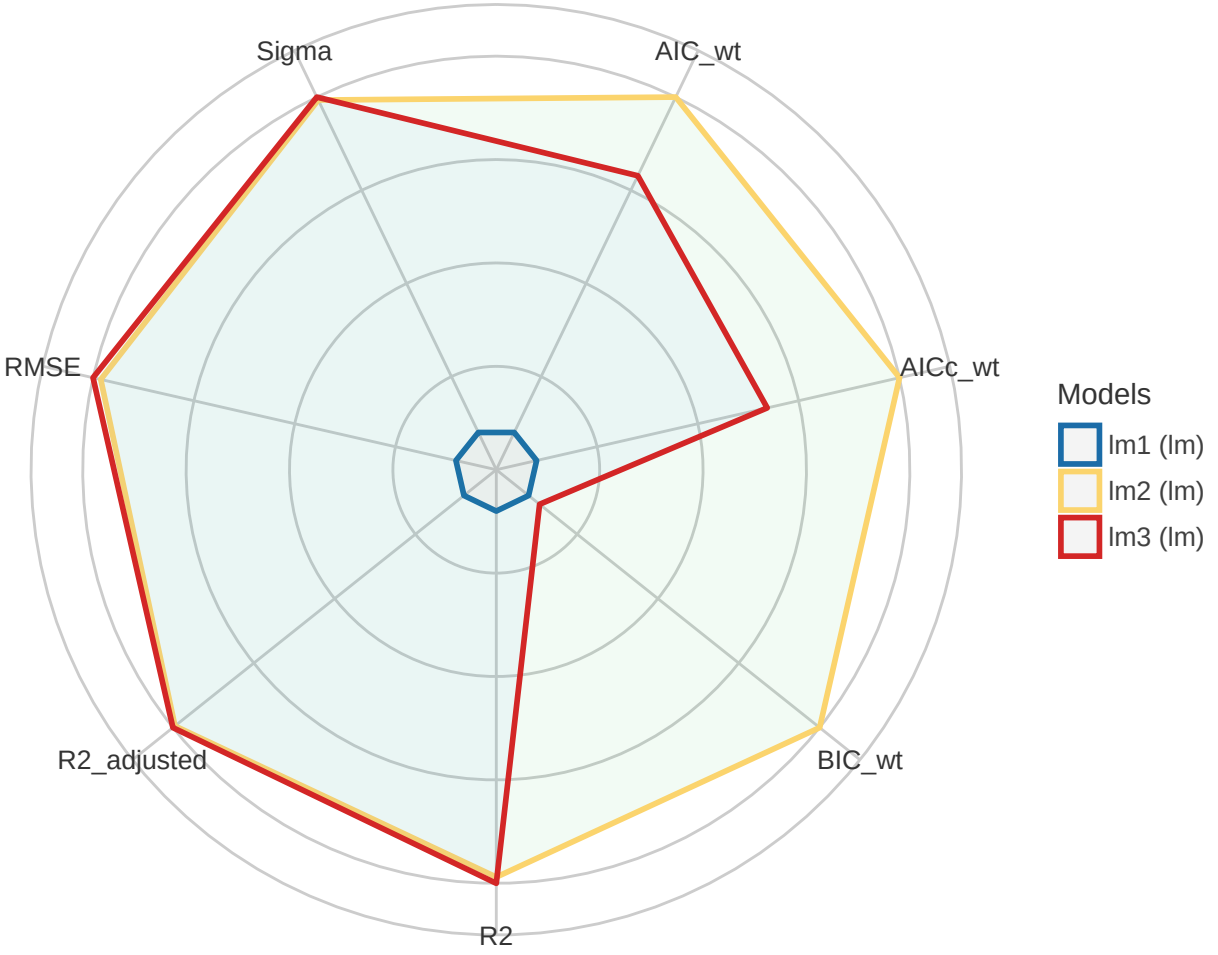

Homogeneity of Variance (Bartlett Test)
Groups should be evenly spread
len
(group mean−centered)
15
10
5
0
−5
−10
OJ × 0.5
OJ × 1
OJ × 2
VC × 0.5
VC × 1
VC × 2

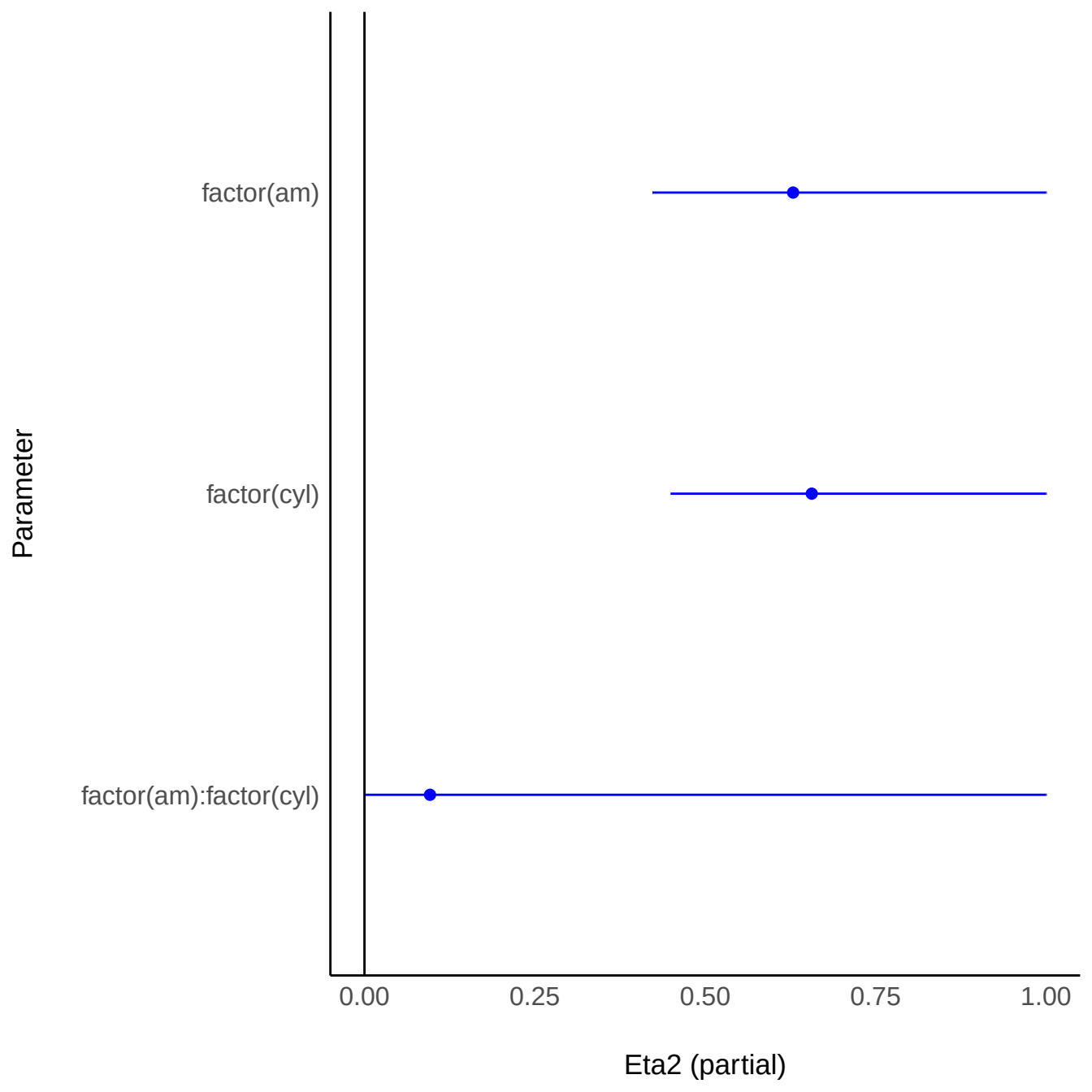

Normality of Residuals
Distribution should be close to the normal curve
Density
−3
0
3
6
Residuals

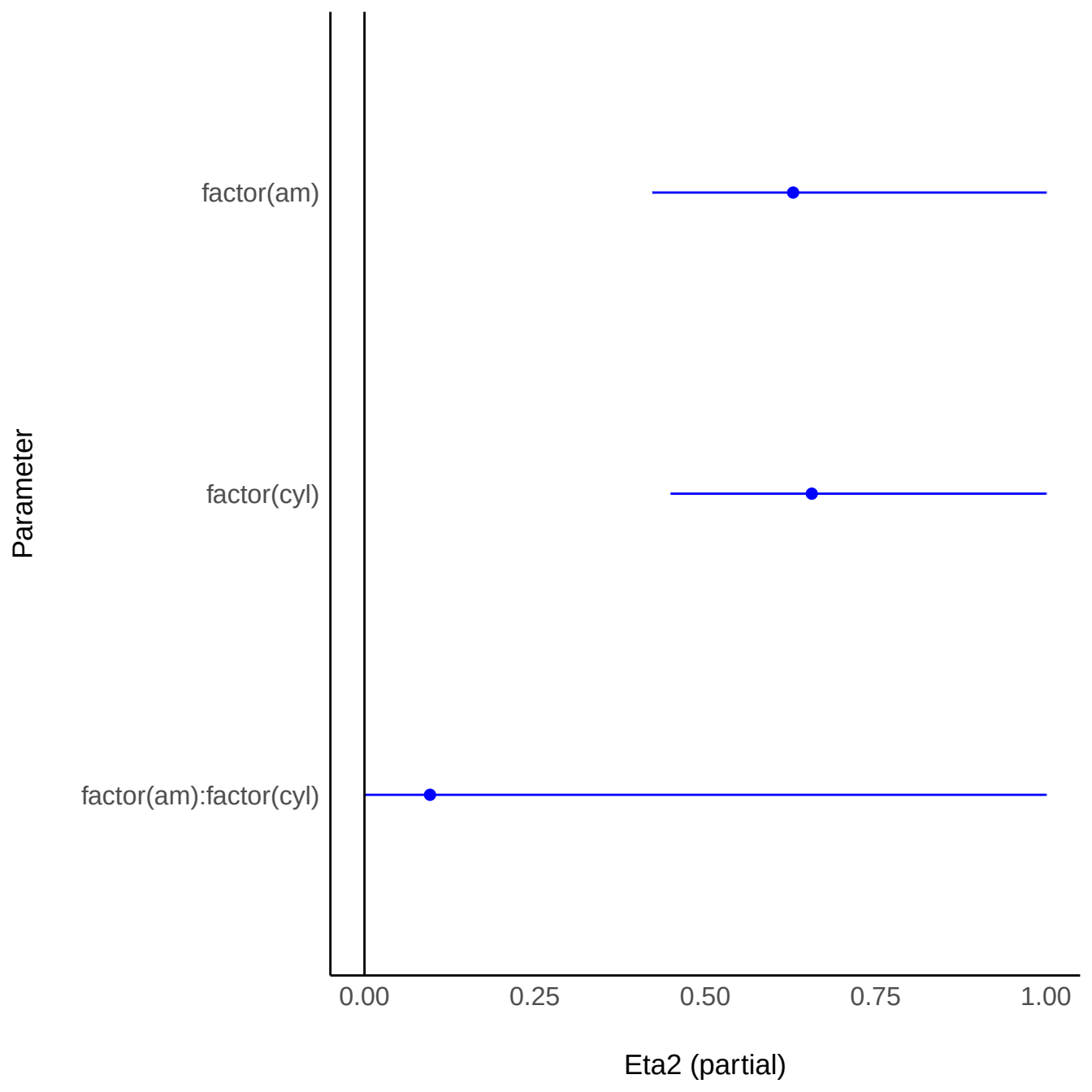

Influential Observations
Points should be inside the contour lines
Std. Residuals
Leverage (h_{ii})
8
4
0
−4
−8
0.0
0.1
0.2
0.3
0.7
0.7
34
31
15
16
33

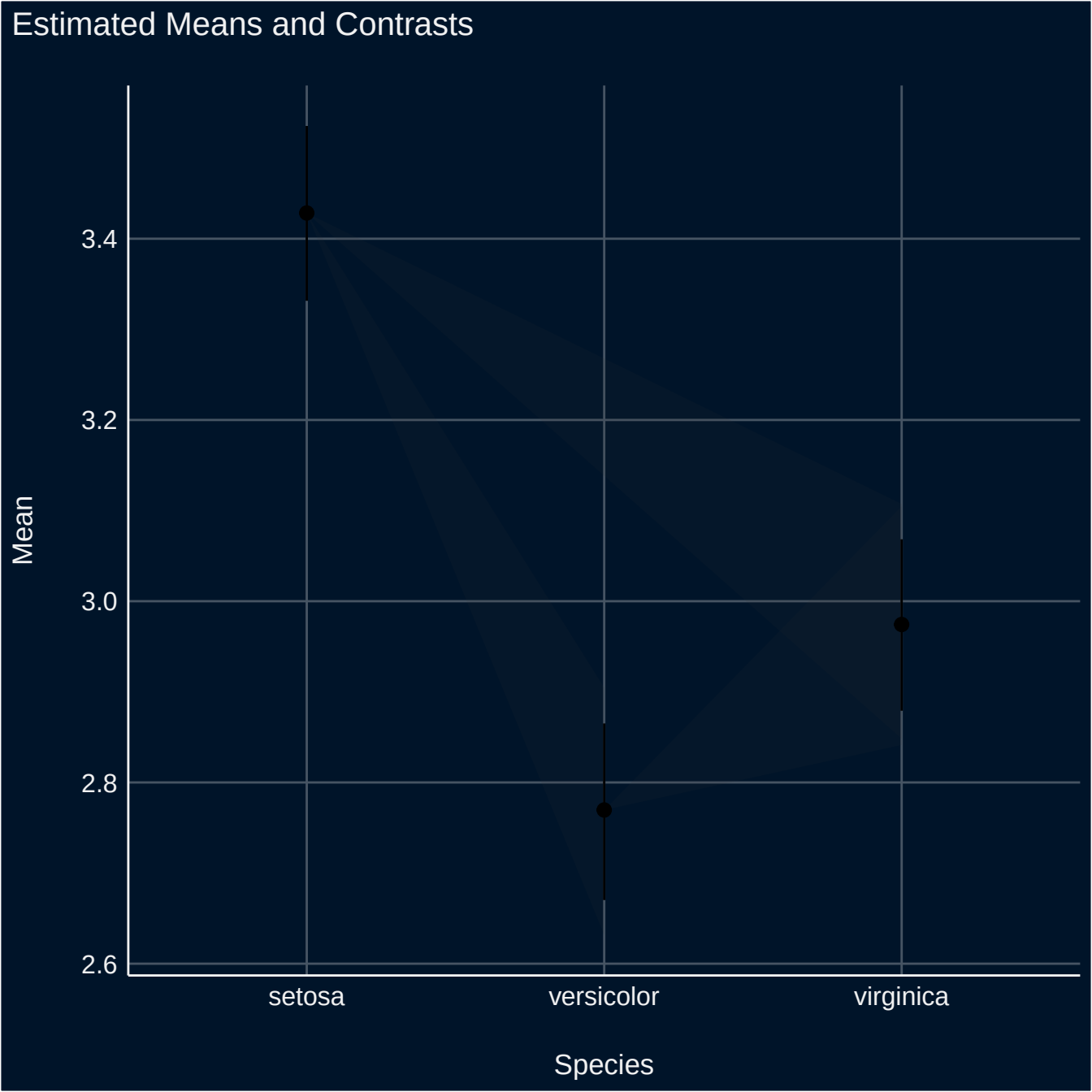

Species (versicolor)
Species (virginica)
Petal Length
Species (versicolor) × Petal Length
Species (virginica) × Petal Length
Parameter
−4
−2
0
2
Estimate
Model
lm1
lm2
lm3

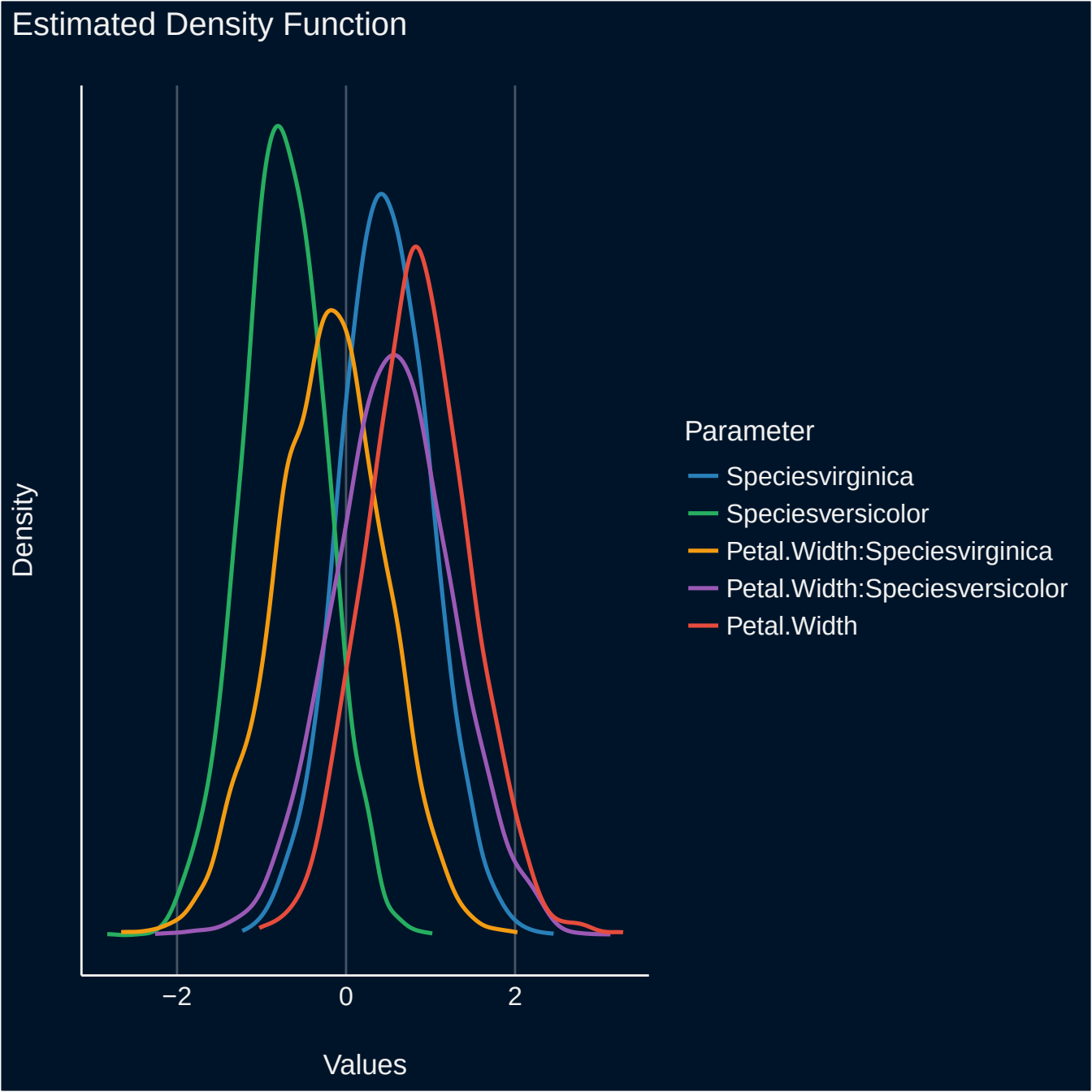
Comparison of Model Indices

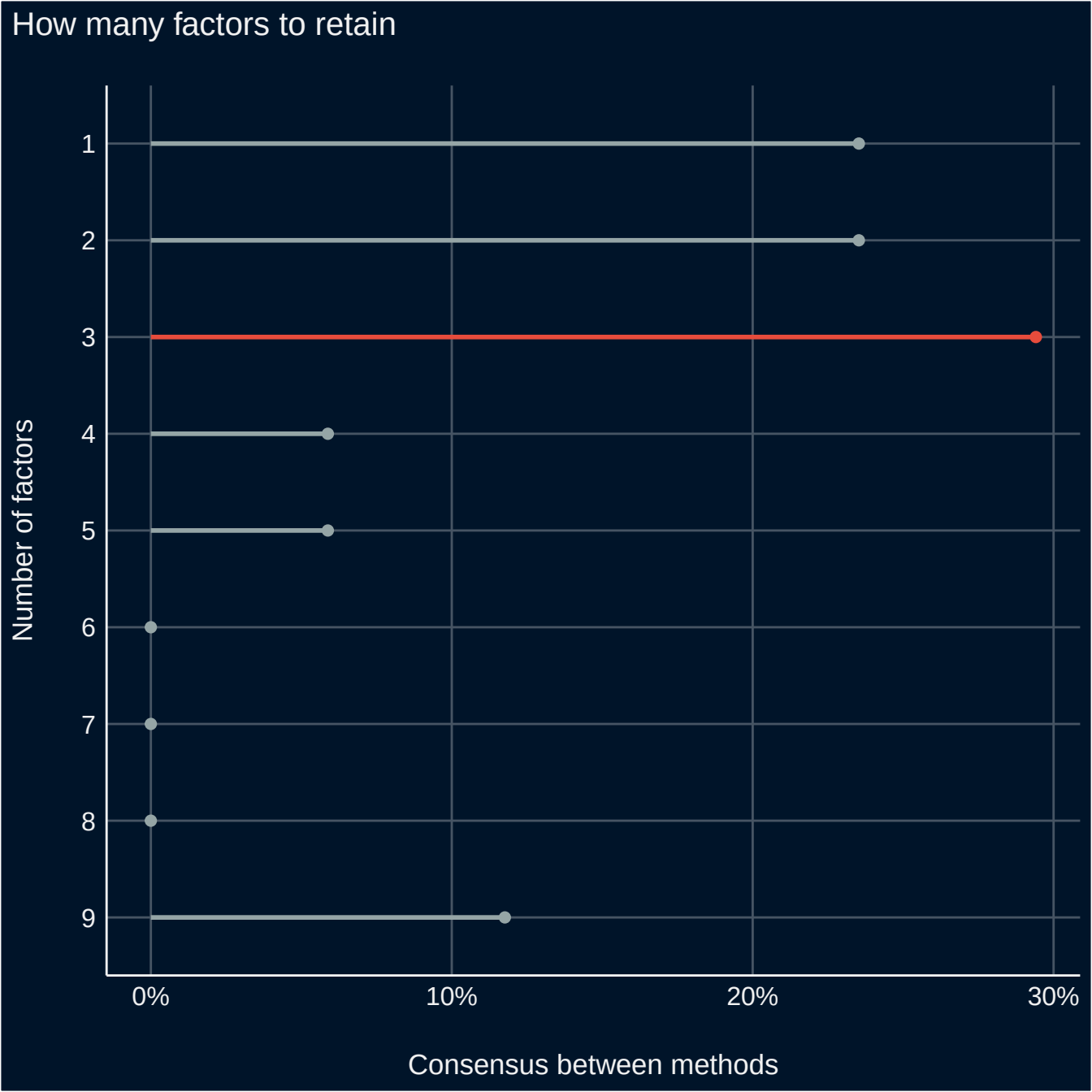


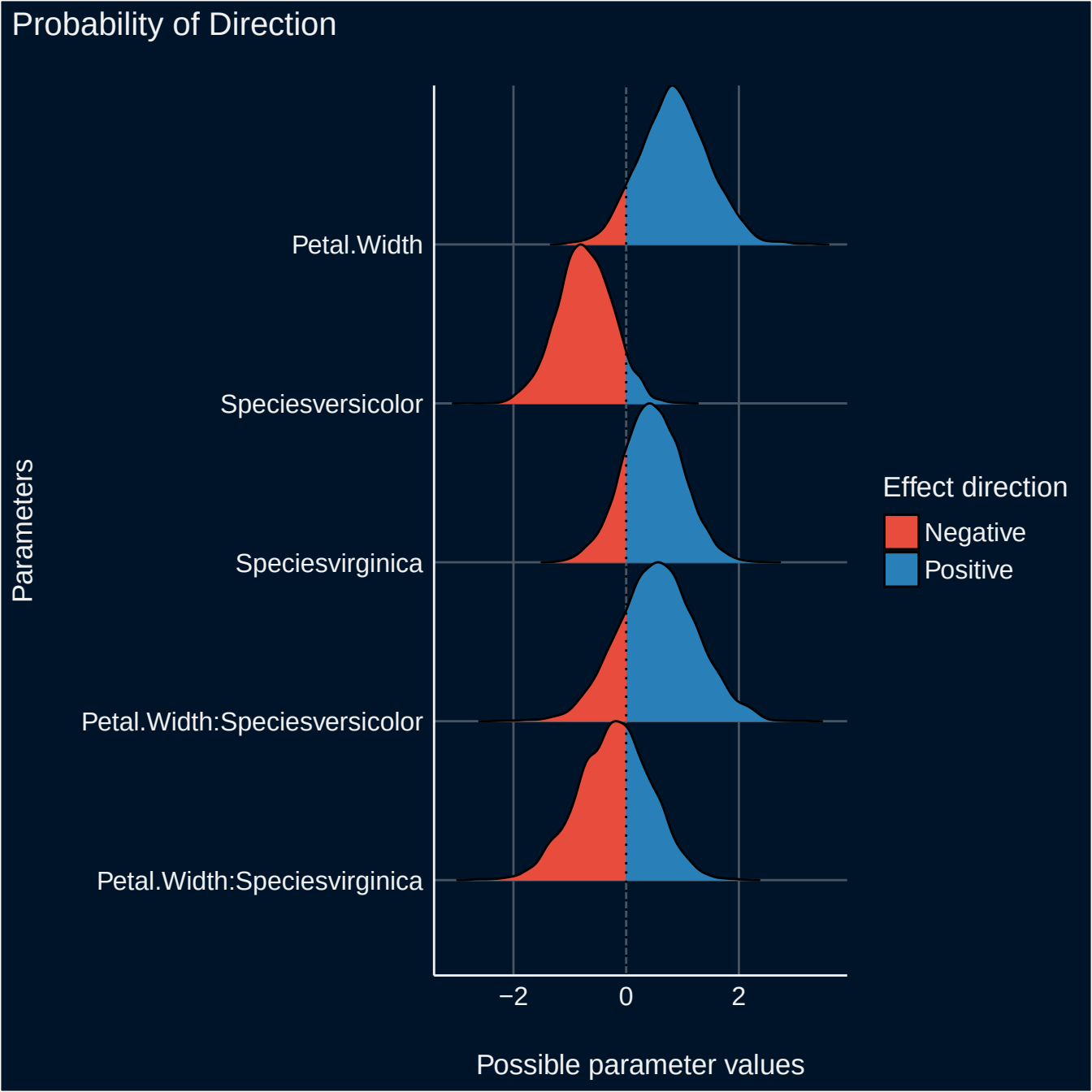

factor(am)
factor(cyl)
factor(am):factor(cyl)
Parameter
0.00
0.25
0.50
0.75
1.00
Eta2 (partial)

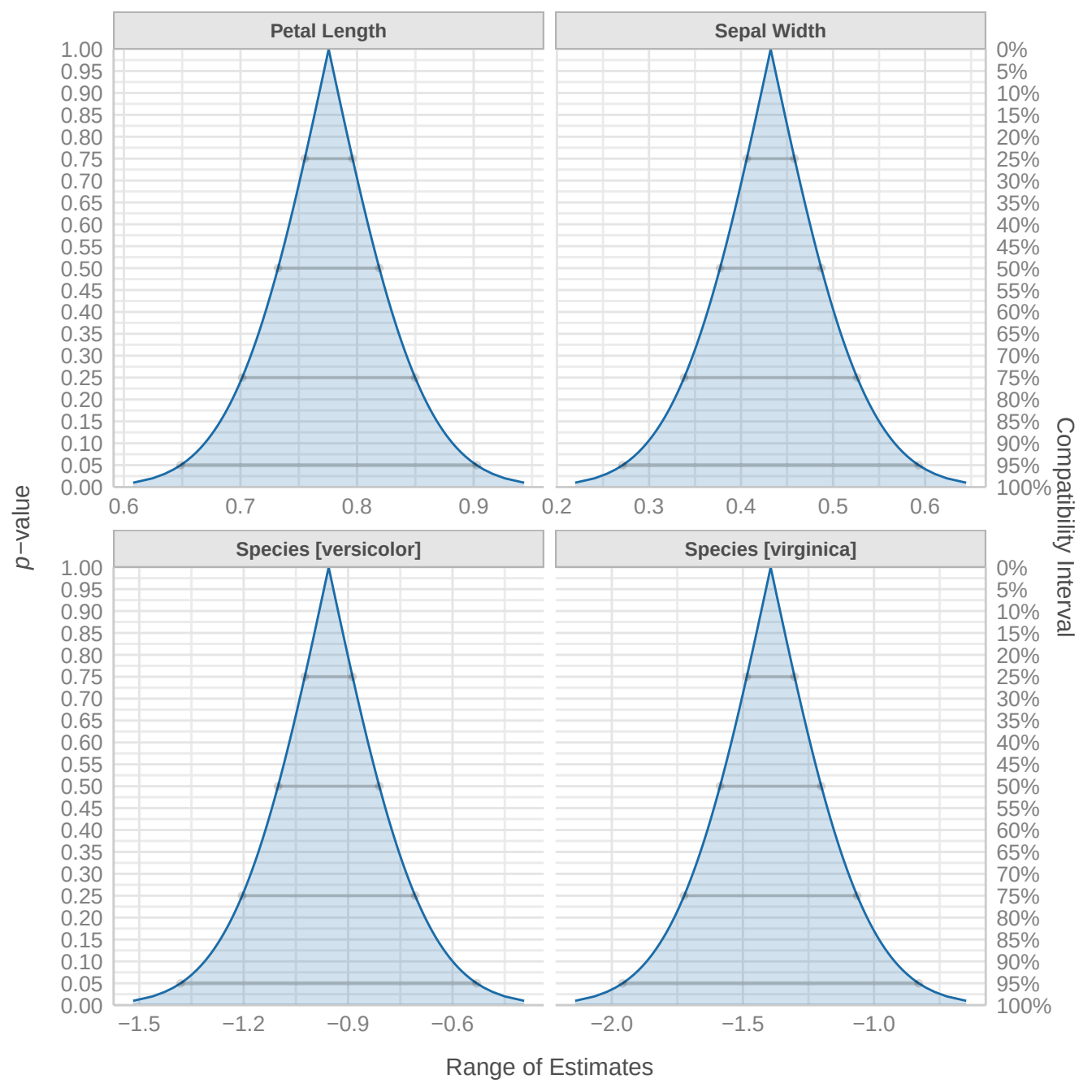

factor(am)
factor(cyl)
factor(am):factor(cyl)
Parameter
0.00
0.25
0.50
0.75
1.00
Eta2 (partial)

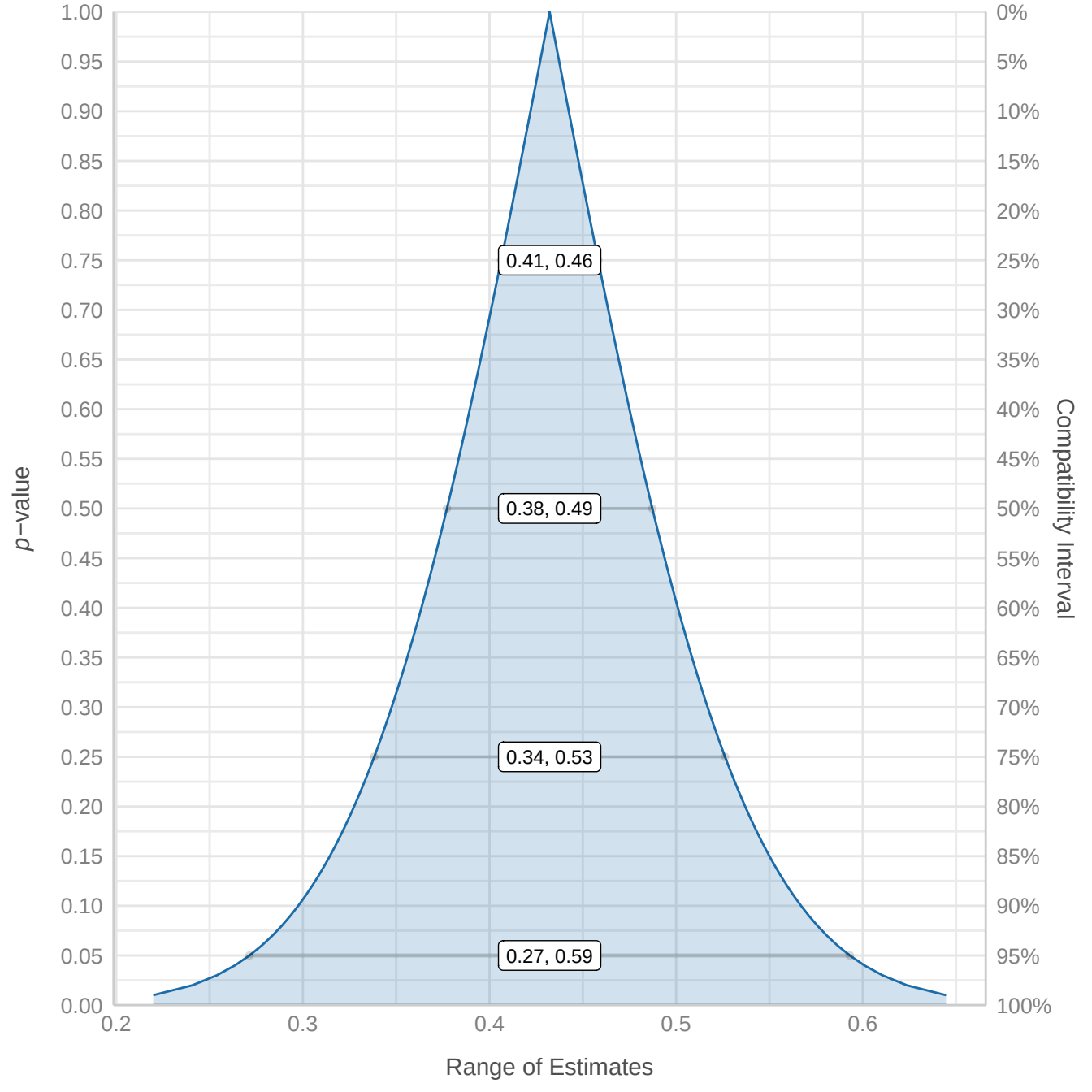

Estimated Means and Contrasts
Mean
3.4
3.2
3.0
2.8
2.6
setosa
versicolor
virginica
Species

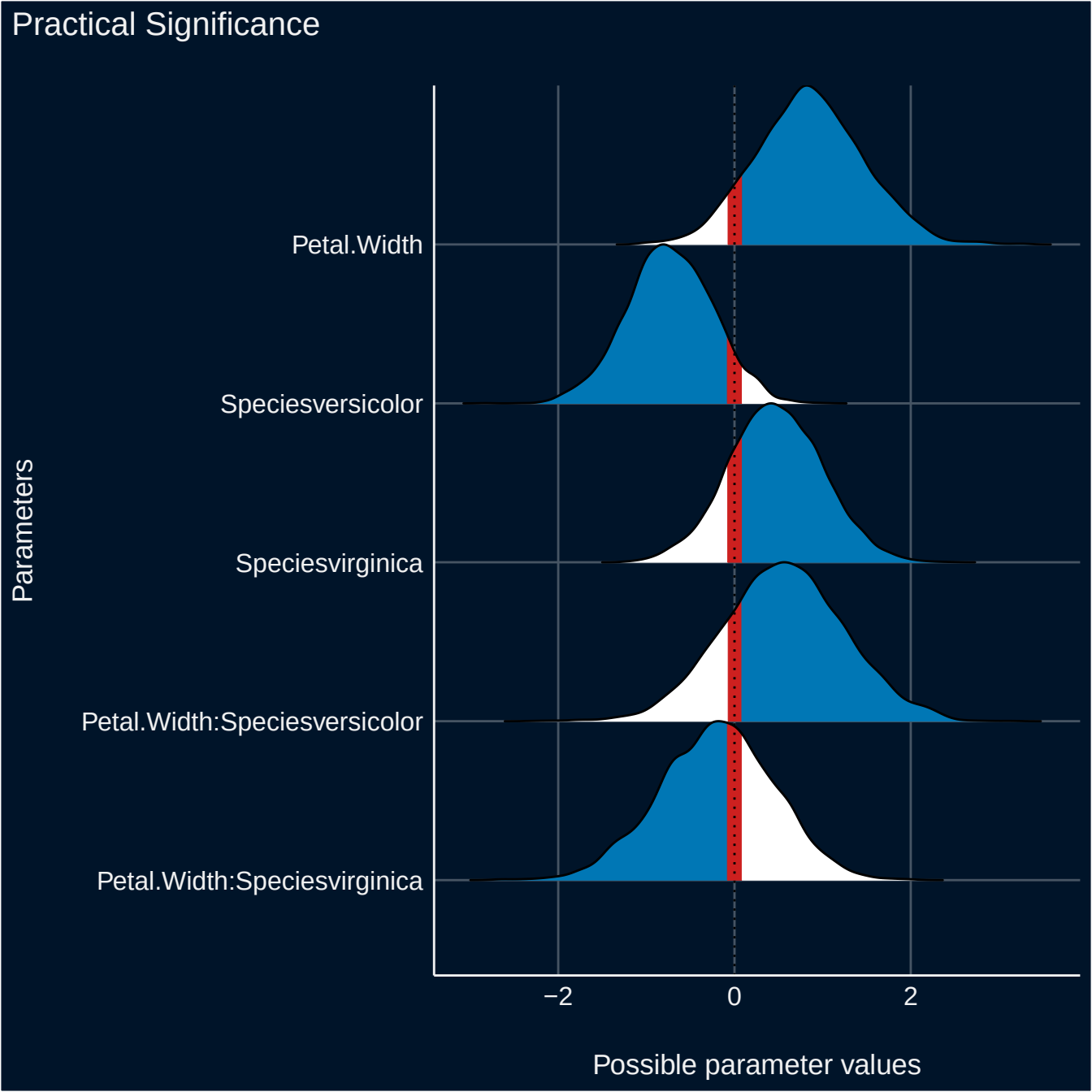

Estimated Density Function
Density
−2
0
2
Values
Parameter
Speciesvirginica
Speciesversicolor
Petal.Width:Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width

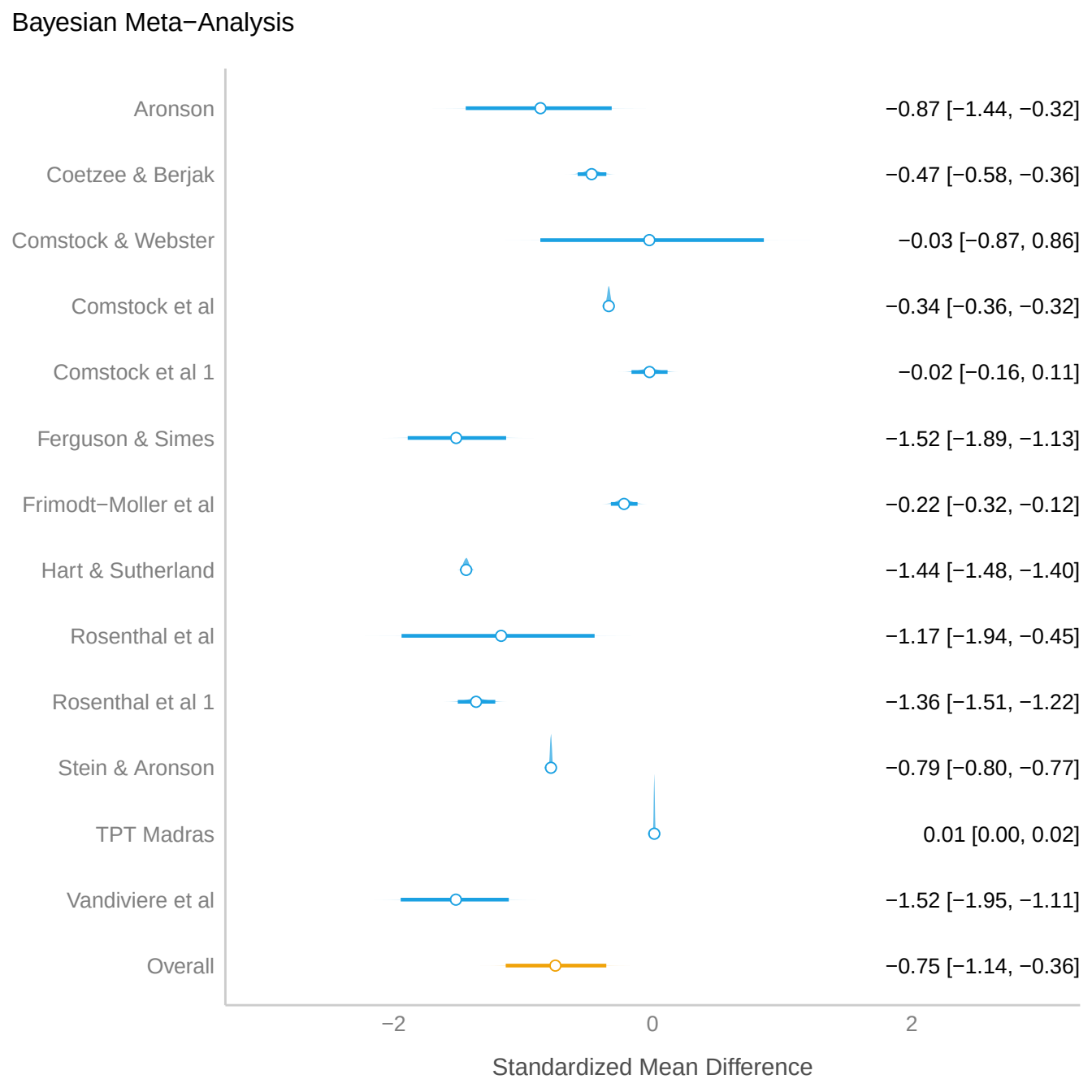

How many factors to retain
Number of factors
1
2
3
4
5
6
7
8
9
0%
10%
20%
30%
Consensus between methods

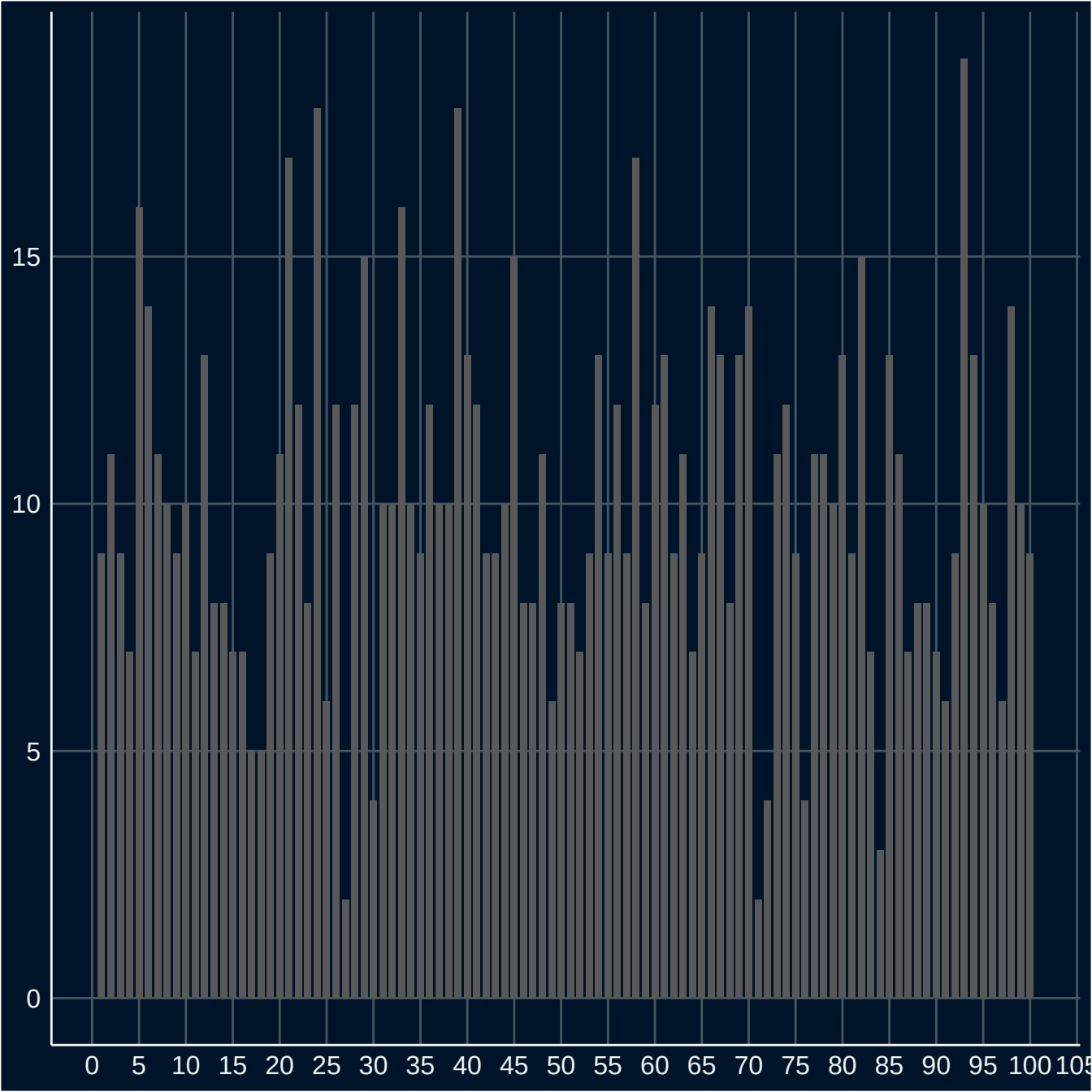

Probability of Direction
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Parameters
−2
0
2
Possible parameter values
Effect direction
Negative
Positive

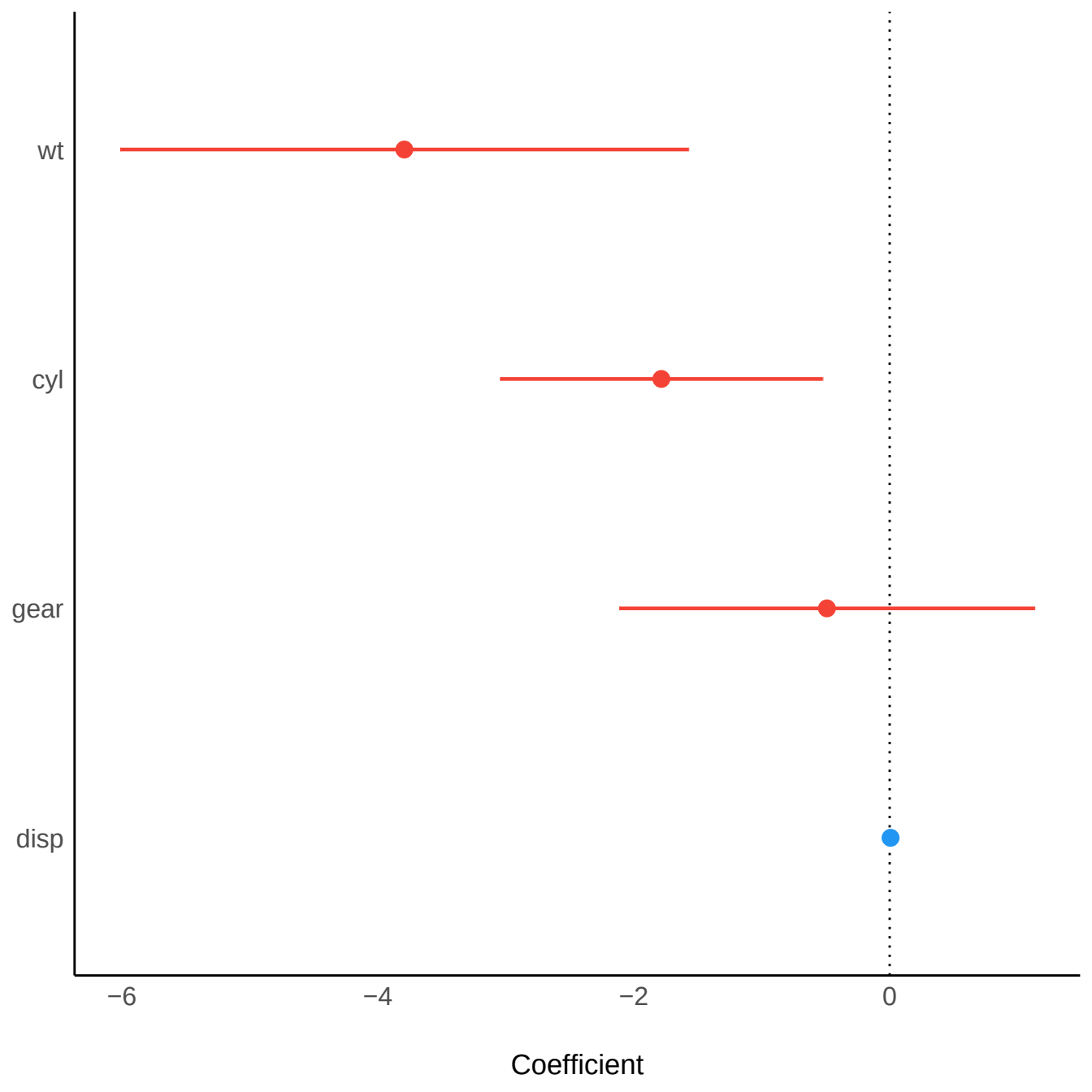

Petal Length
Sepal Width
Species [versicolor]
Species [virginica]
p−value
Compatibility Interval
Range of Estimates
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%
0.6
0.7
0.8
0.9
0.2
0.3
0.4
0.5
0.6
−1.5
−1.2
−0.9
−0.6
−2.0
−1.5
−1.0

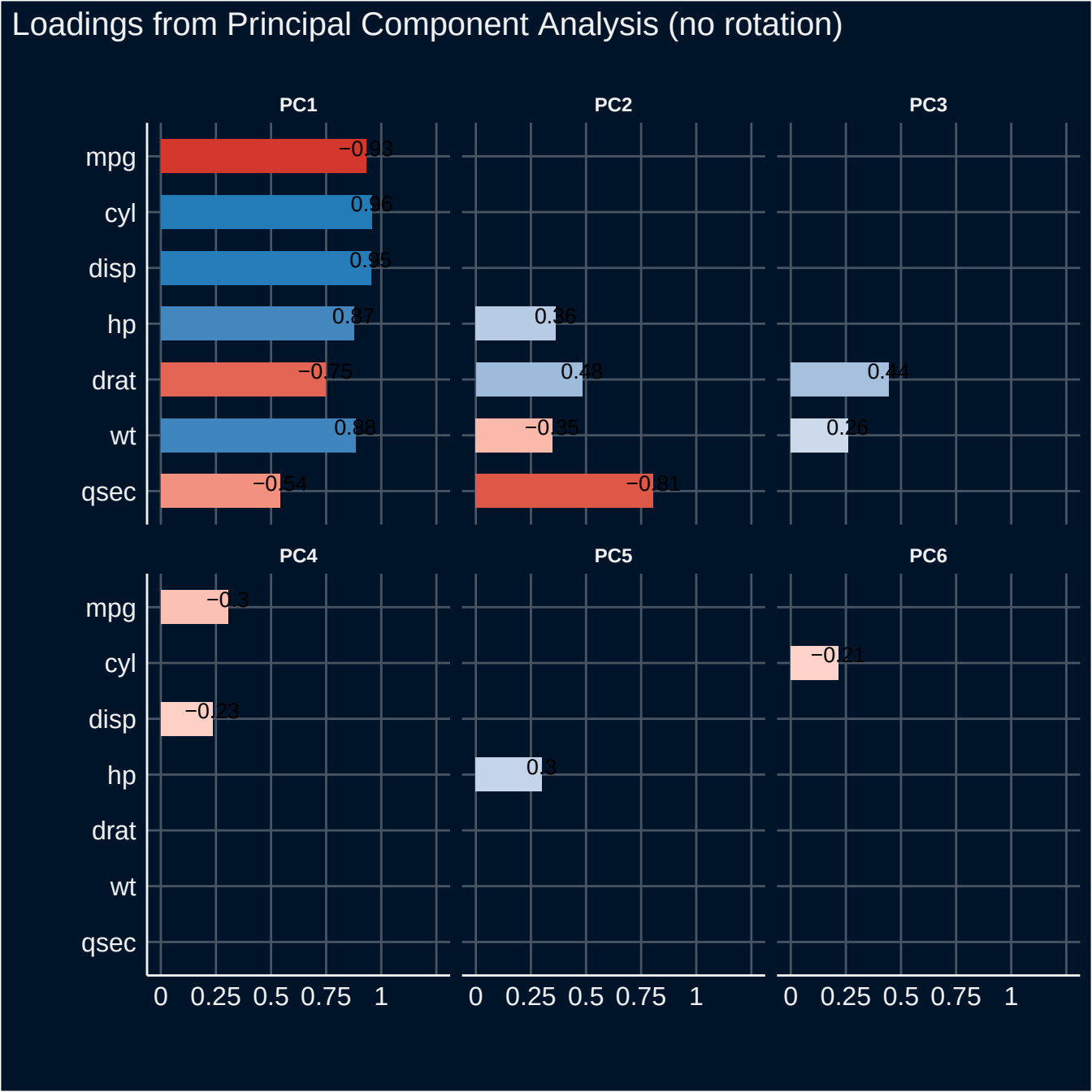

0.41, 0.46
0.38, 0.49
0.34, 0.53
0.27, 0.59
p−value
Compatibility Interval
Range of Estimates
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%
0.2
0.3
0.4
0.5
0.6

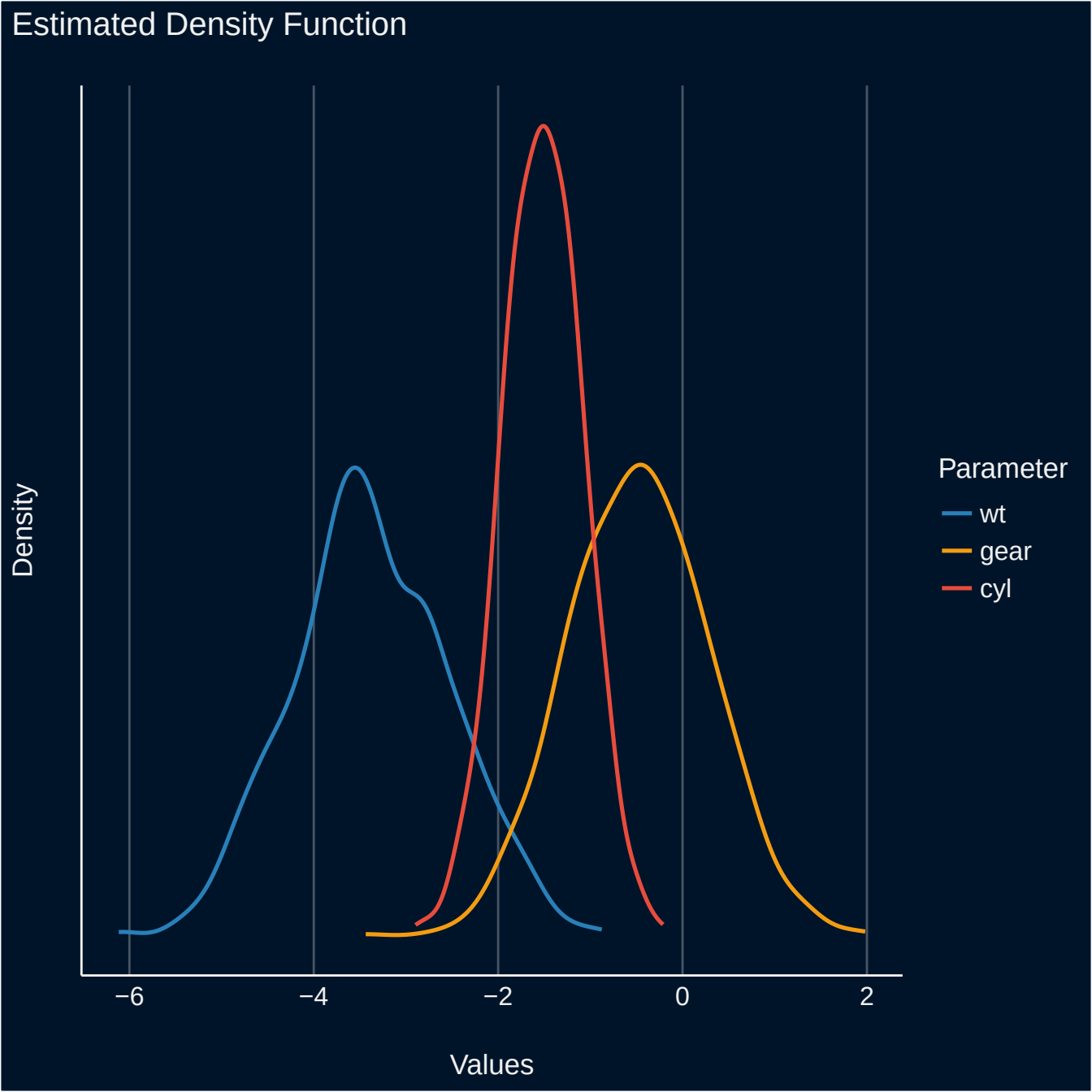

Practical Significance
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Parameters
−2
0
2
Possible parameter values

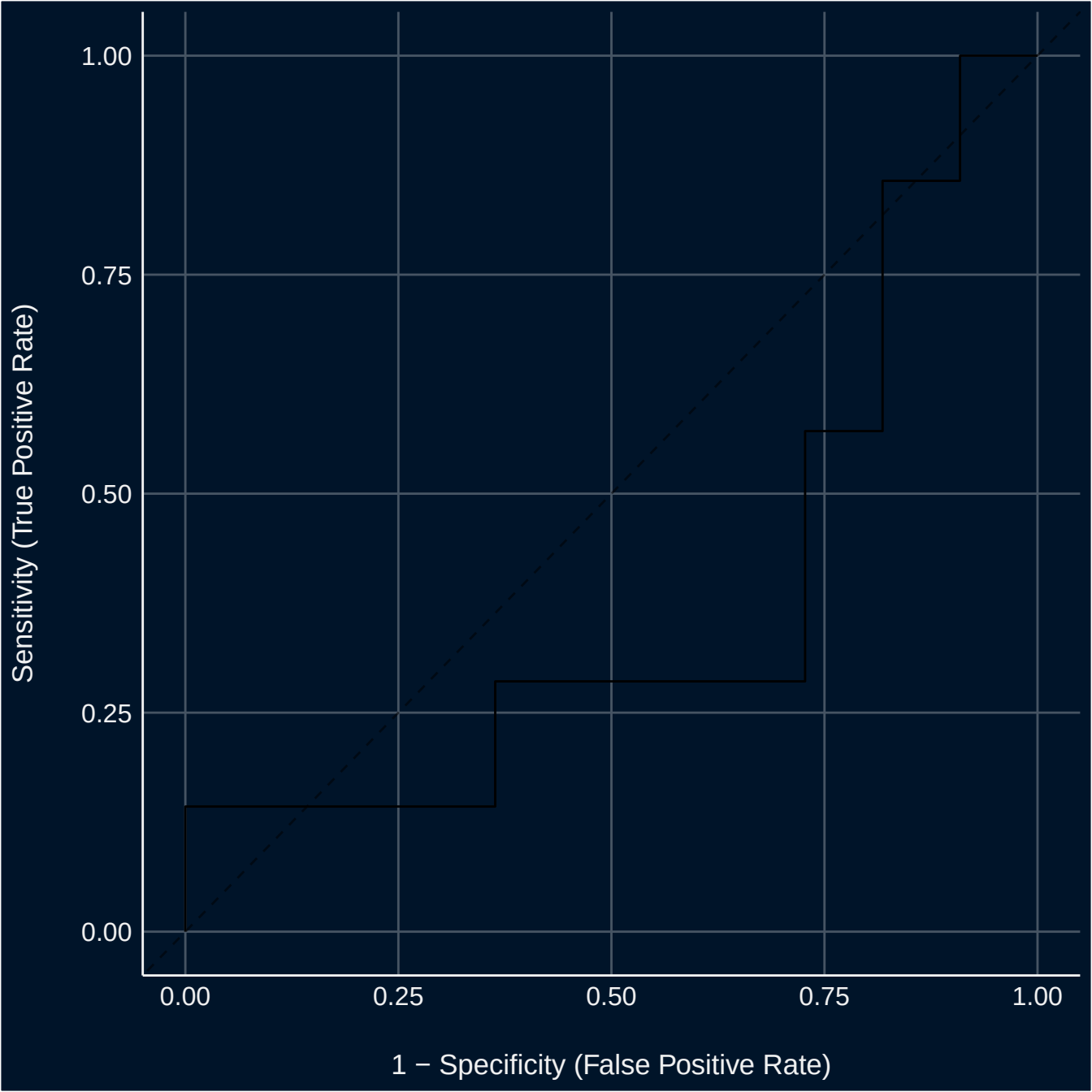

Bayesian Meta−Analysis
Aronson
Coetzee & Berjak
Comstock & Webster
Comstock et al
Comstock et al 1
Ferguson & Simes
Frimodt−Moller et al
Hart & Sutherland
Rosenthal et al
Rosenthal et al 1
Stein & Aronson
TPT Madras
Vandiviere et al
Overall
−0.87 [−1.44, −0.32]
−0.47 [−0.58, −0.36]
−0.03 [−0.87, 0.86]
−0.34 [−0.36, −0.32]
−0.02 [−0.16, 0.11]
−1.52 [−1.89, −1.13]
−0.22 [−0.32, −0.12]
−1.44 [−1.48, −1.40]
−1.17 [−1.94, −0.45]
−1.36 [−1.51, −1.22]
−0.79 [−0.80, −0.77]
0.01 [0.00, 0.02]
−1.52 [−1.95, −1.11]
−0.75 [−1.14, −0.36]
−2
0
2
Standardized Mean Difference

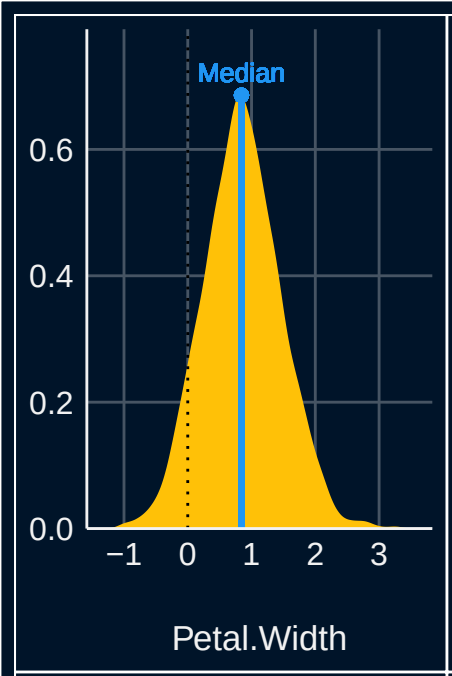

15
10
5
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105

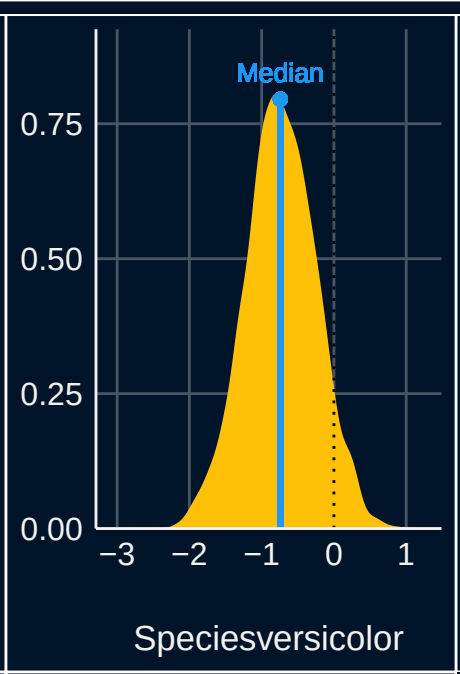

wt
cyl
gear
disp
−6
−4
−2
0
Coefficient

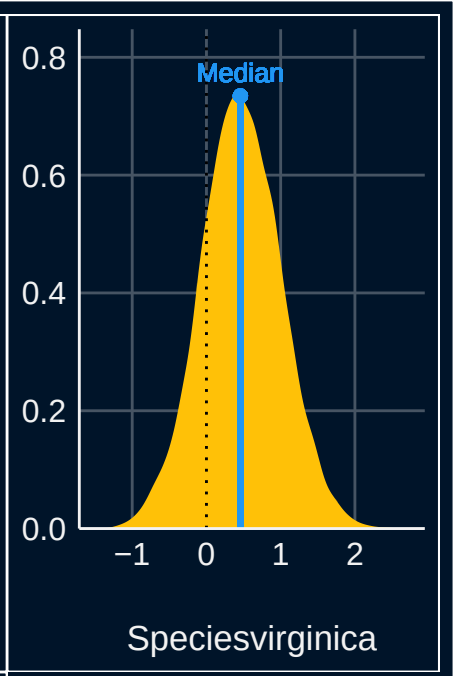

Loadings from Principal Component Analysis (no rotation)
PC1
PC2
PC3
PC4
PC5
PC6
mpg
cyl
disp
hp
drat
wt
qsec
−0.93
0.96
0.95
0.87
−0.75
0.88
−0.54
0.36
0.48
−0.35
−0.81
0.44
0.26
−0.3
−0.23
0.3
−0.21
0
0.25
0.5
0.75
1

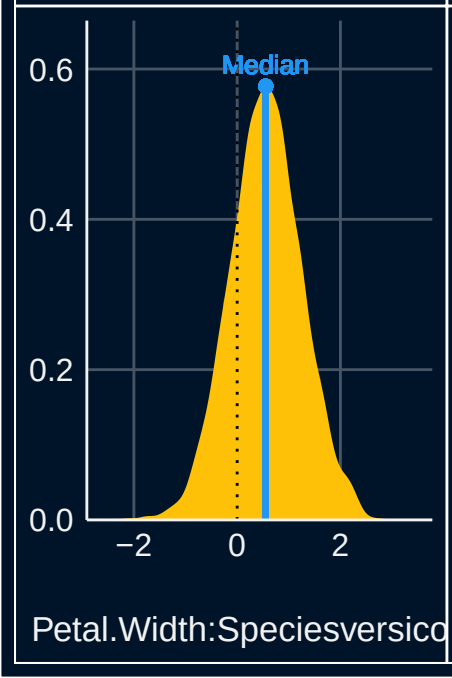

Estimated Density Function
Density
Values
−6
−4
−2
0
2
Parameter
wt
gear
cyl

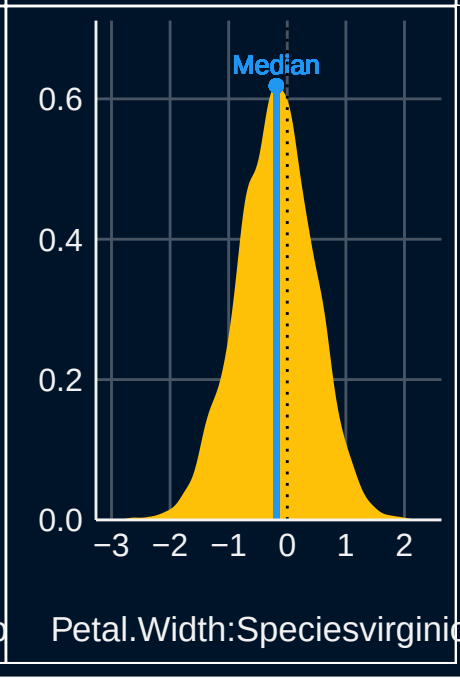

1.00
0.75
0.50
0.25
0.00
Sensitivity (True Positive Rate)
0.00
0.25
0.50
0.75
1.00
1 − Specificity (False Positive Rate)

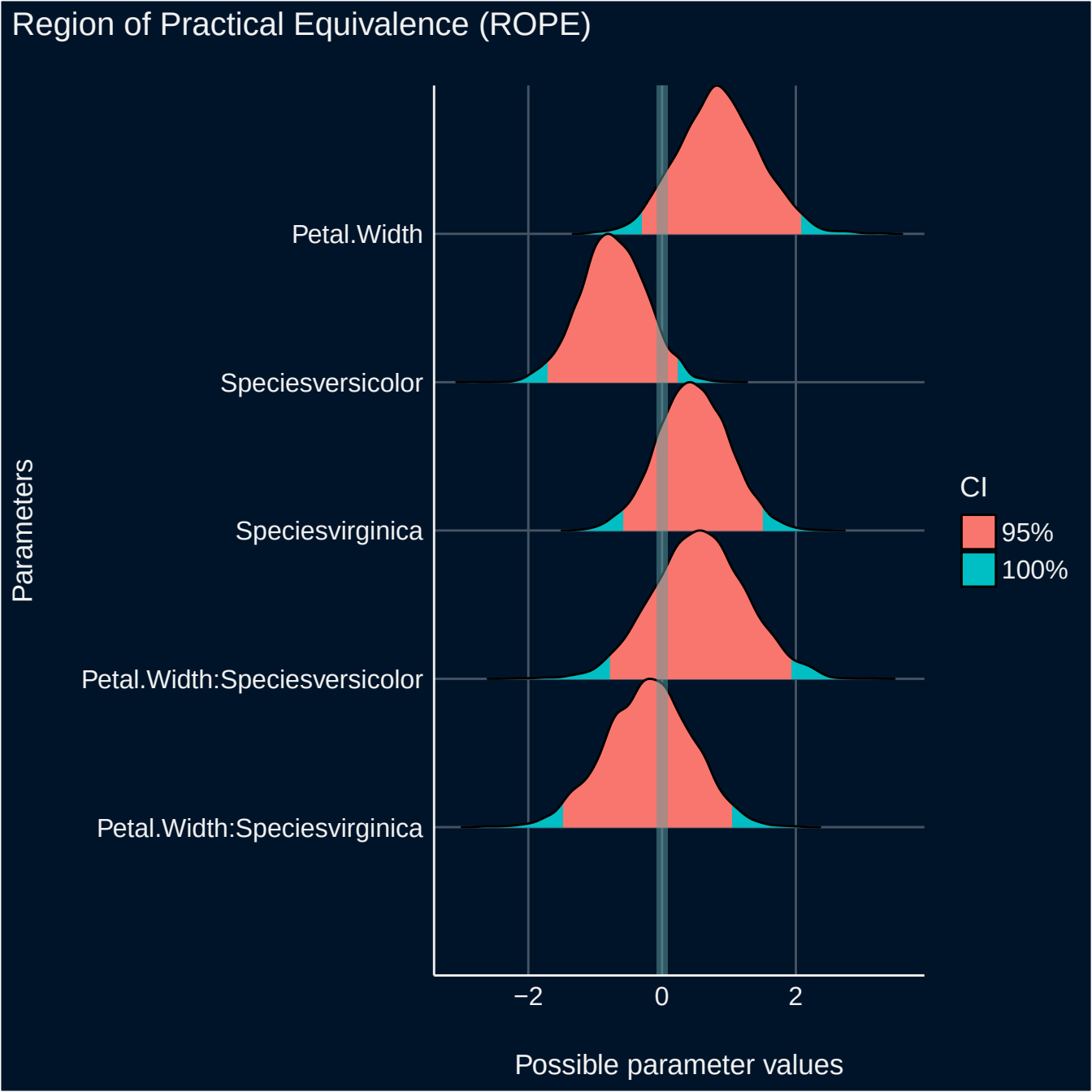

Median
0.6
0.4
0.2
0.0
−1
0
1
2
3
Petal.Width

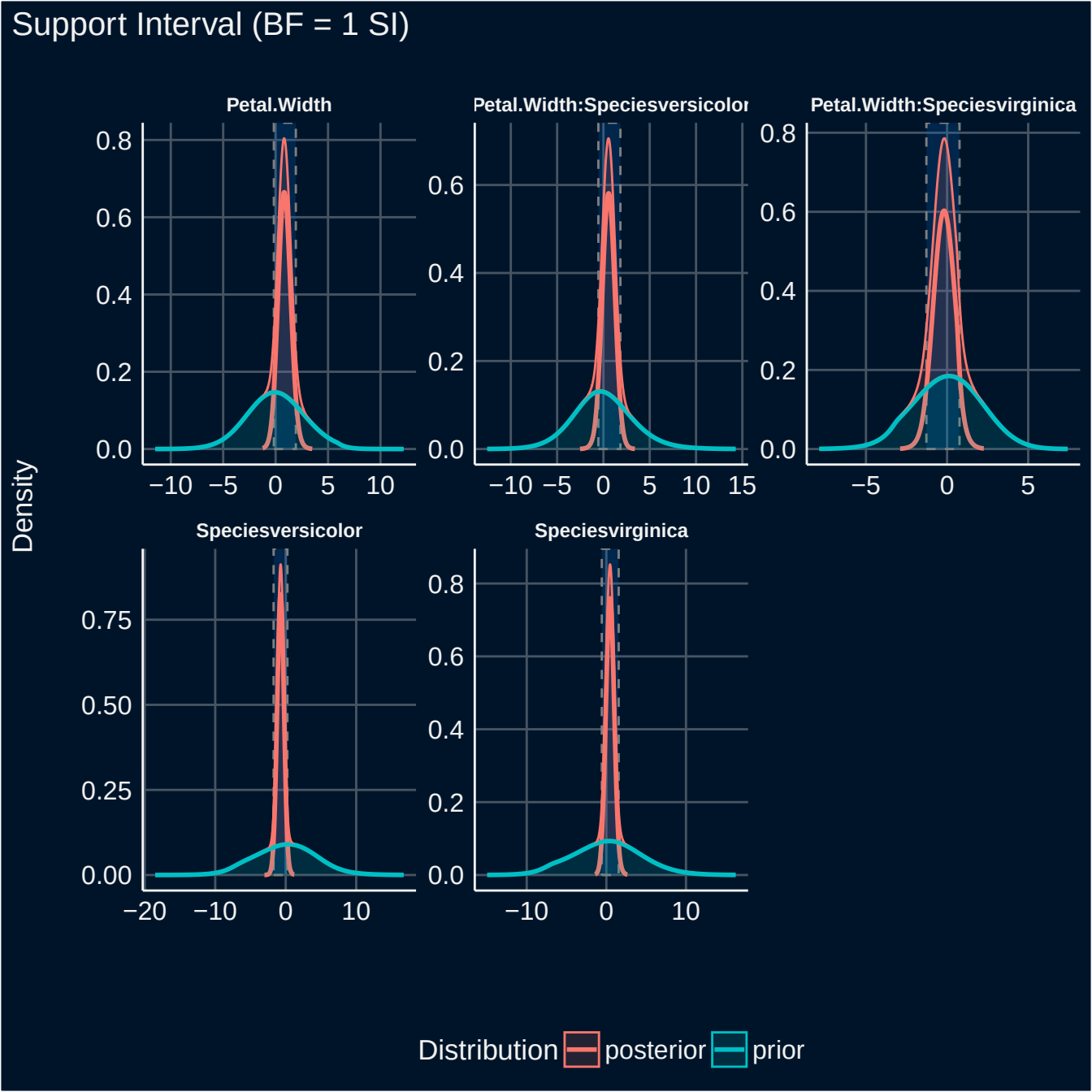

Median
0.75
0.50
0.25
0.00
−3
−2
−1
0
1
Speciesversicolor

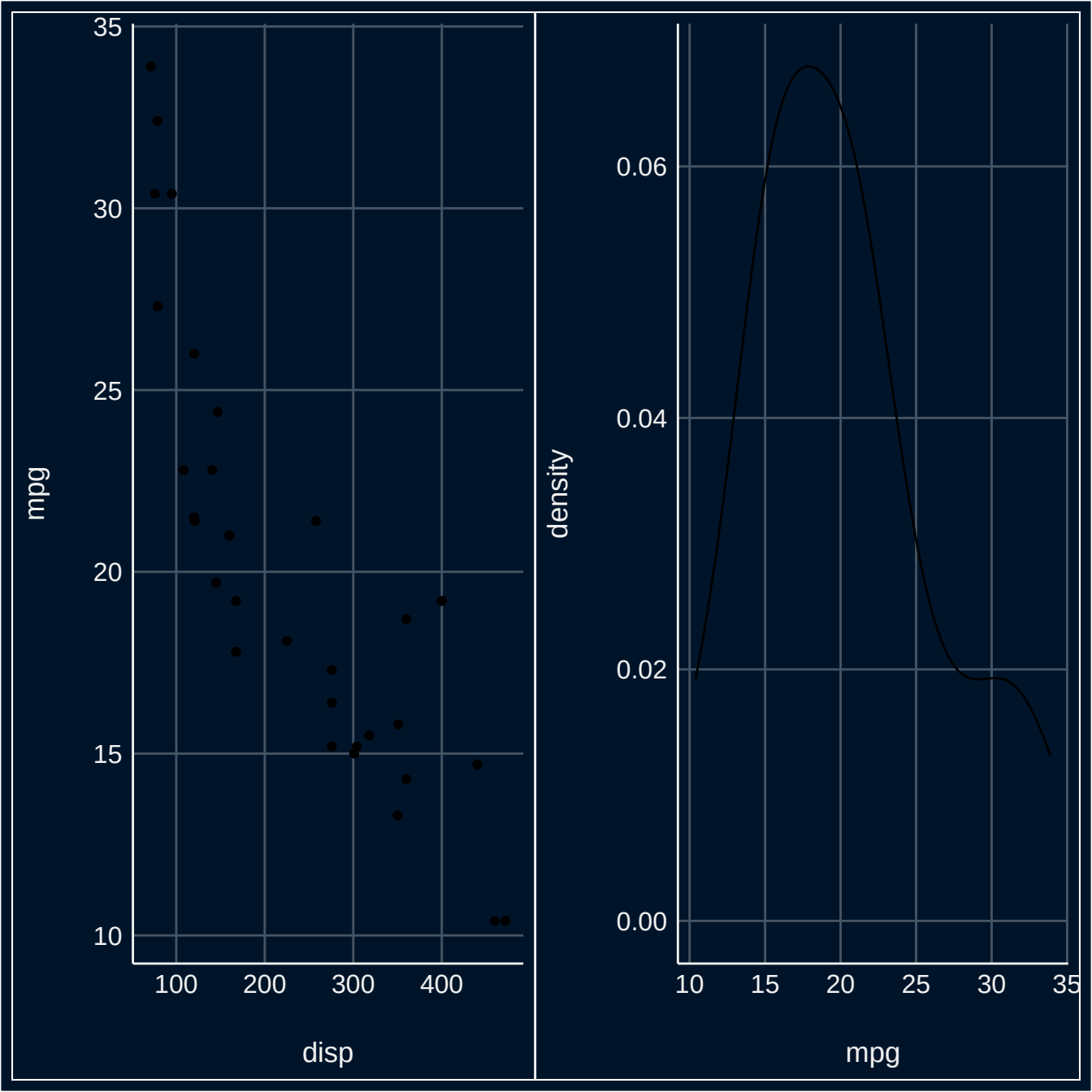

Median
0.8
0.6
0.4
0.2
0.0
−1
0
1
2
Speciesvirginica

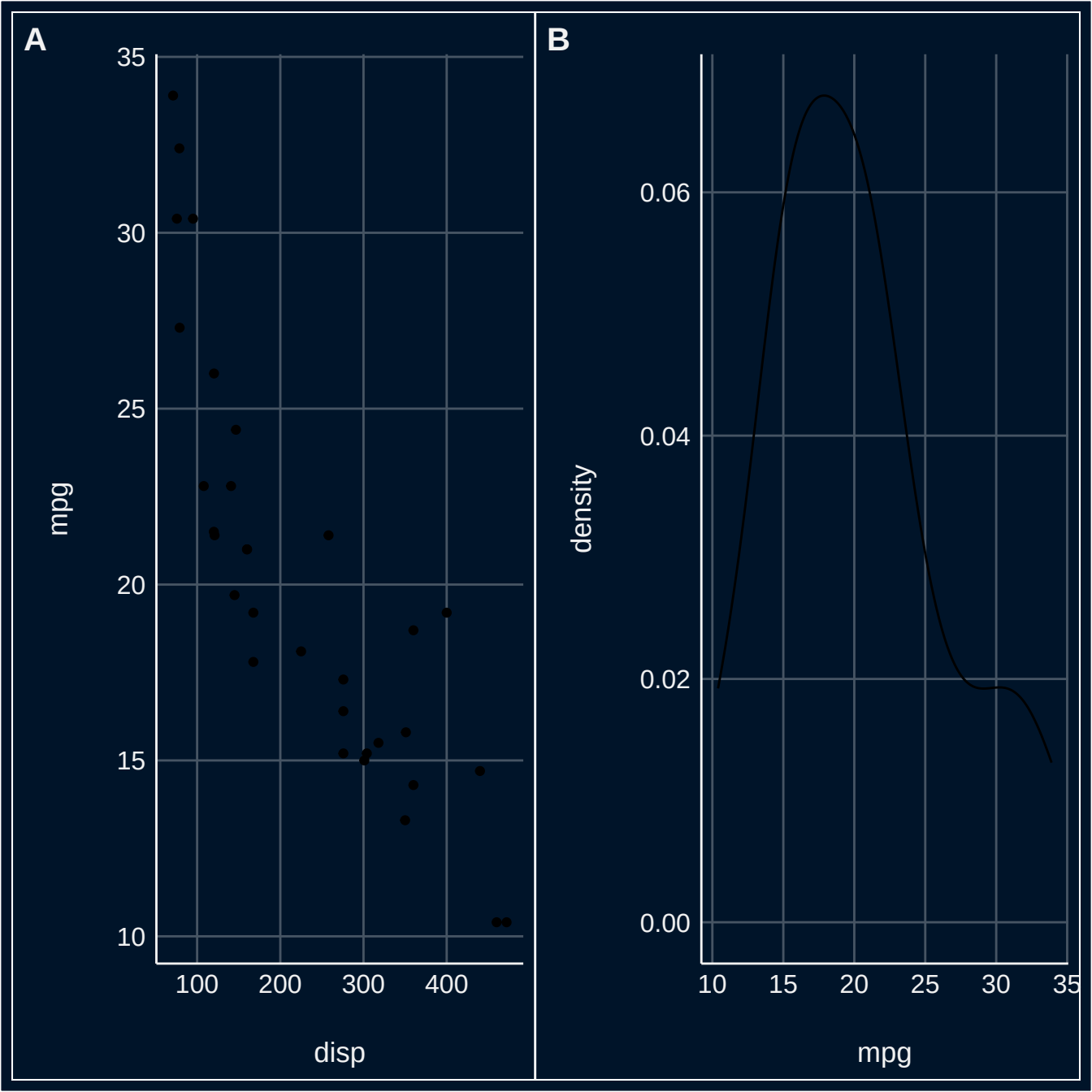

Median
0.6
0.4
0.2
0.0
−2
0
2
Petal.Width:Speciesversico


Median
0.6
0.4
0.2
0.0
−3
−2
−1
0
1
2
Petal.Width:Speciesvirginica


Region of Practical Equivalence (ROPE)
Petal.Width
Speciesversicolor
Speciesvirginica
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Parameters
−2
0
2
Possible parameter values
CI
95%
100%


Support Interval (BF = 1 SI)
Petal.Width
Petal.Width:Speciesversicolor
Petal.Width:Speciesvirginica
Speciesversicolor
Speciesvirginica
Density
Distribution
posterior
prior


35
30
25
20
15
10
mpg
100
200
300
400
disp
0.06
0.04
0.02
0.00
density
10
15
20
25
30
35
mpg


A
35
30
25
20
15
10
mpg
100
200
300
400
disp
B
0.06
0.04
0.02
0.00
density
10
15
20
25
30
35
mpg

The surprising truth about mtcars

Fig. 1

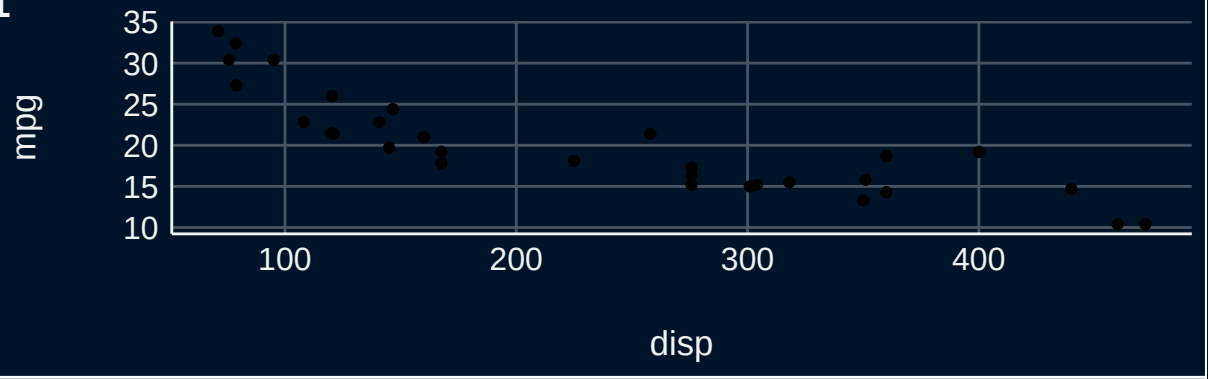


Fig. 2

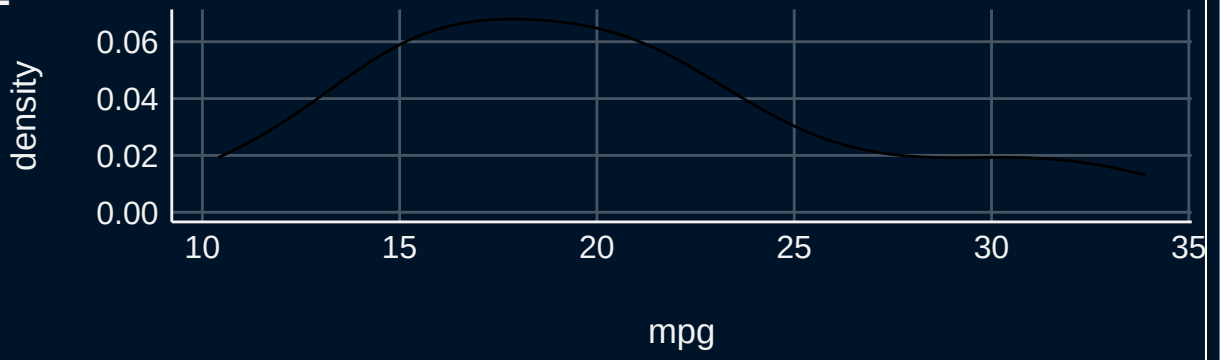
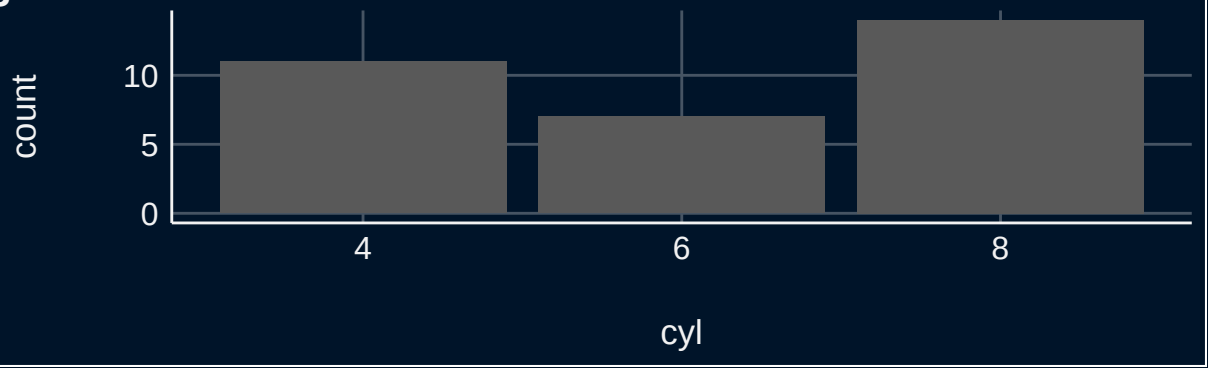
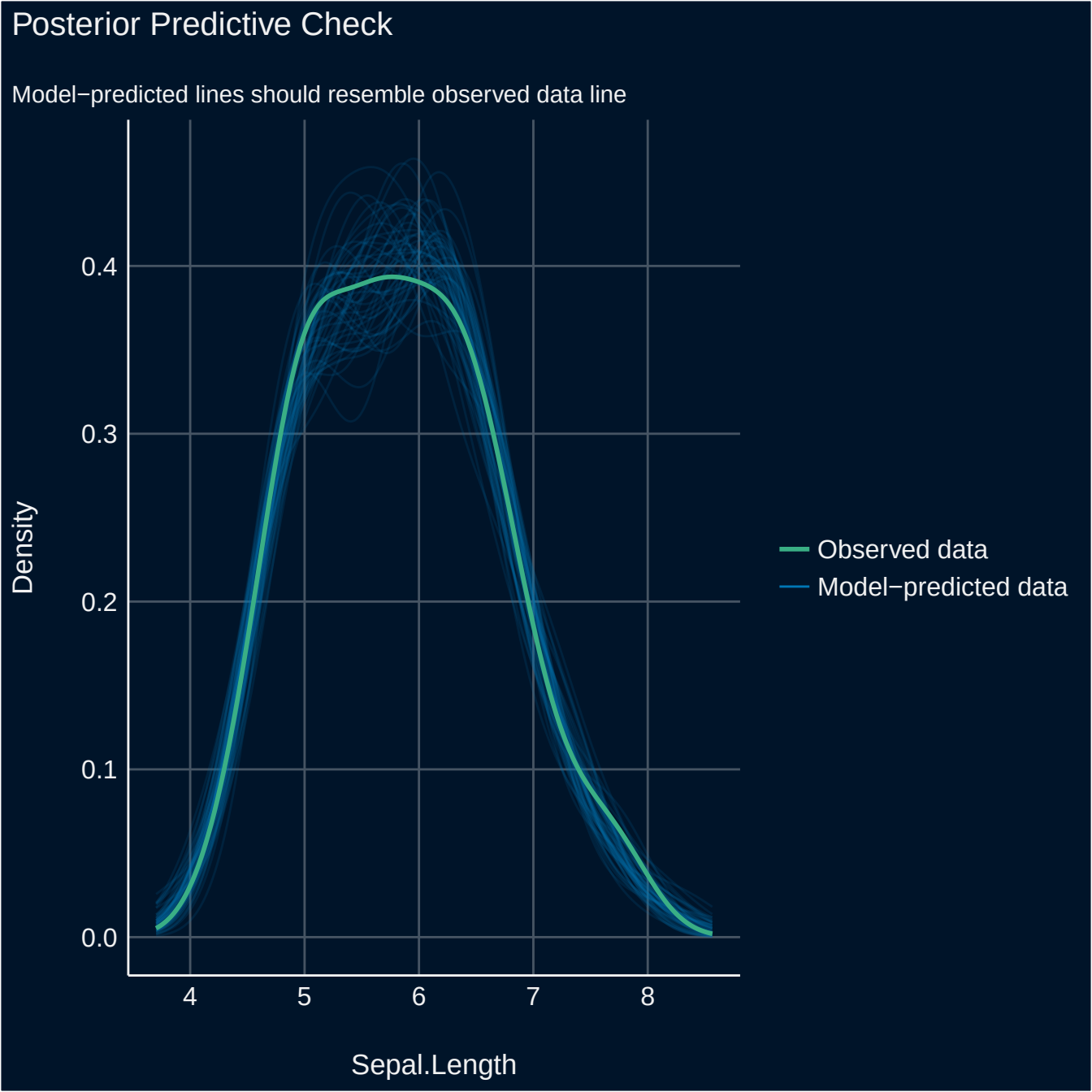
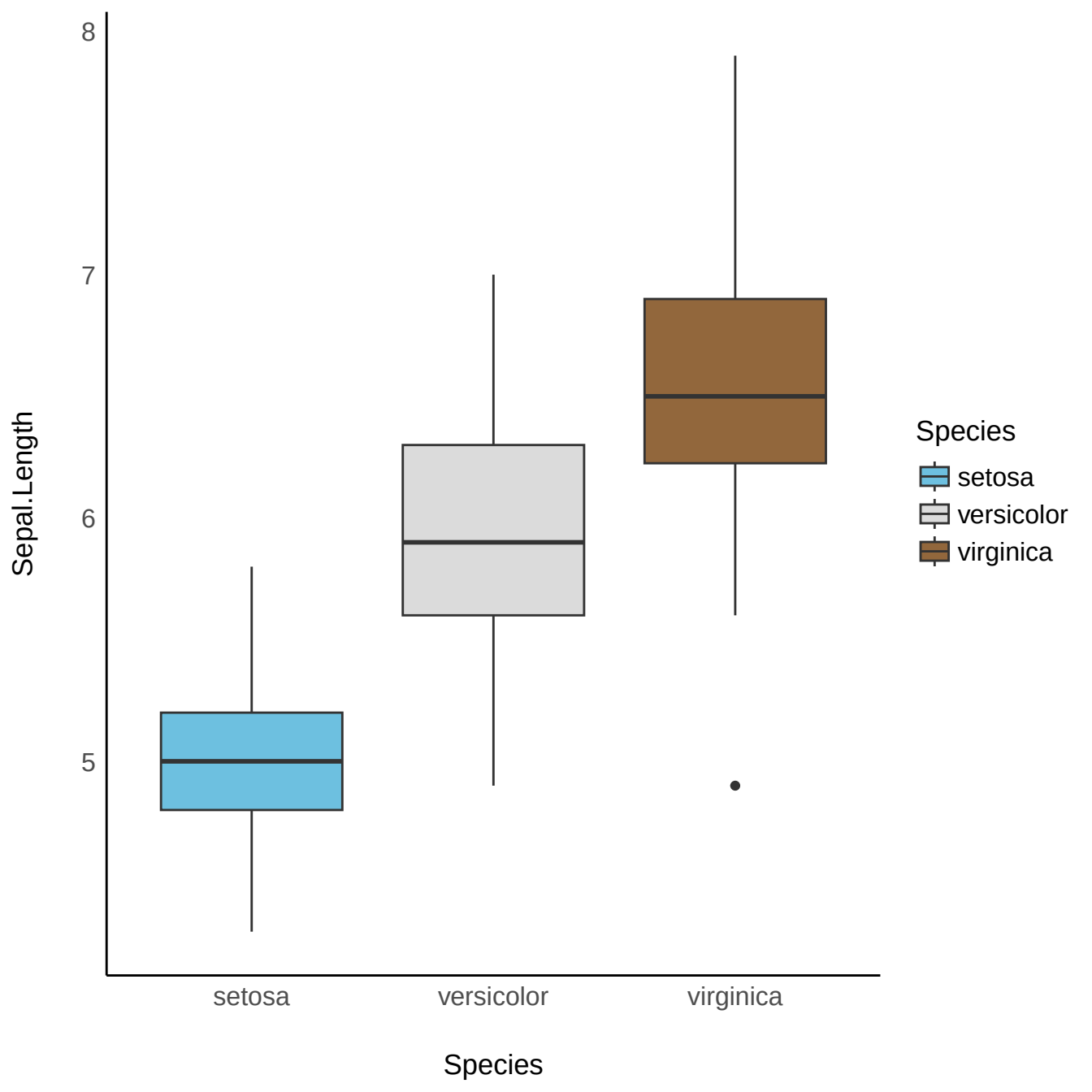
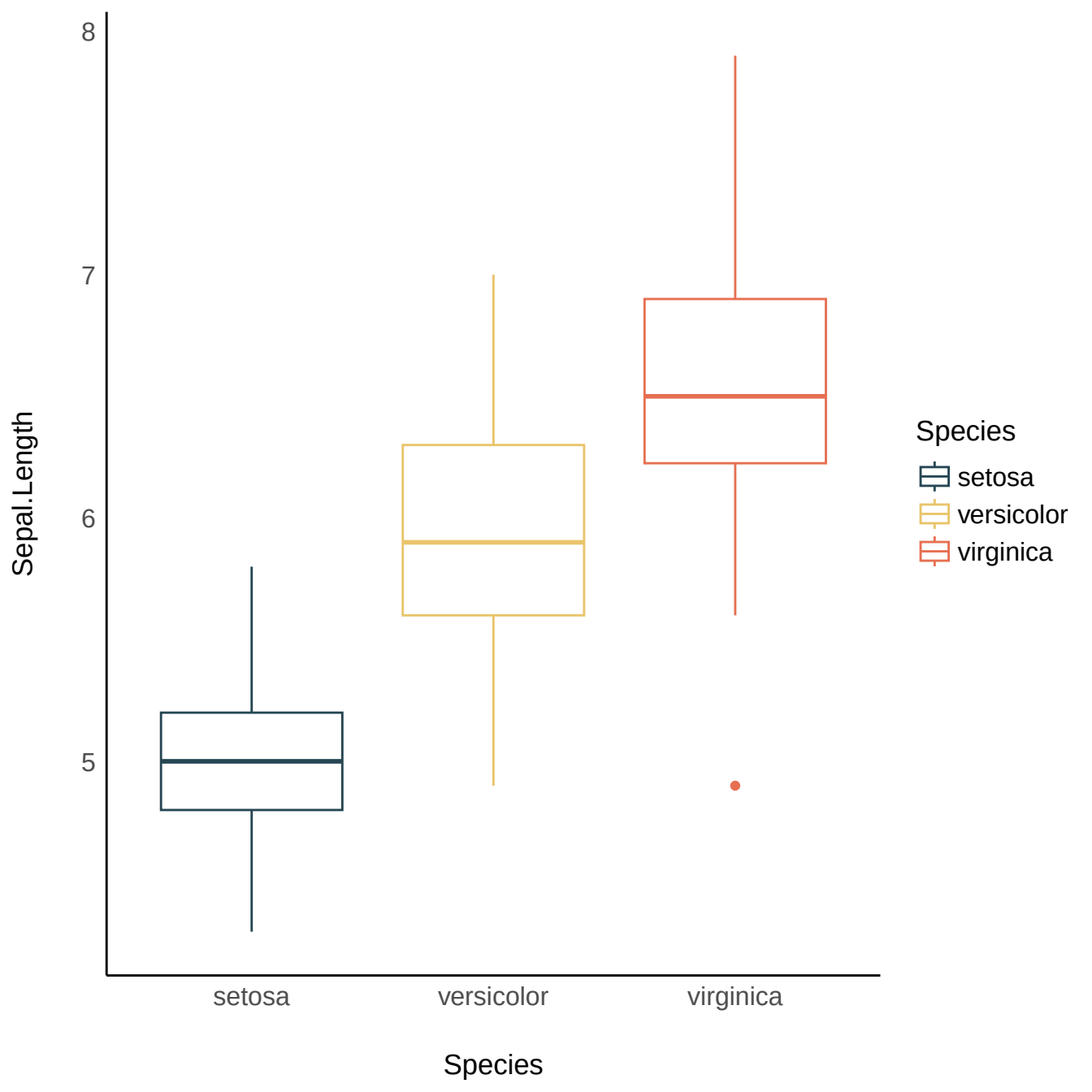


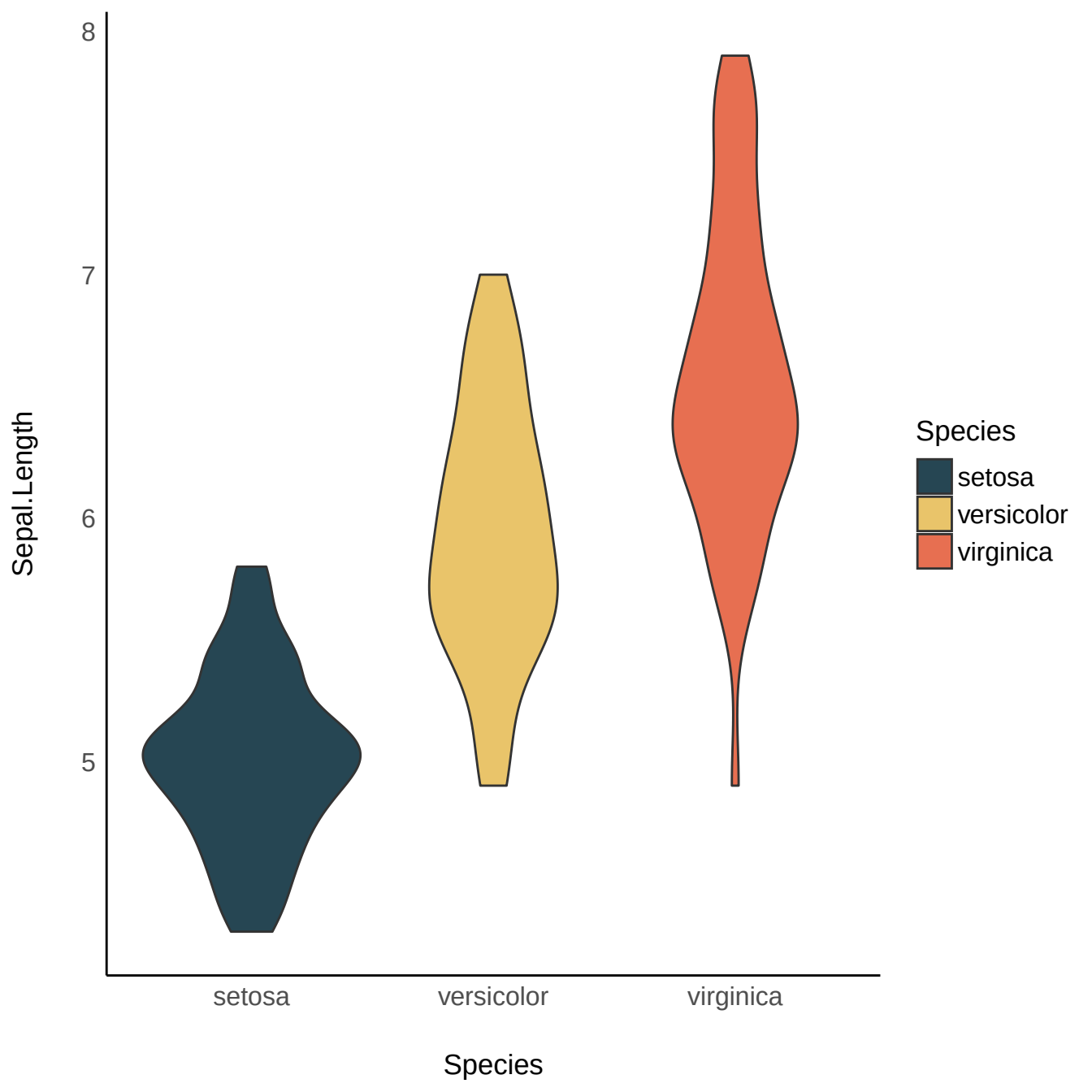
Fig. 3

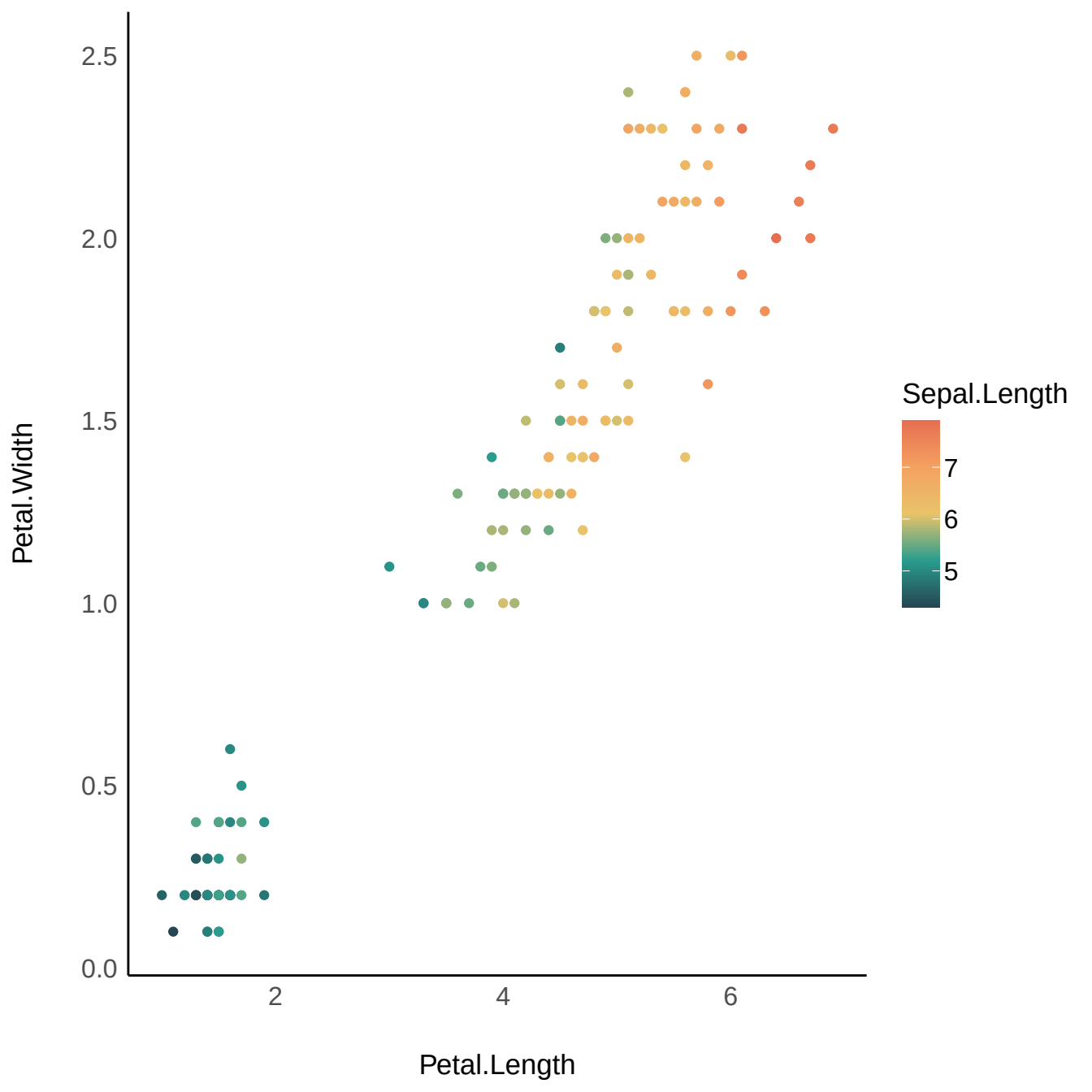


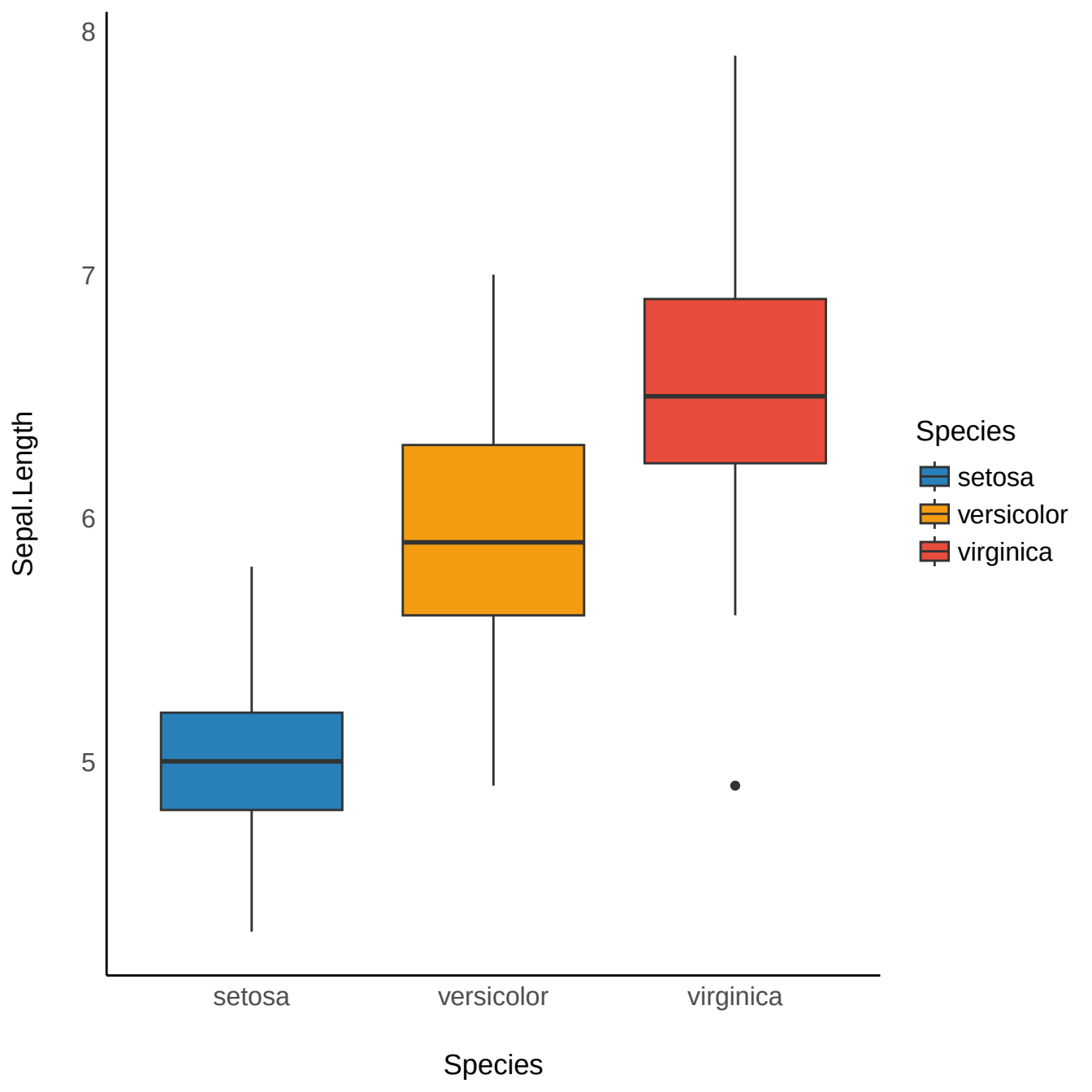

Posterior Predictive Check
Model−predicted lines should resemble observed data line
Density
0.0
0.1
0.2
0.3
0.4
4
5
6
7
8
Sepal.Length
Observed data
Model−predicted data

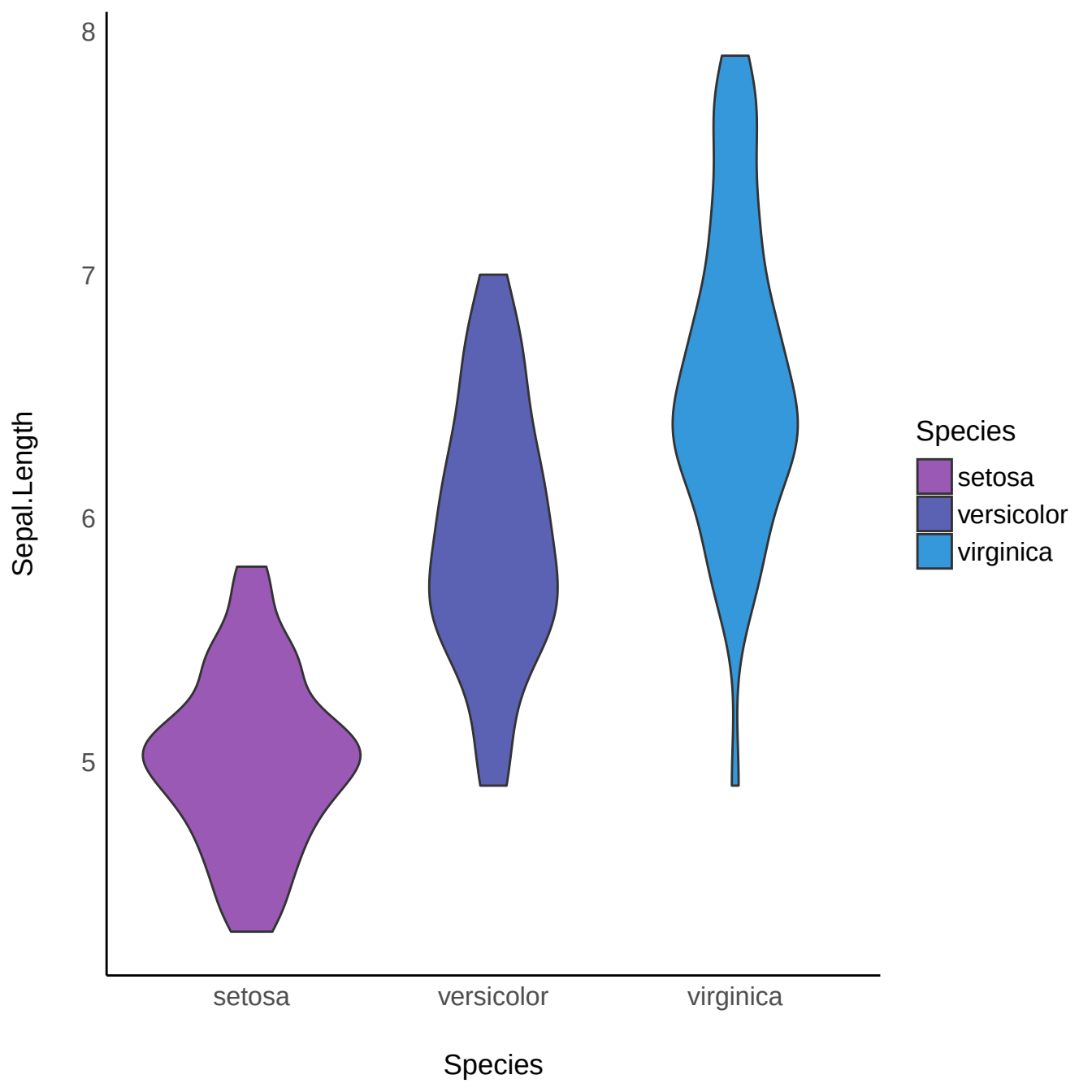

8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica


8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica


8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica


Petal.Width
2.5
2.0
1.5
1.0
0.5
0.0
2
4
6
Petal.Length
Sepal.Length
7
6
5


8
7
6
5
Sepal.Length
setosa
versicolor
virginica
Species
Species
setosa
versicolor
virginica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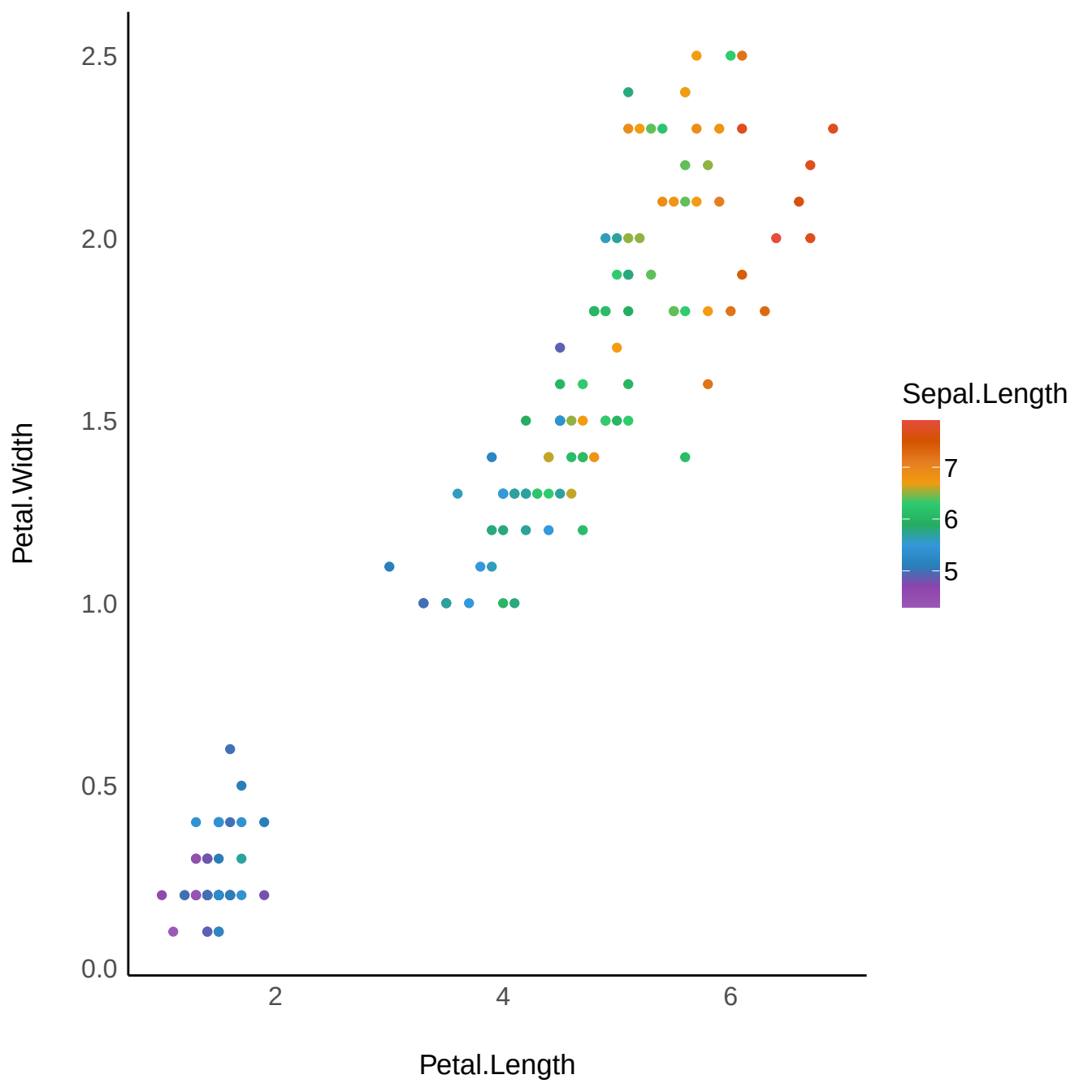
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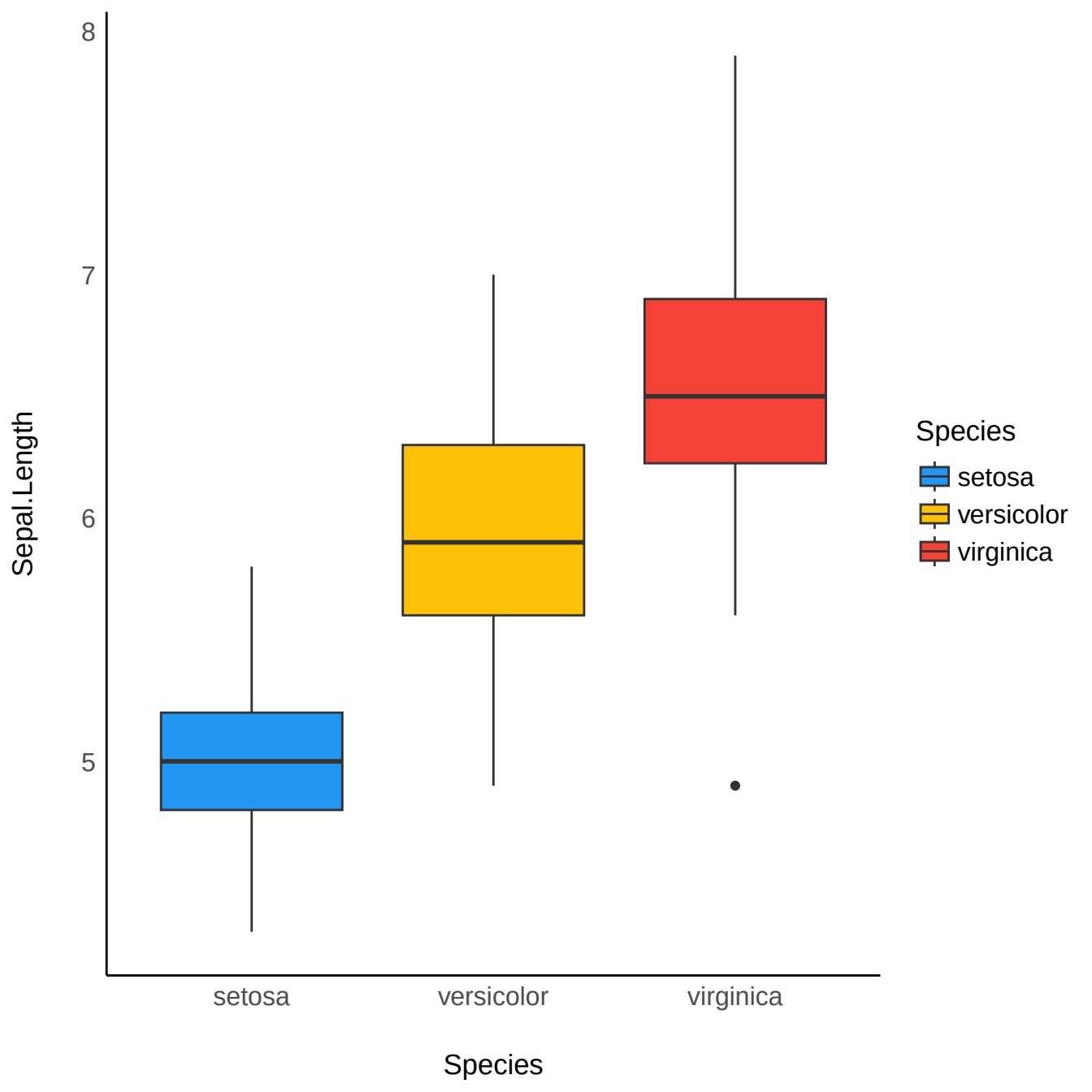
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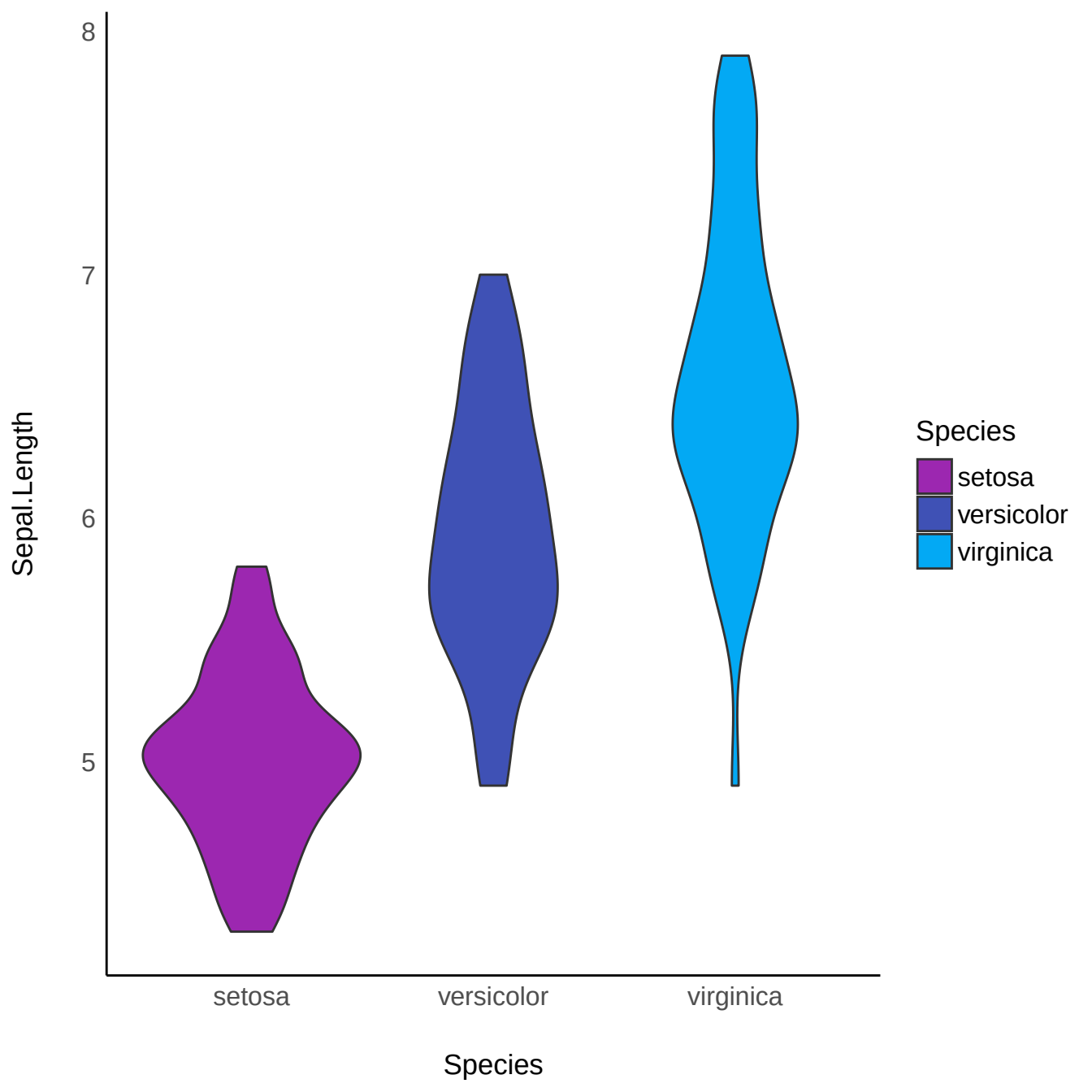
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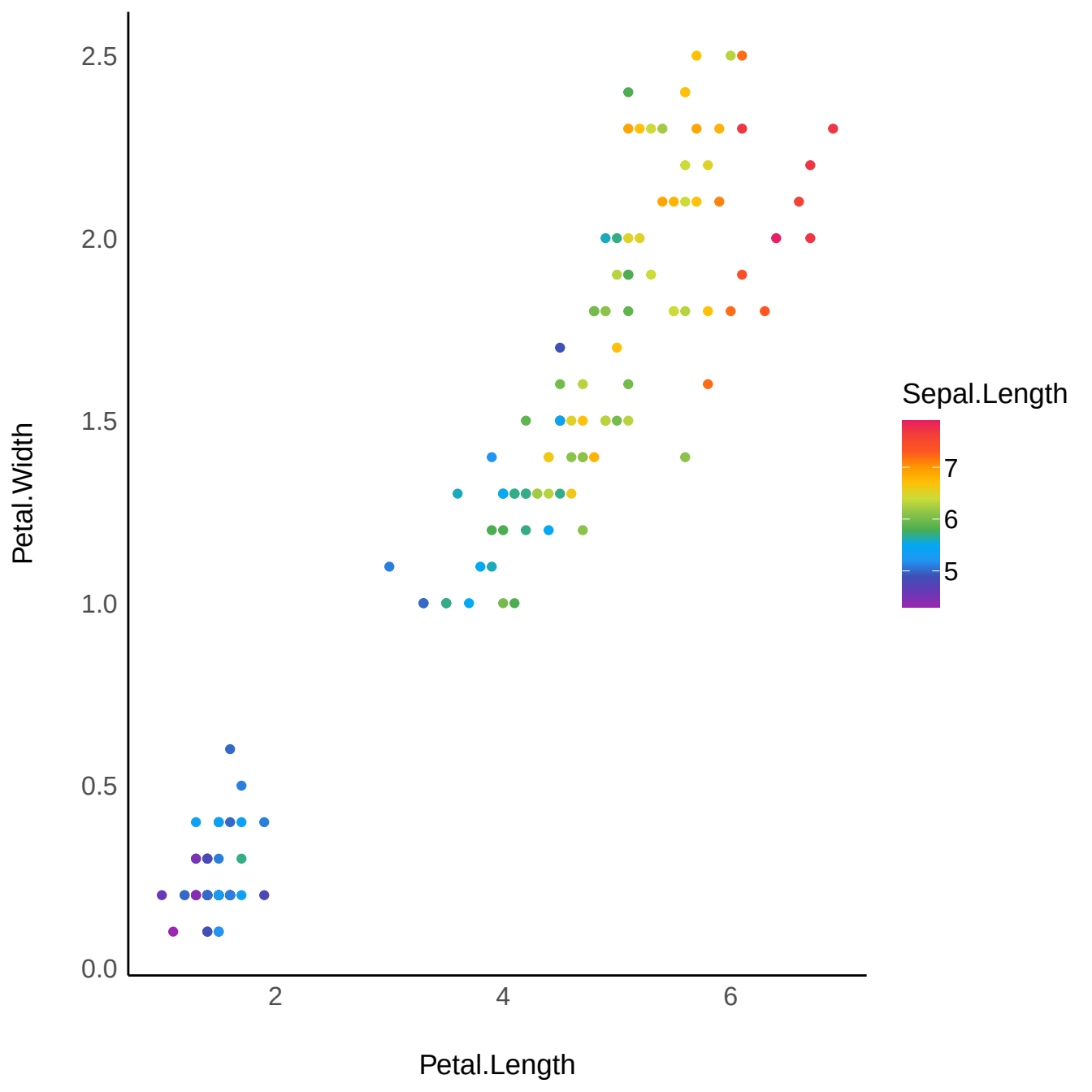
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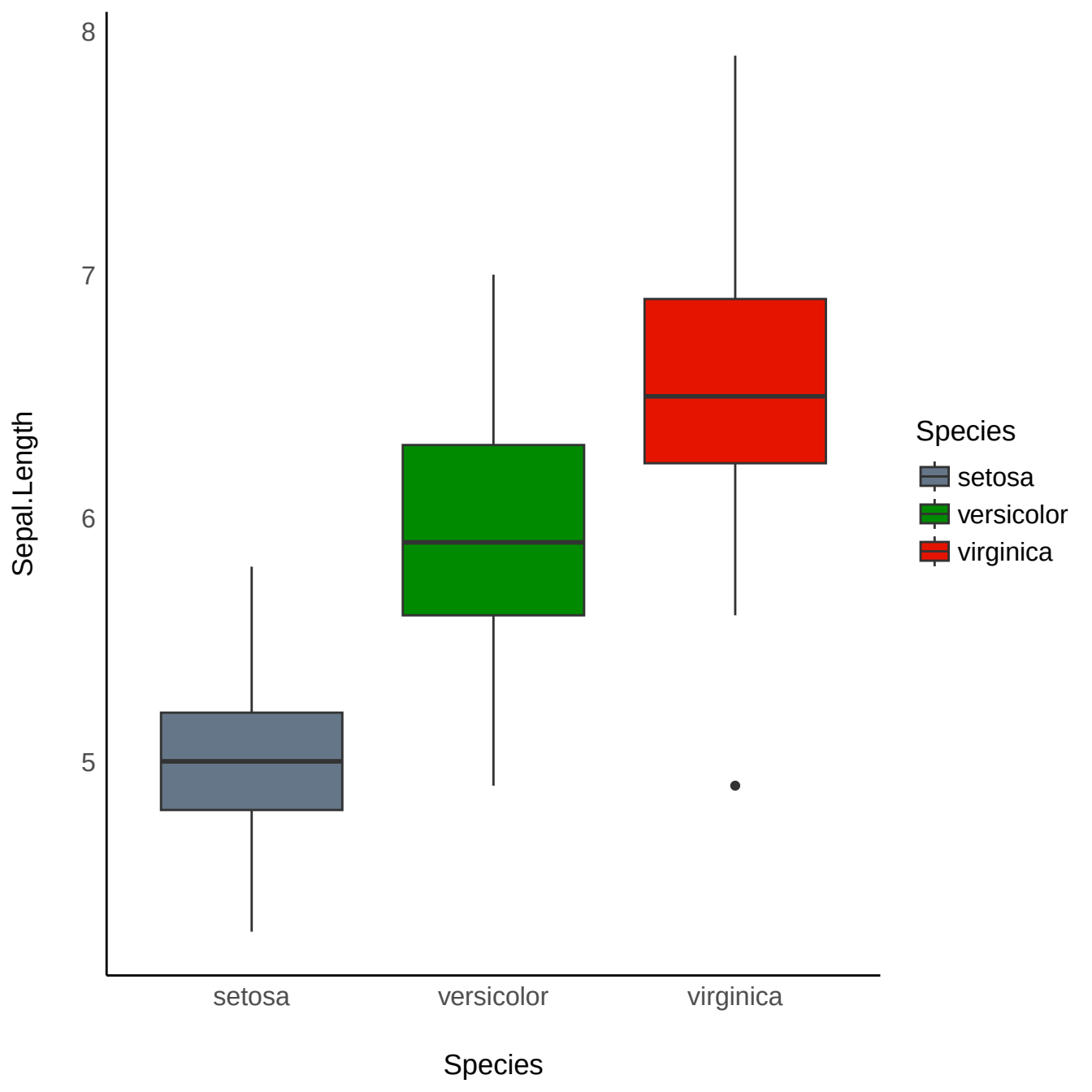
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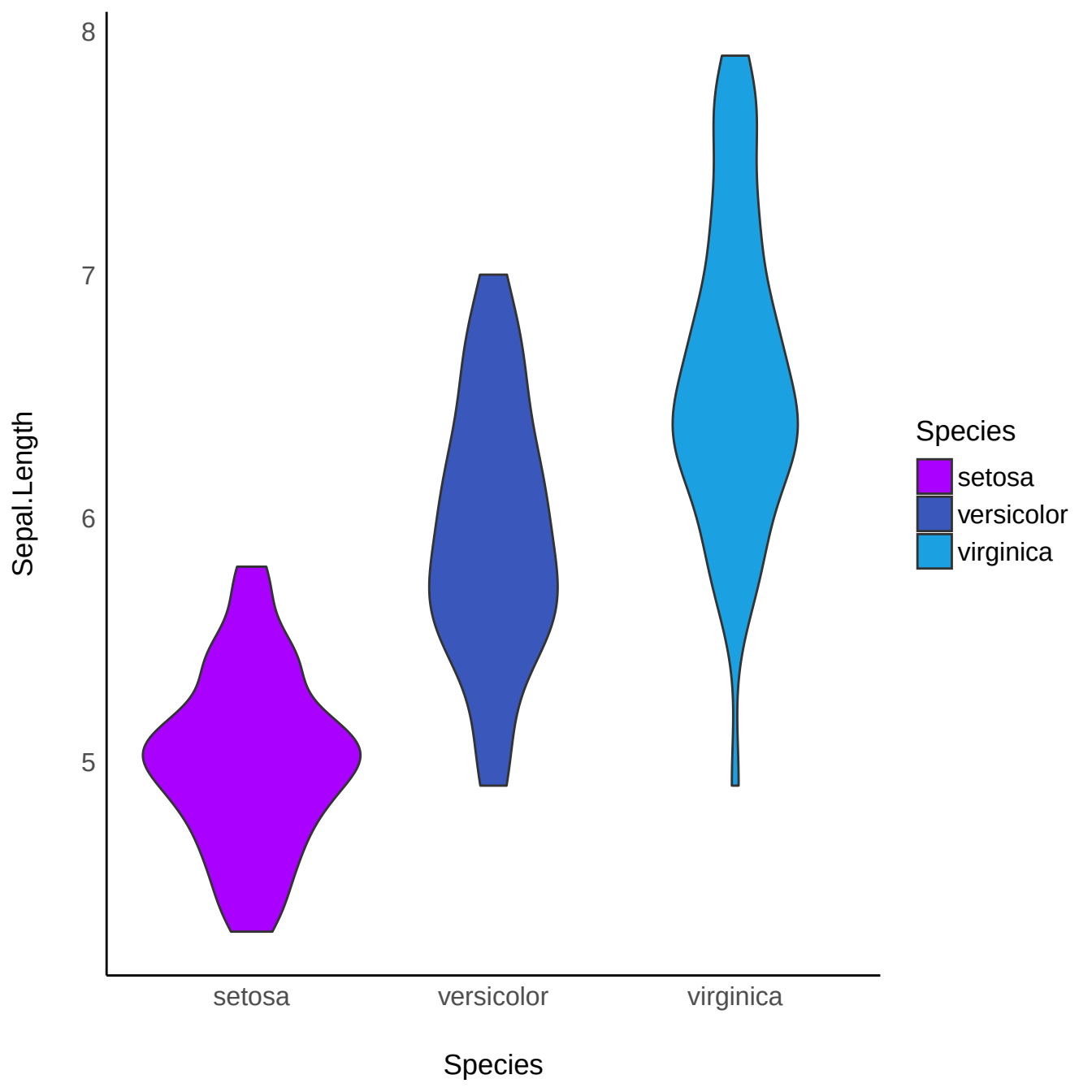
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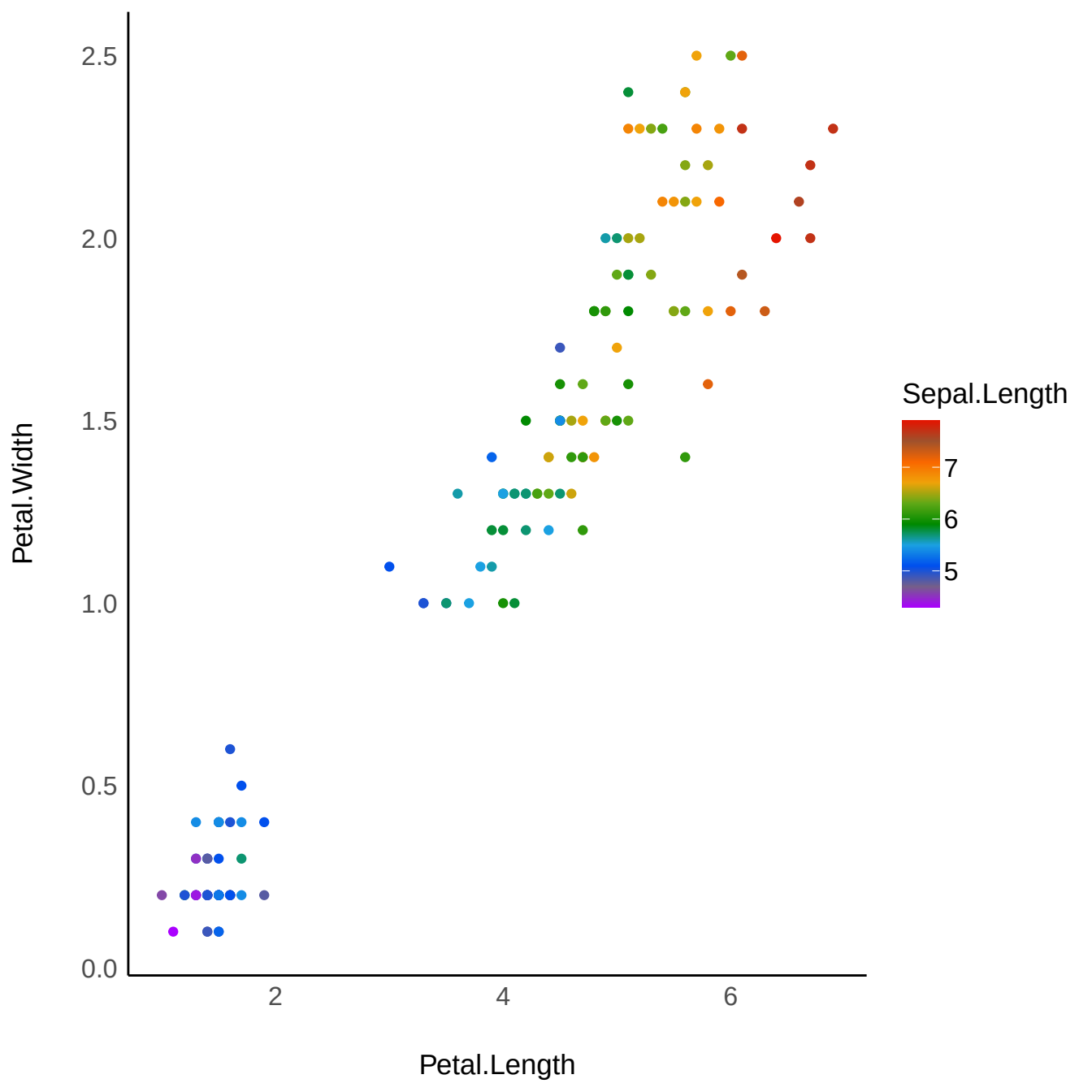
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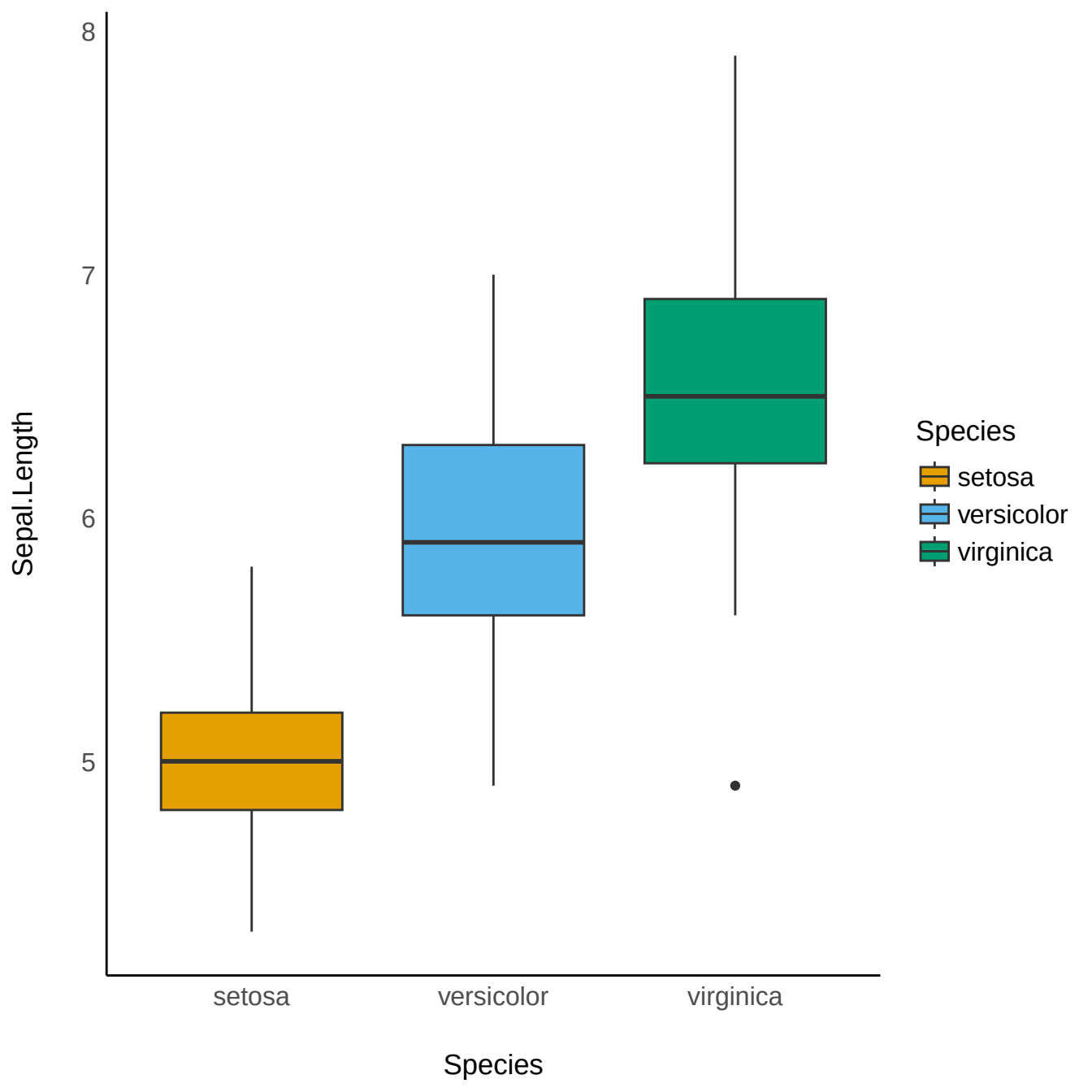
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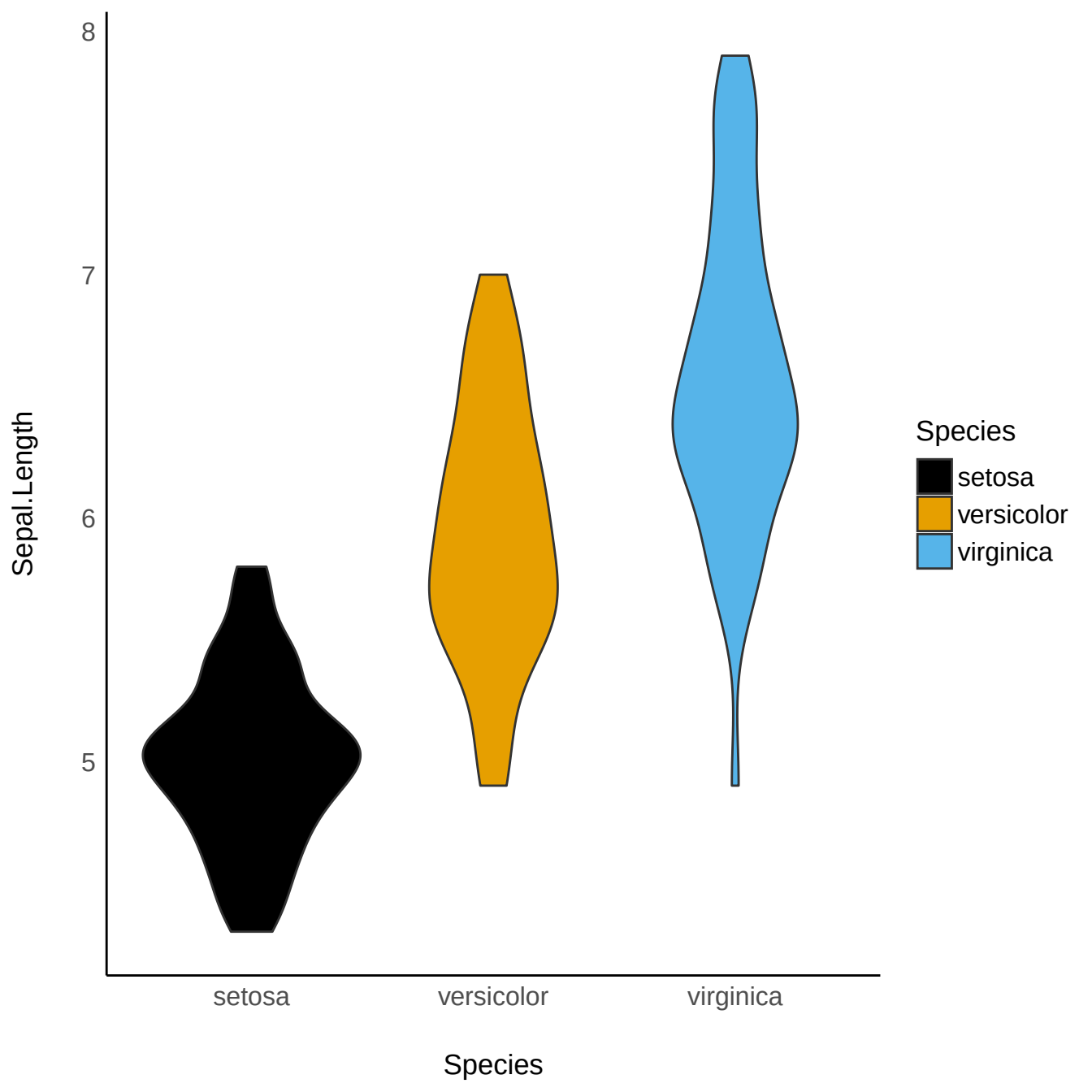
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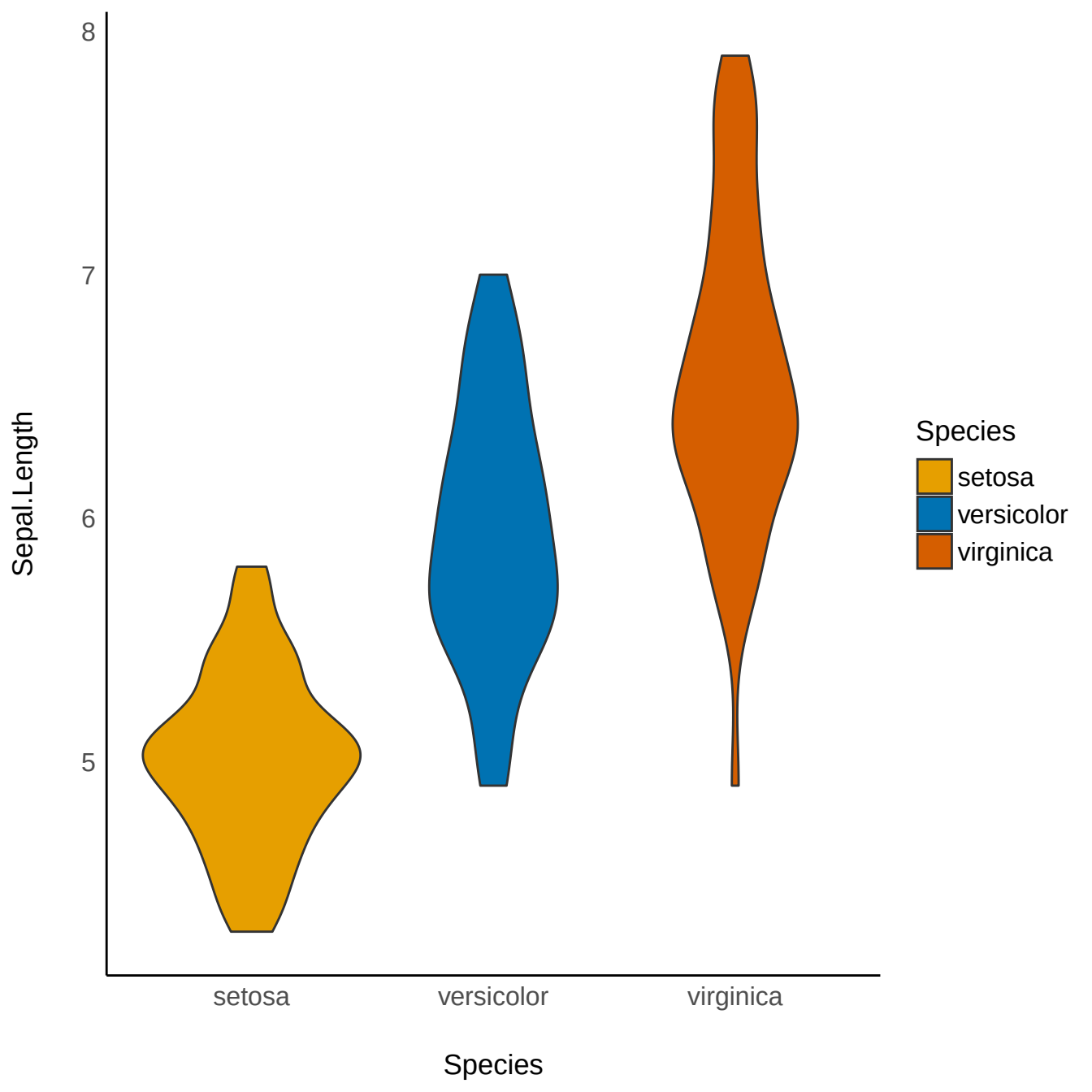
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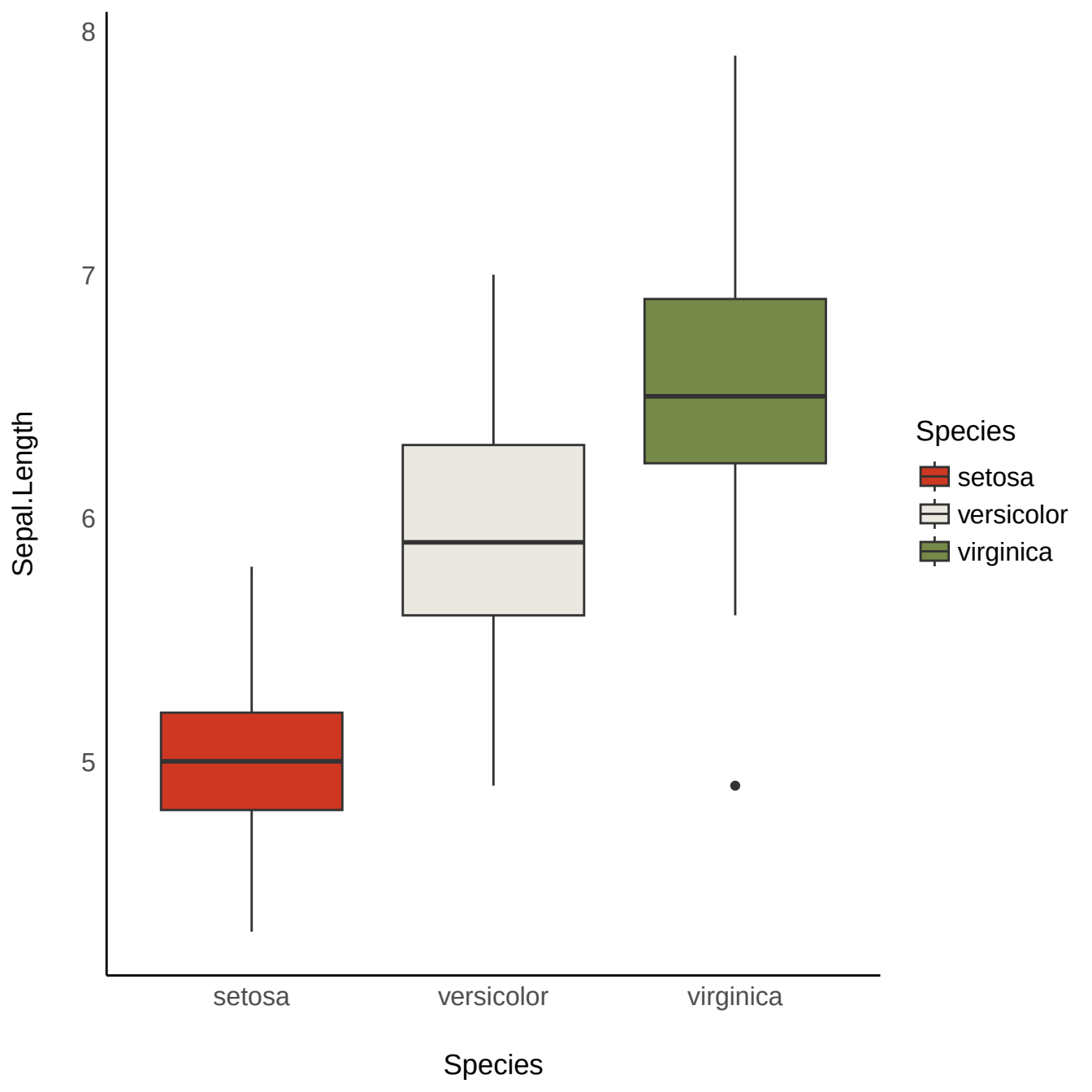
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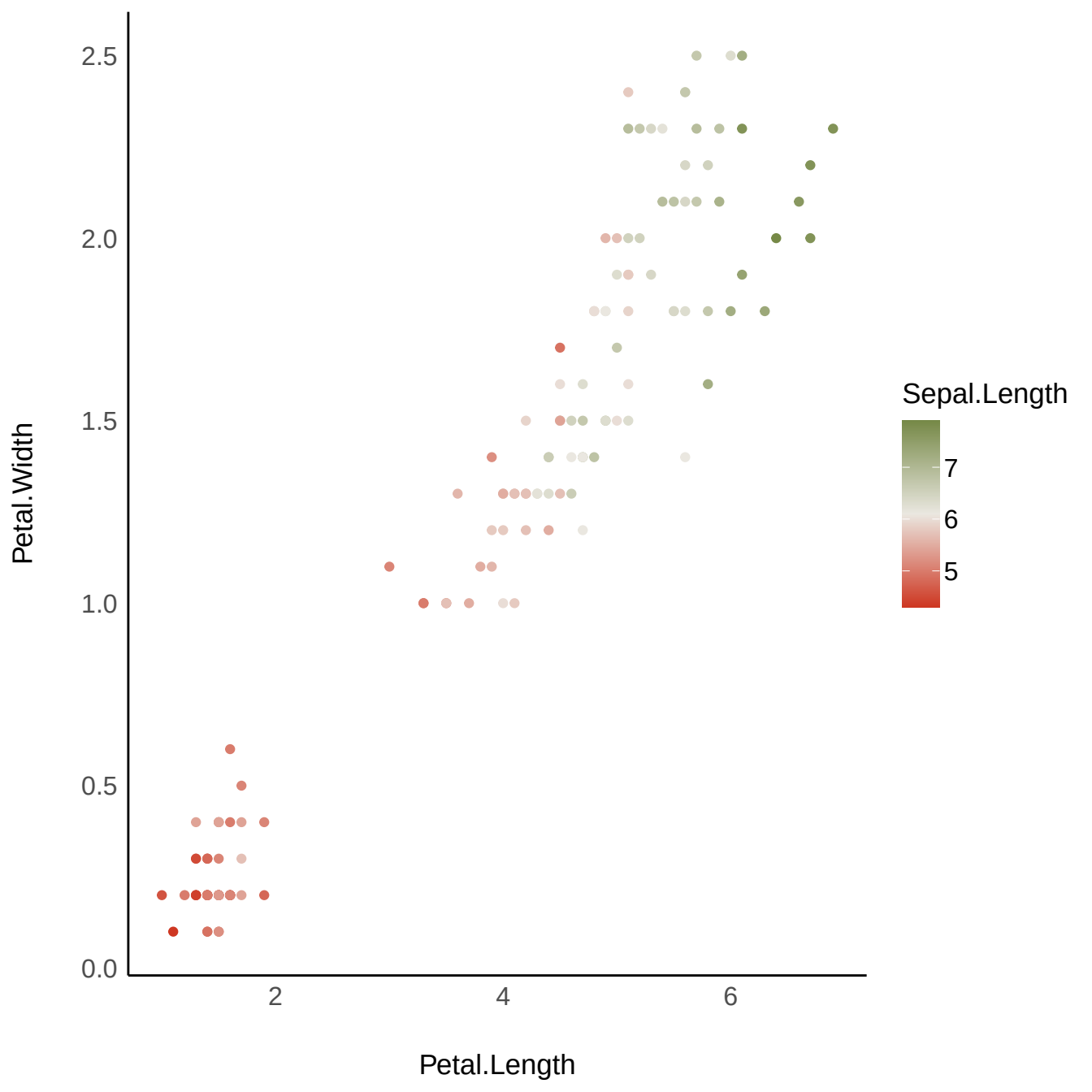
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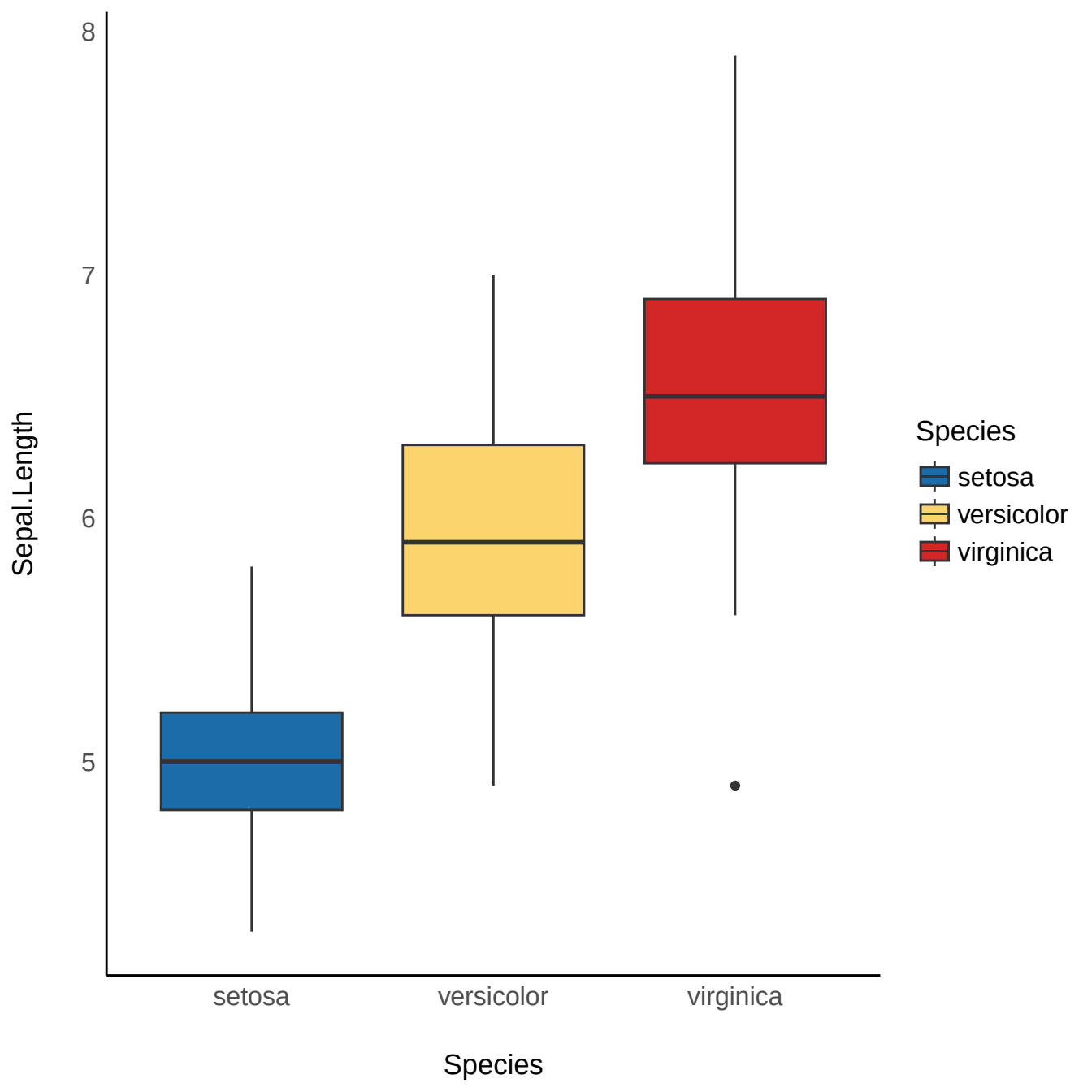
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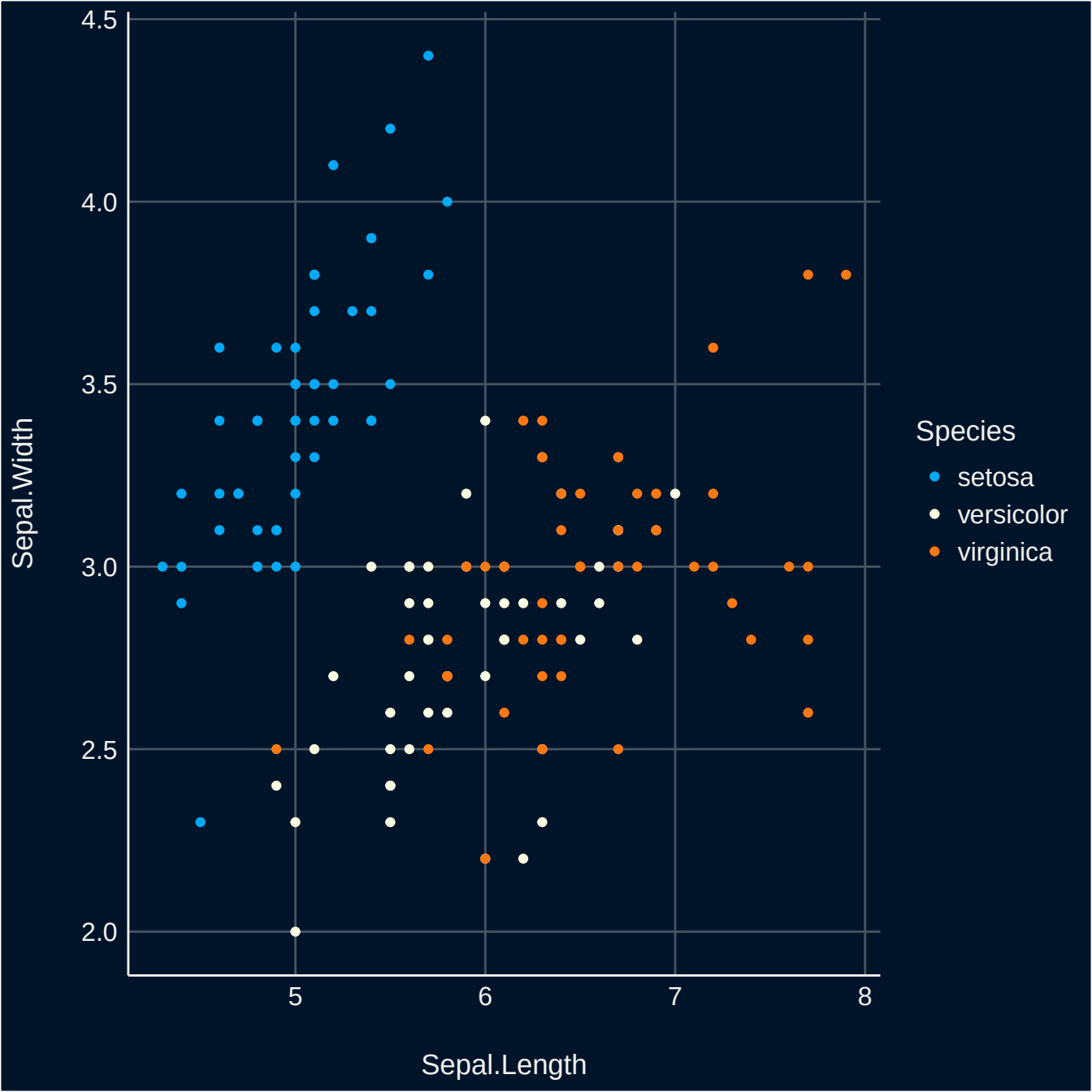
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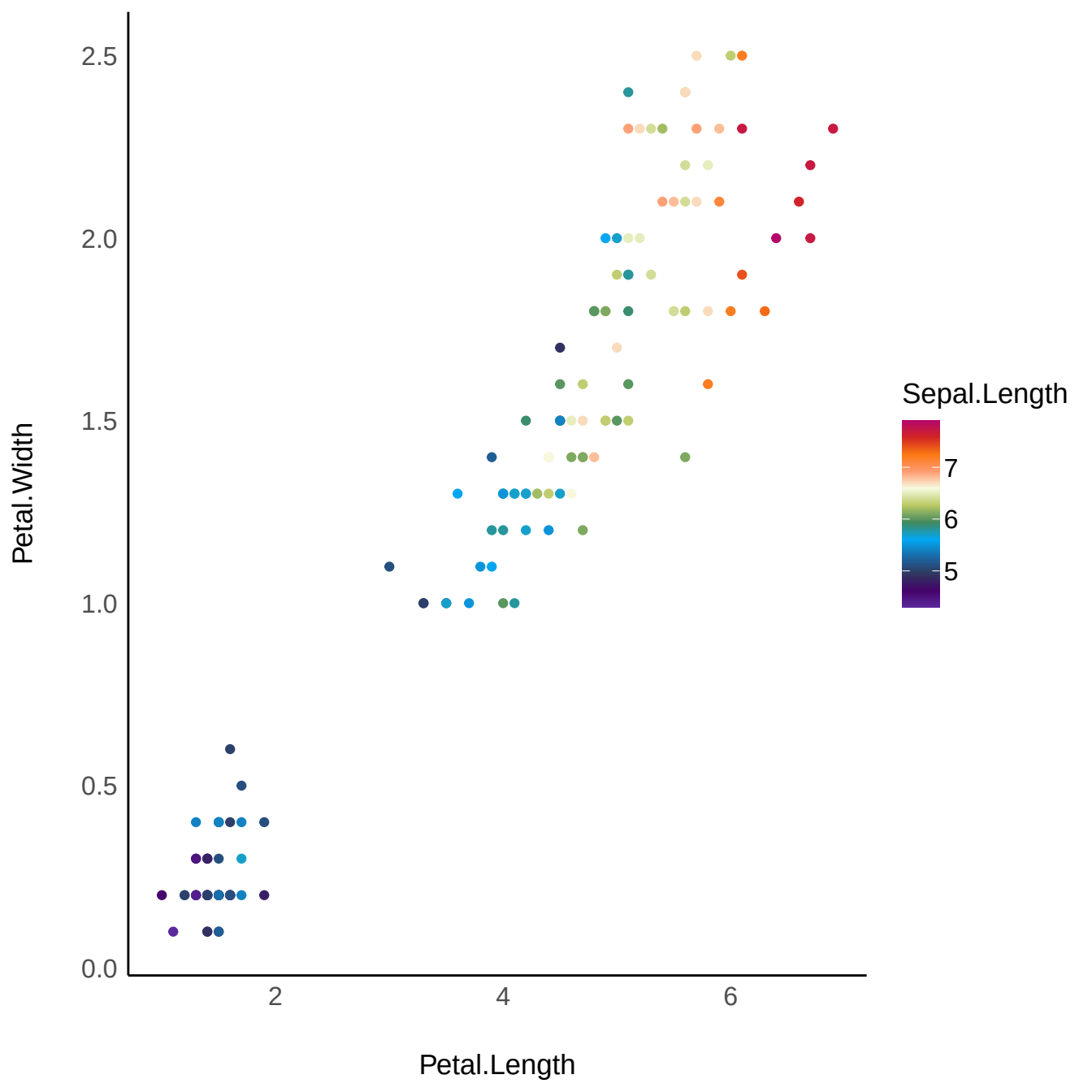
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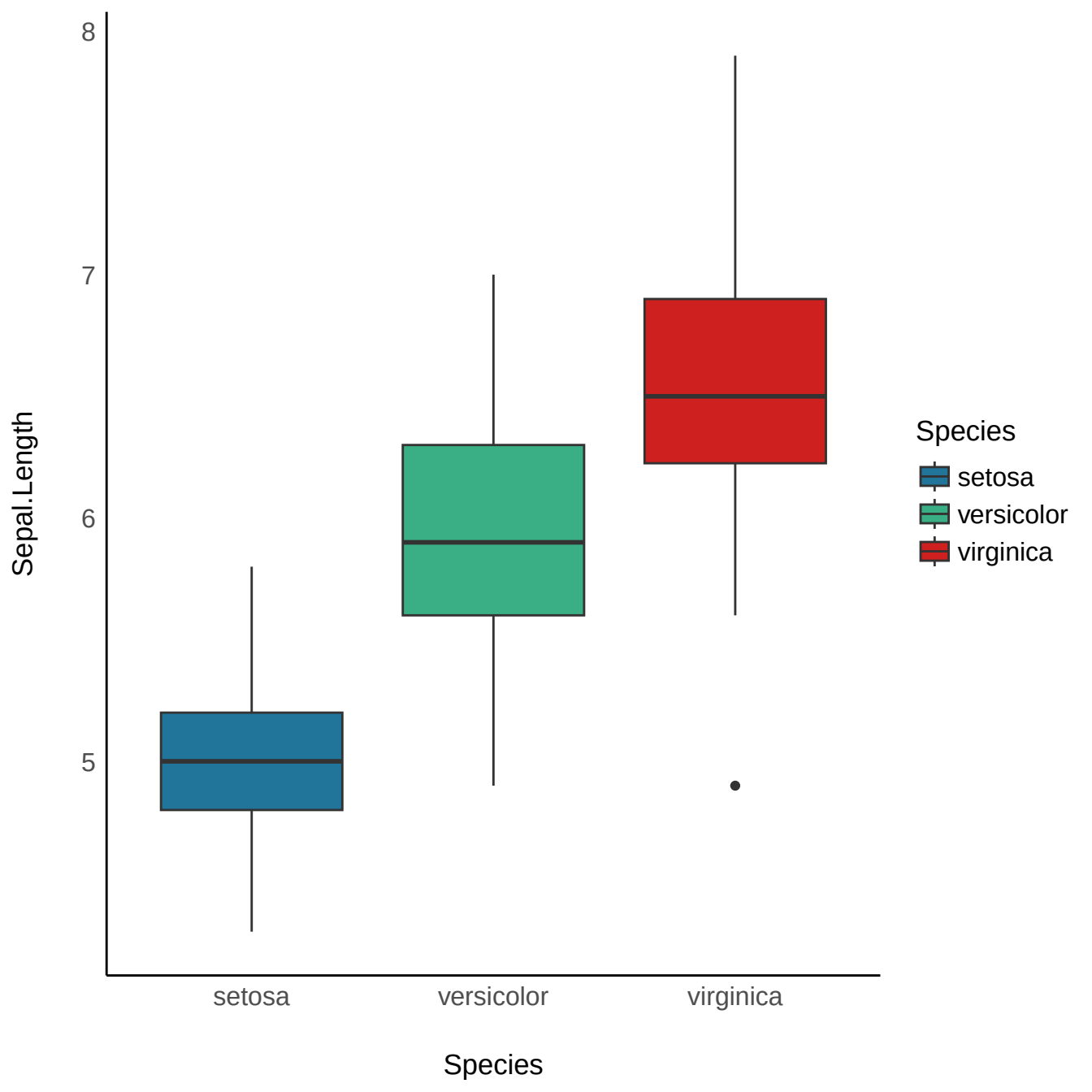
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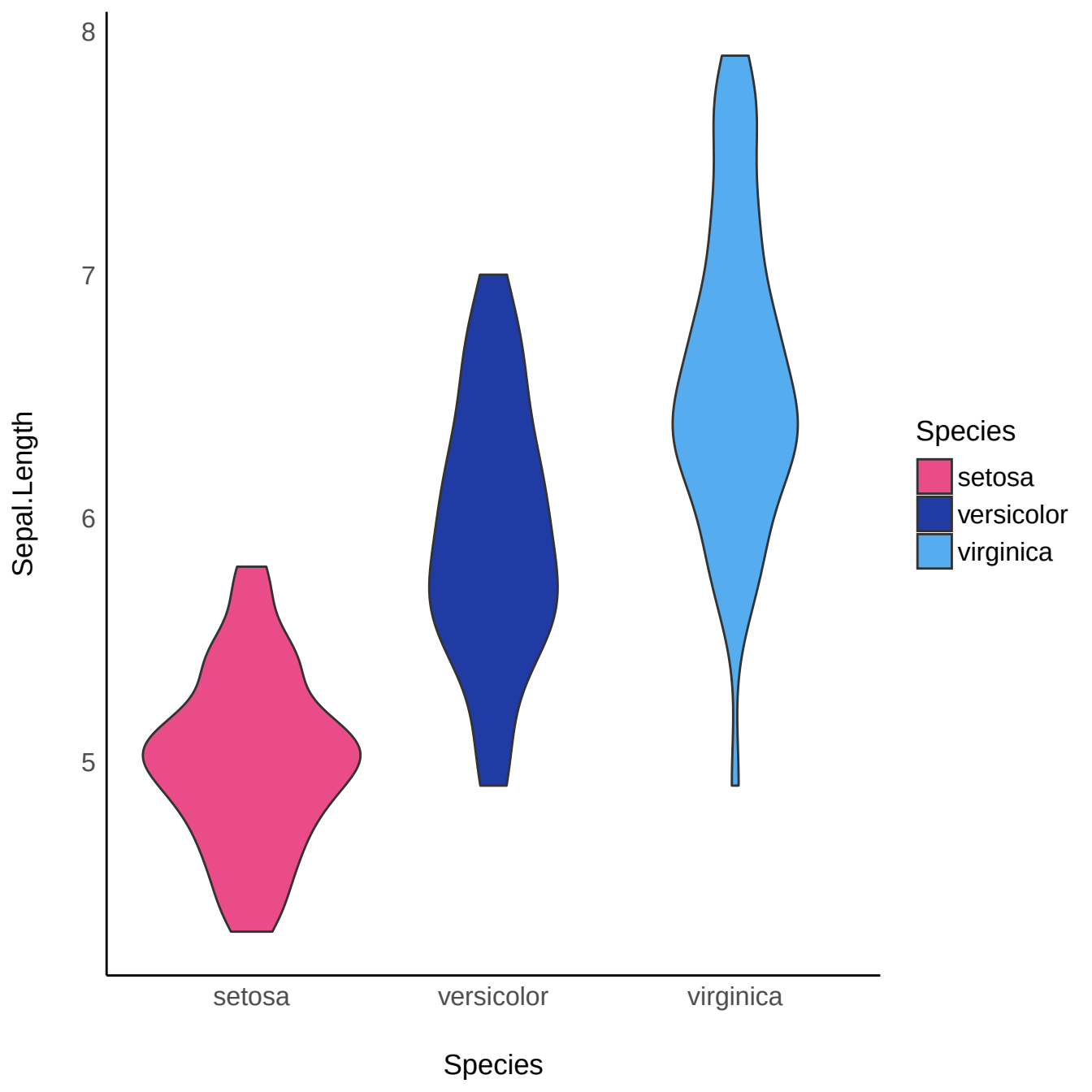
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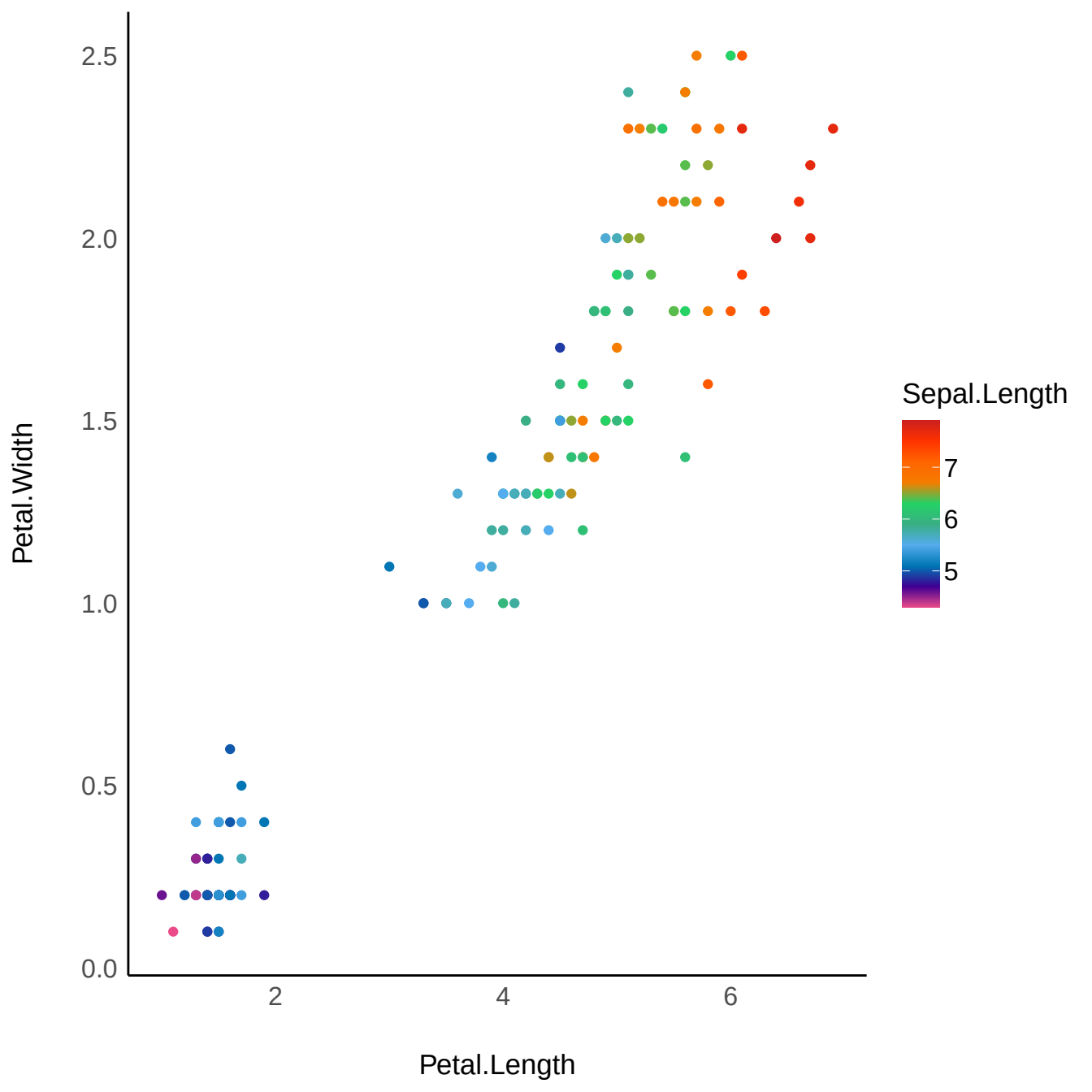
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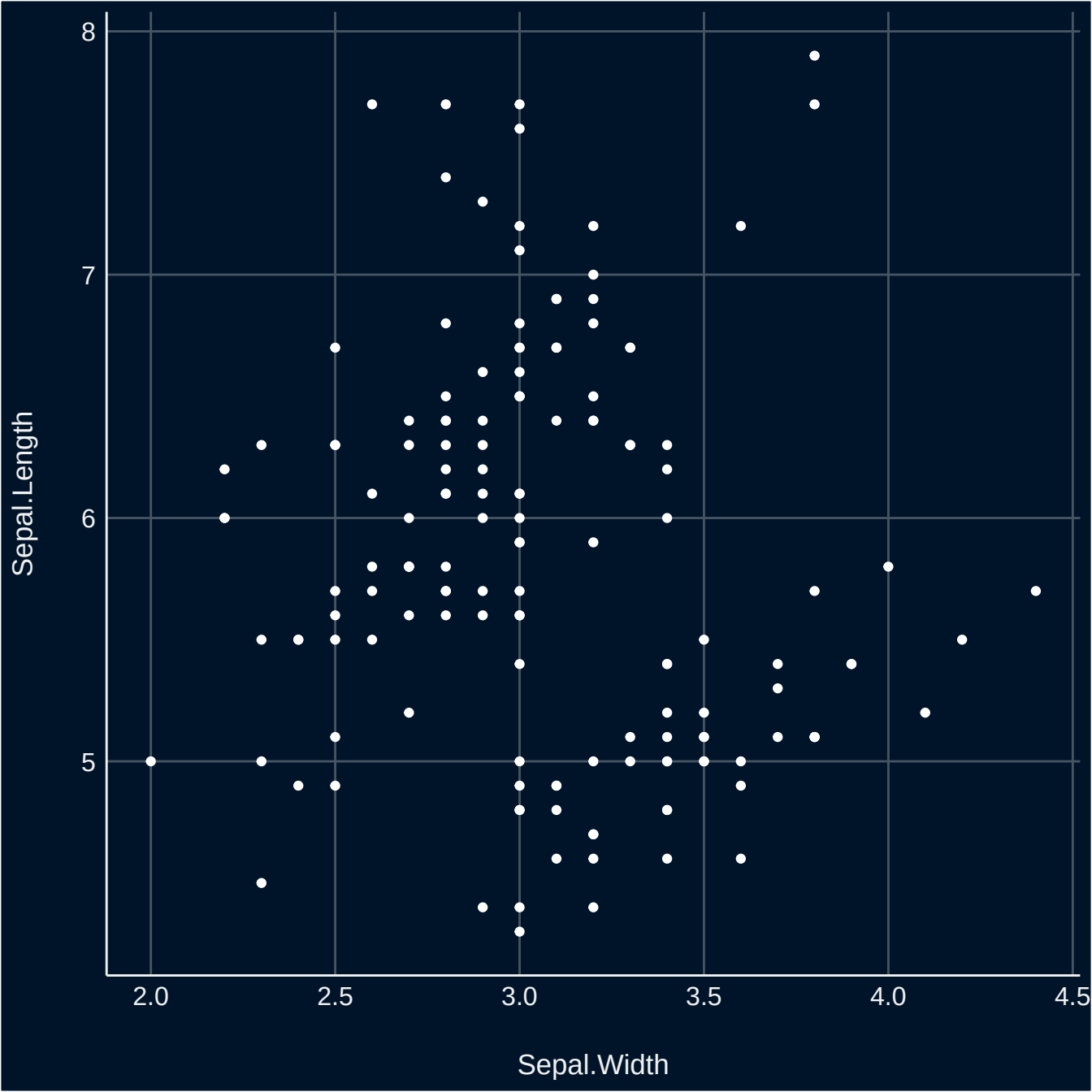
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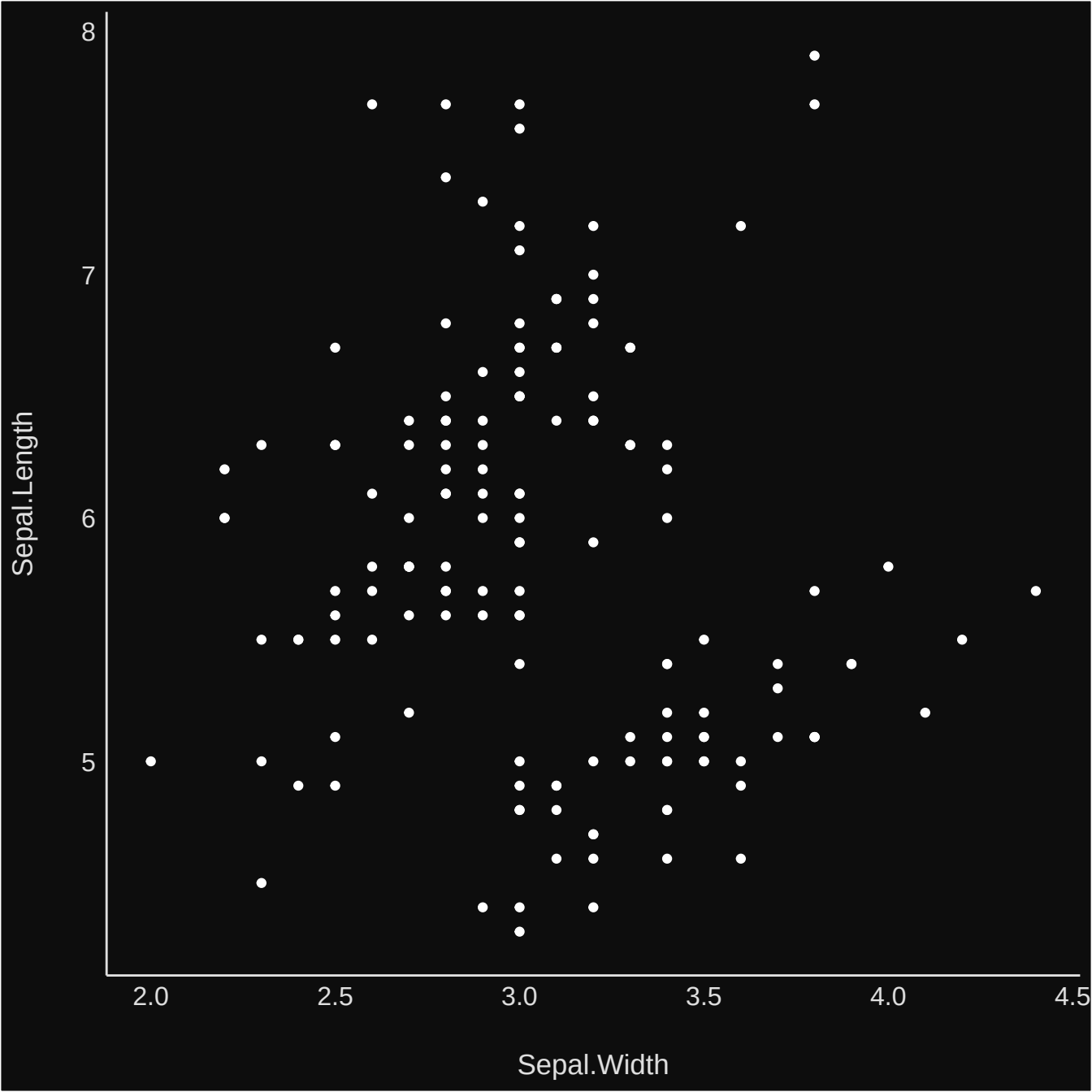
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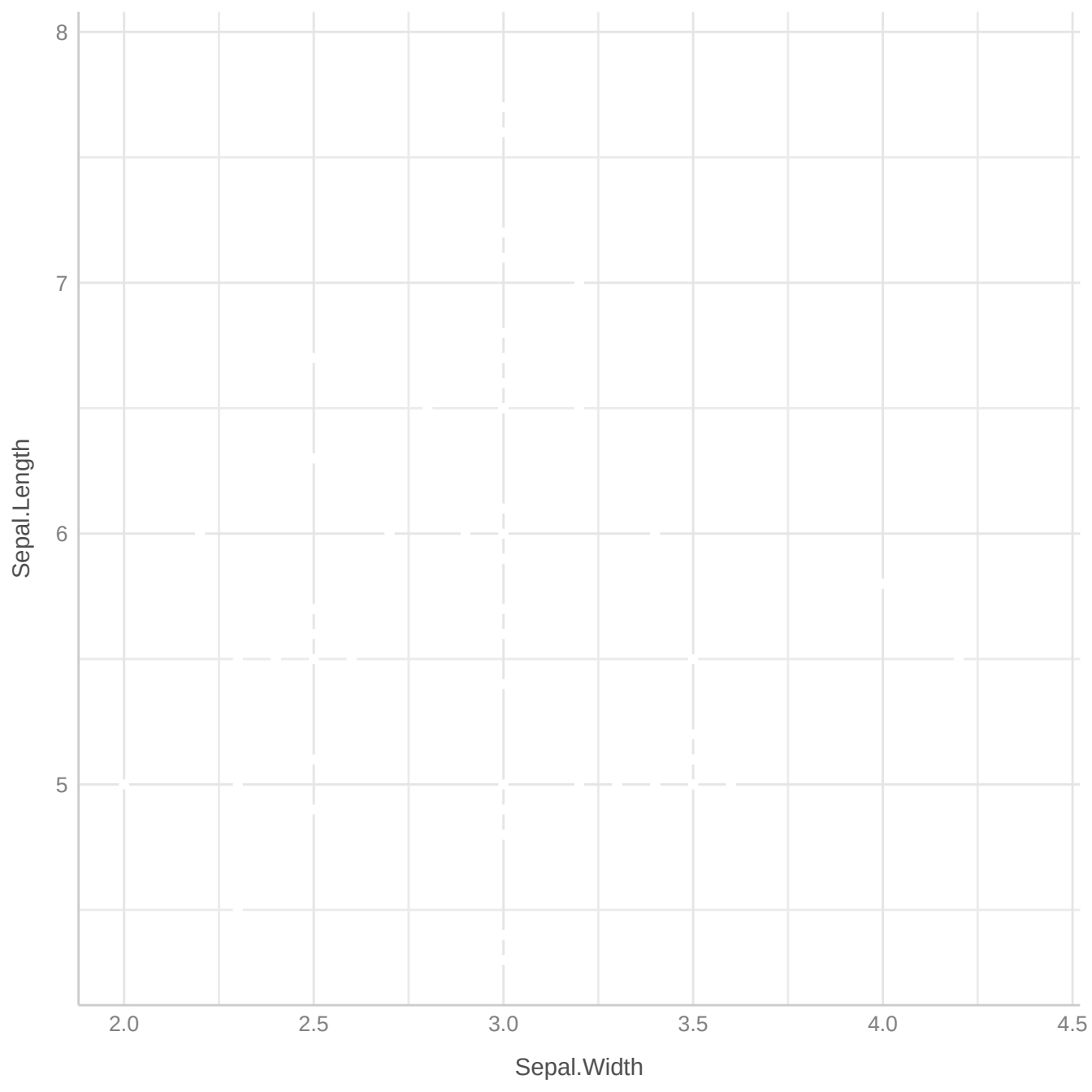
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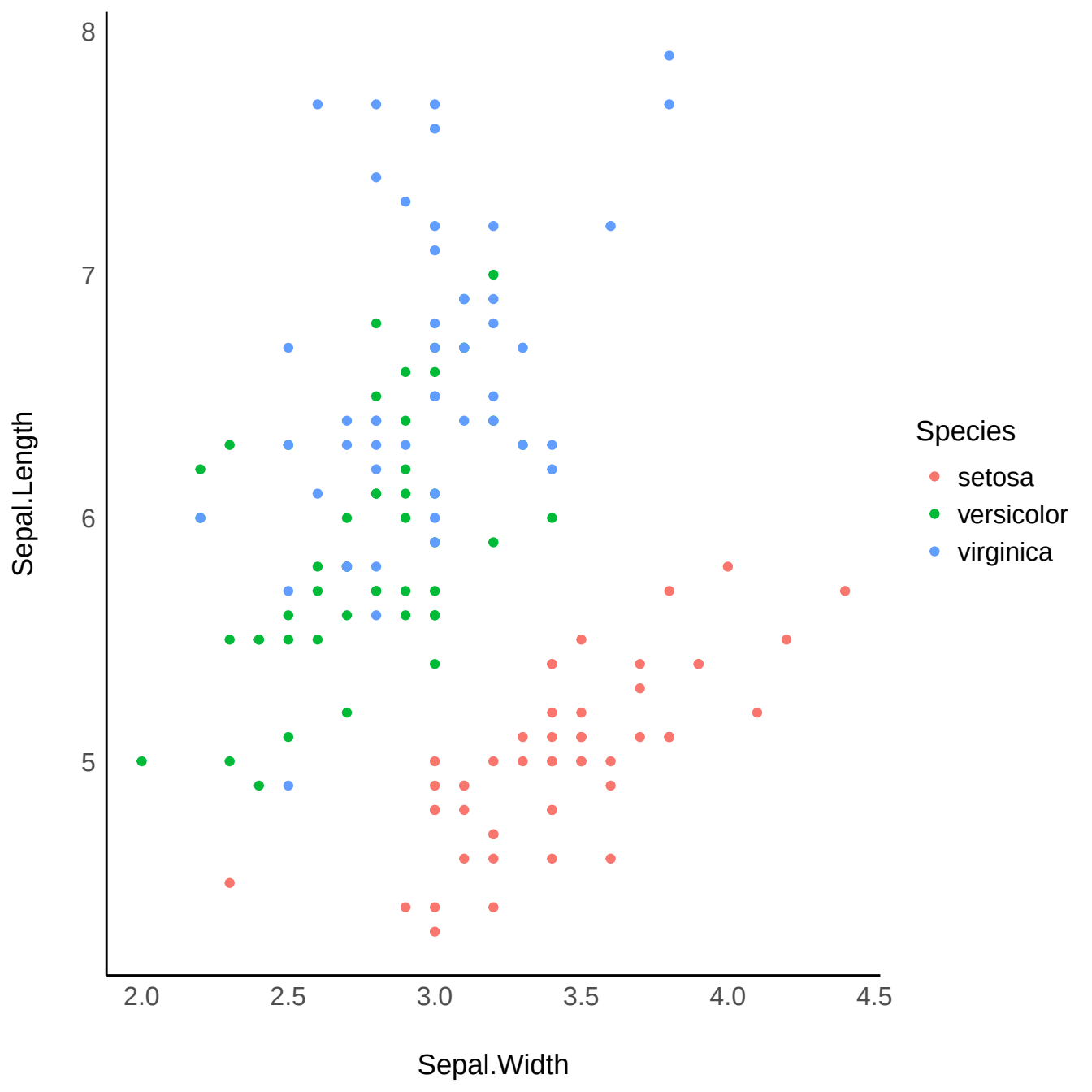
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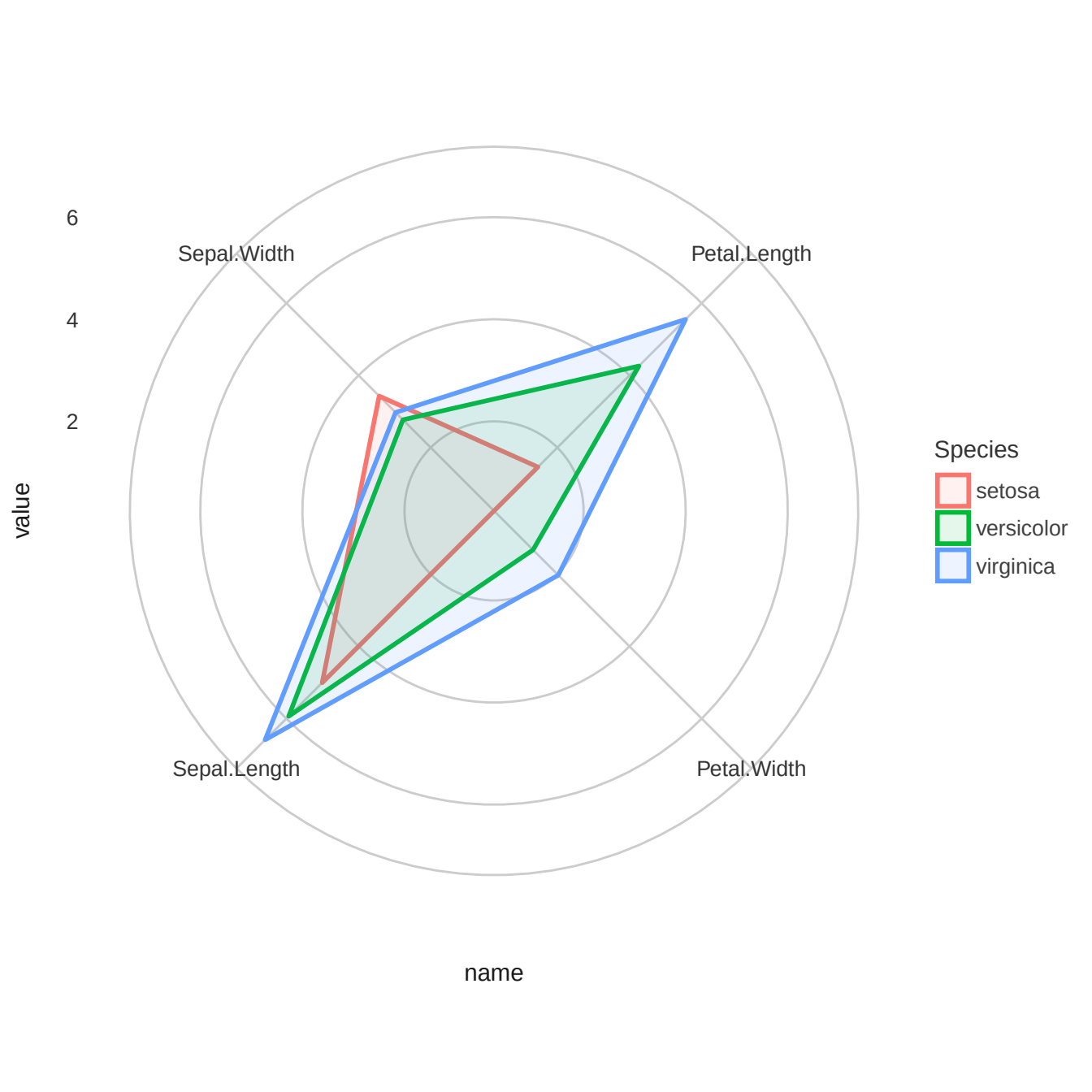
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