

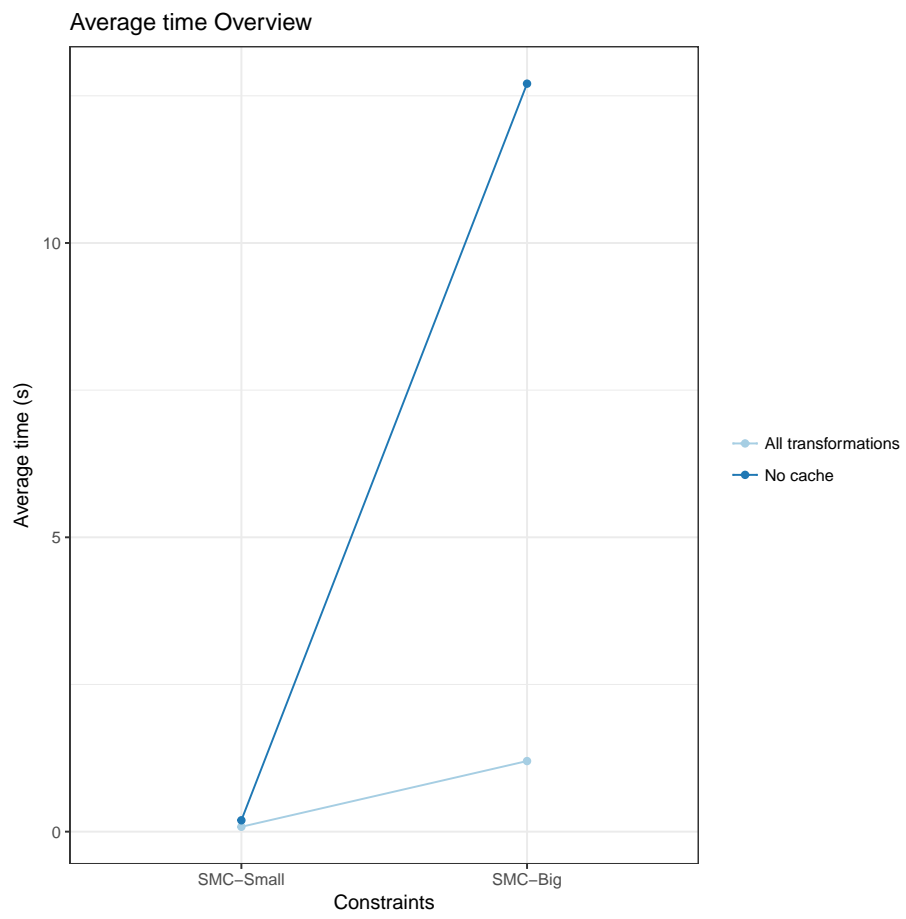
Constraint Normalization and Parameterized Caching for Quantitative Program Analysis

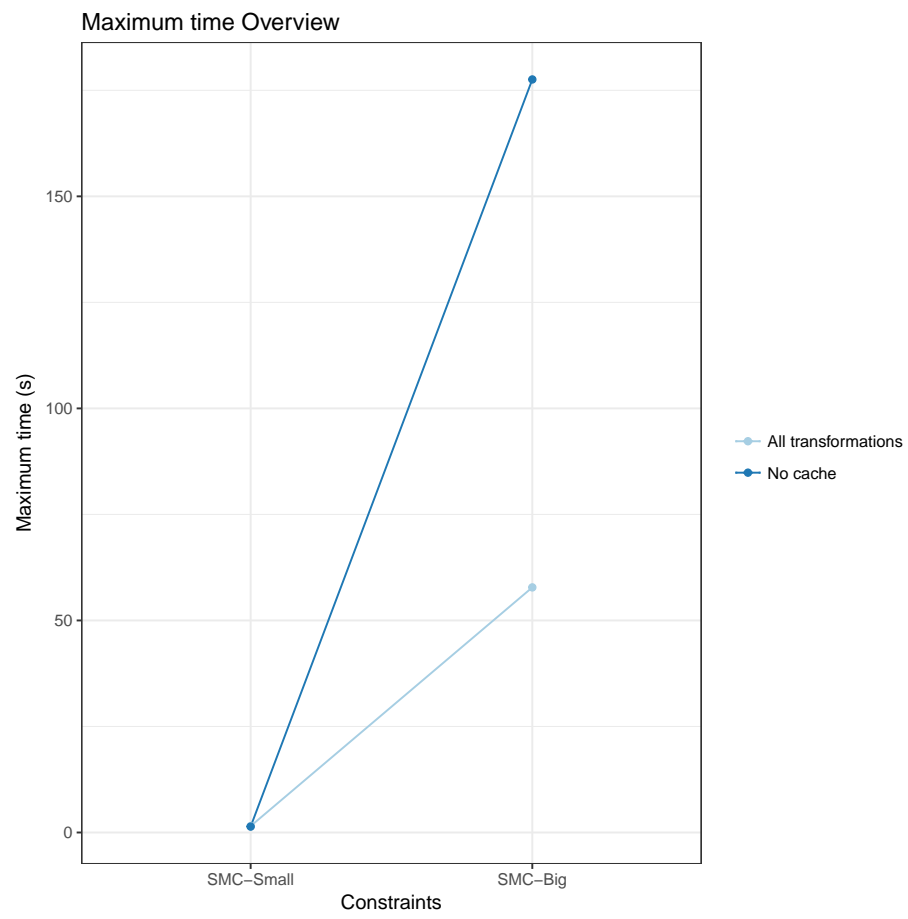
June 23, 2018

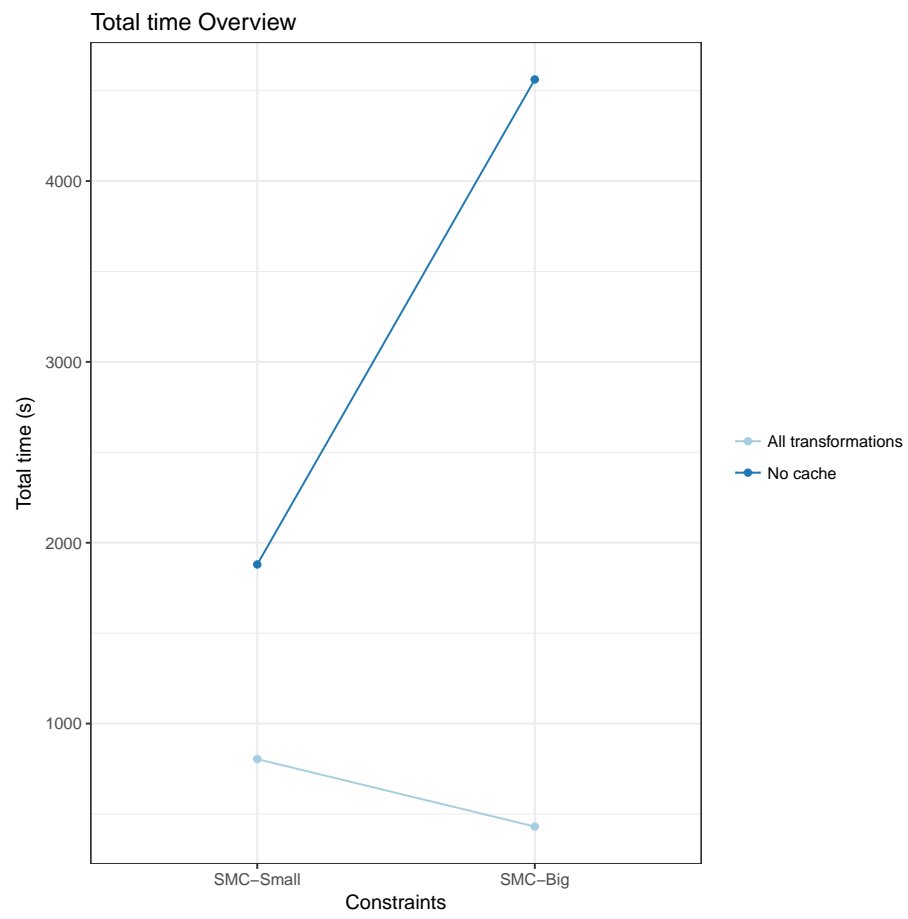
1 Description

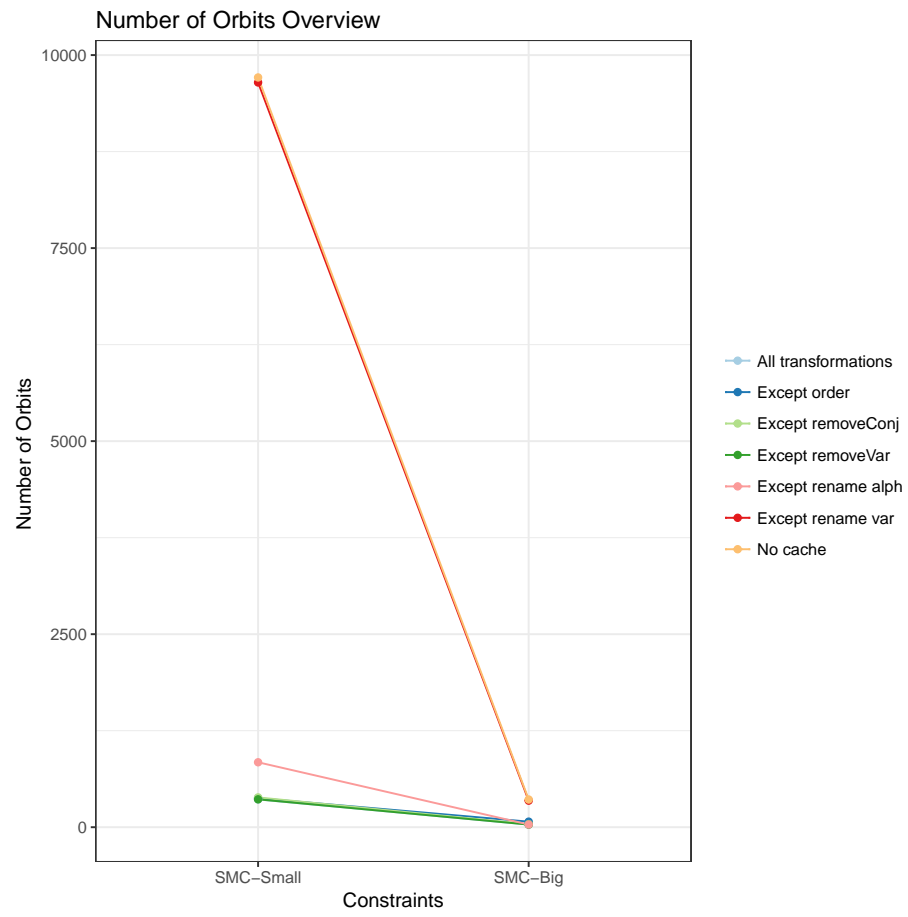
Constraint Normalization and Parameterized Caching for Quantitative Program
Analysis

2 Overview



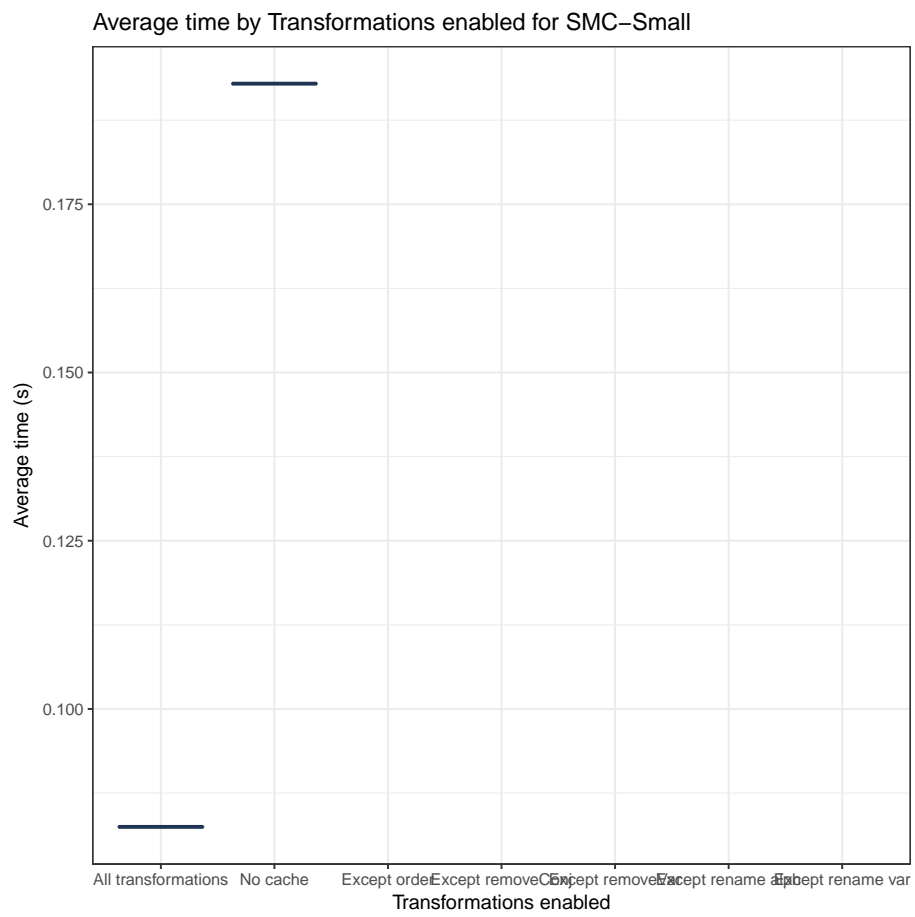




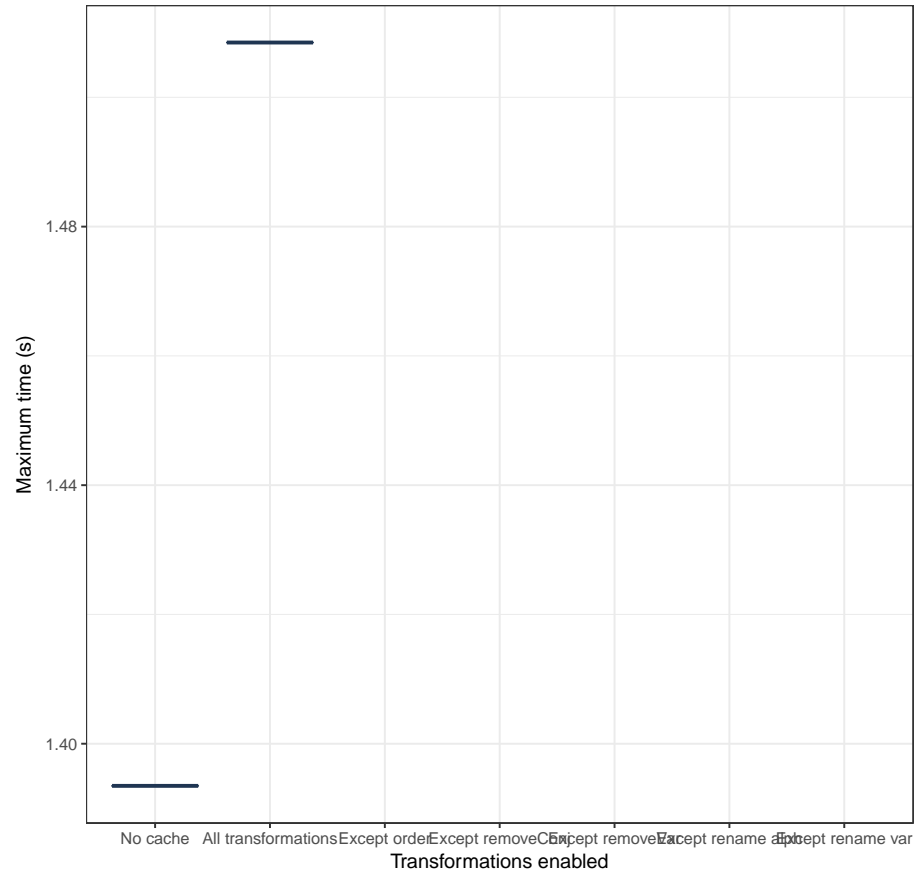


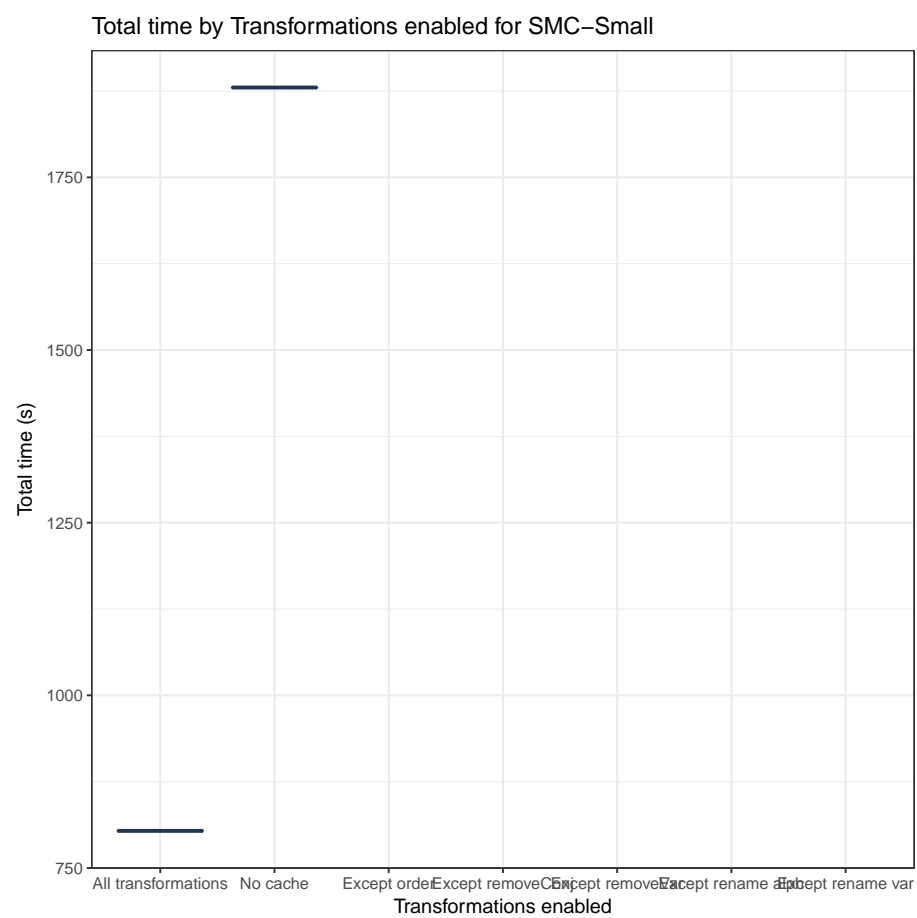
2.1 Objects Overview

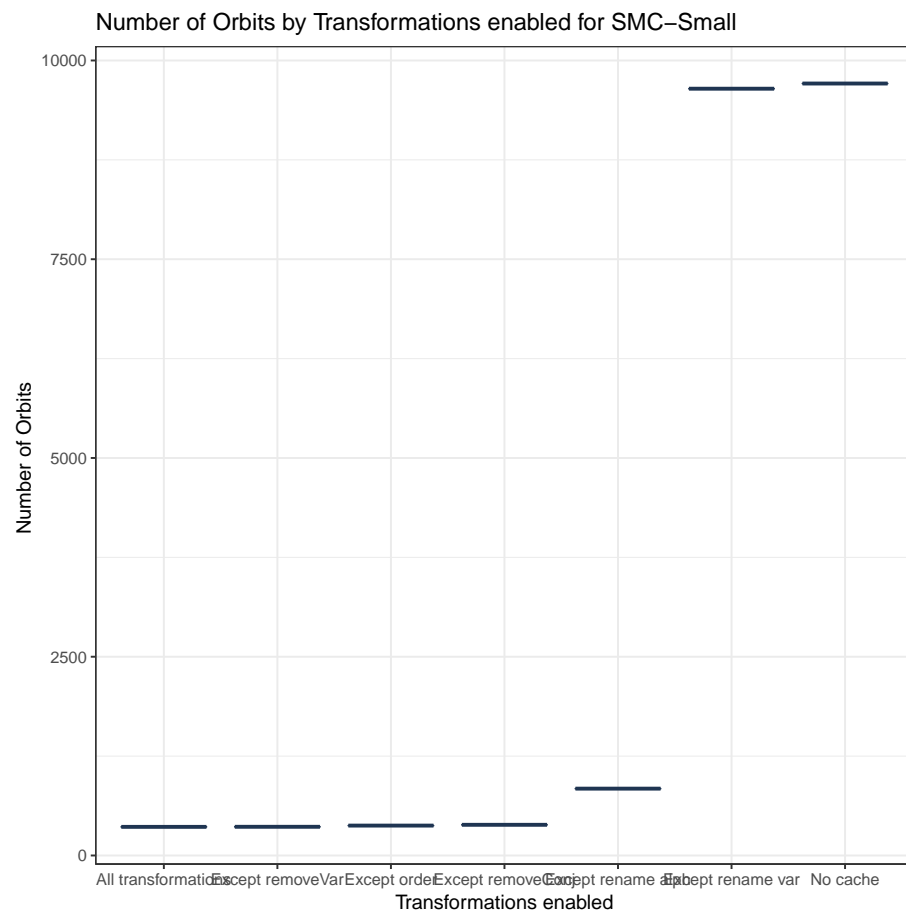
2.1.1 Overview for SMC-Small



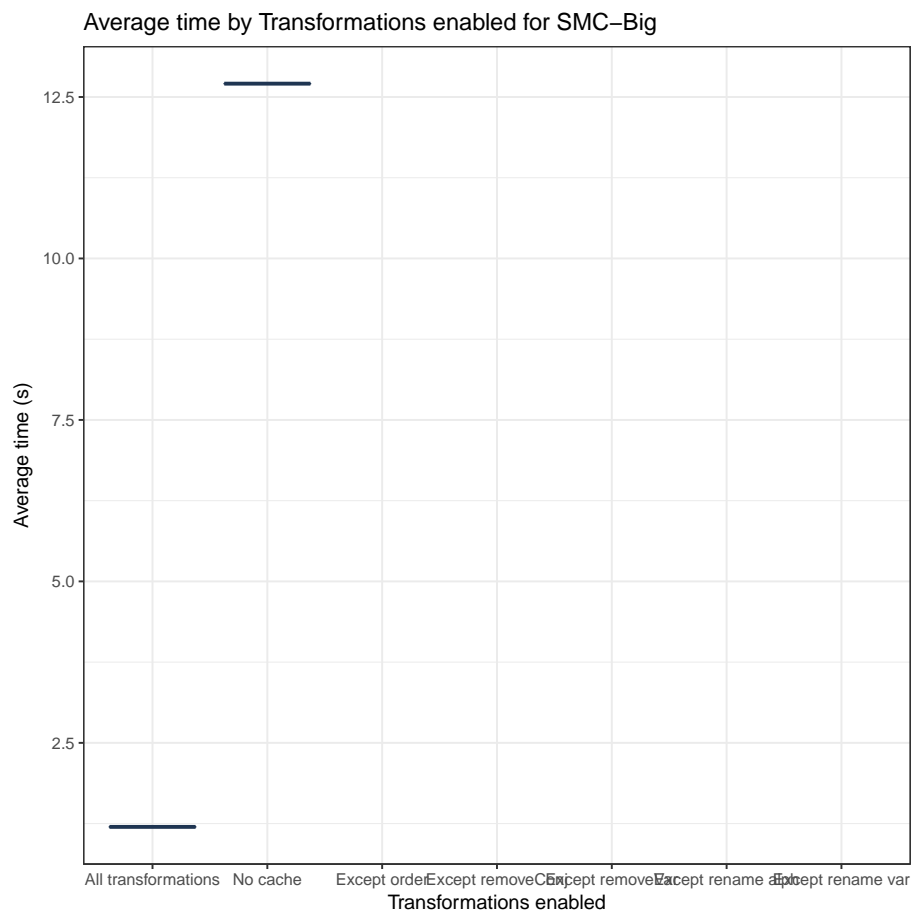
Maximum time by Transformations enabled for SMC–Small

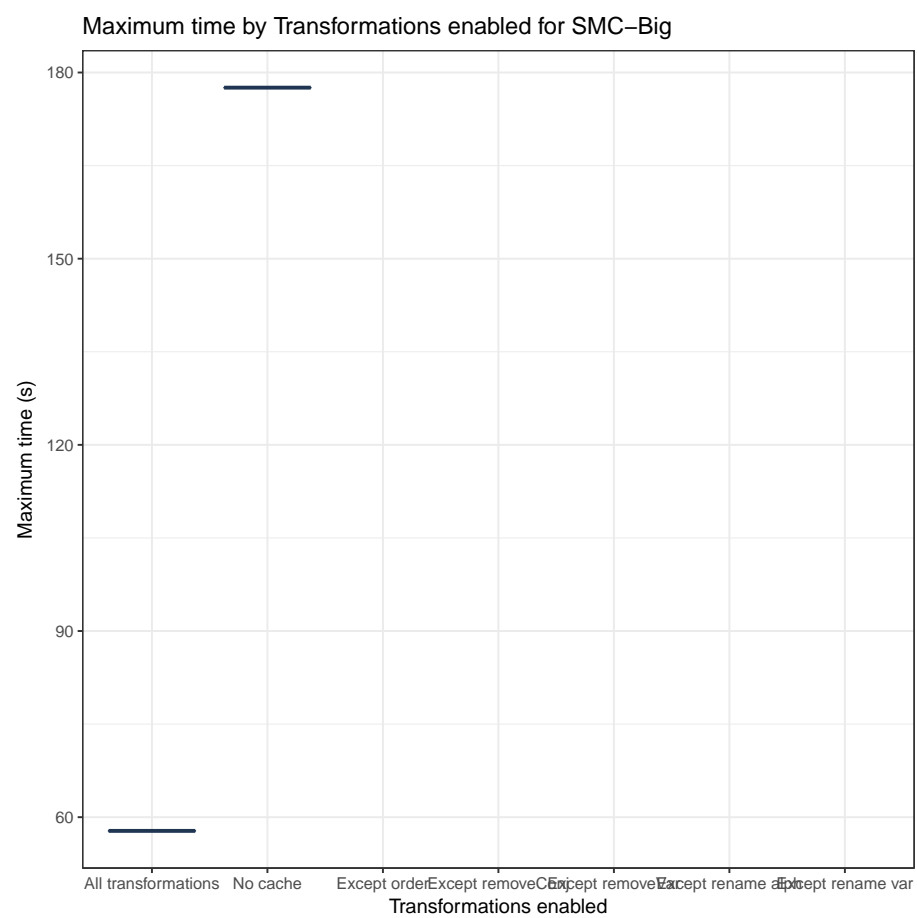


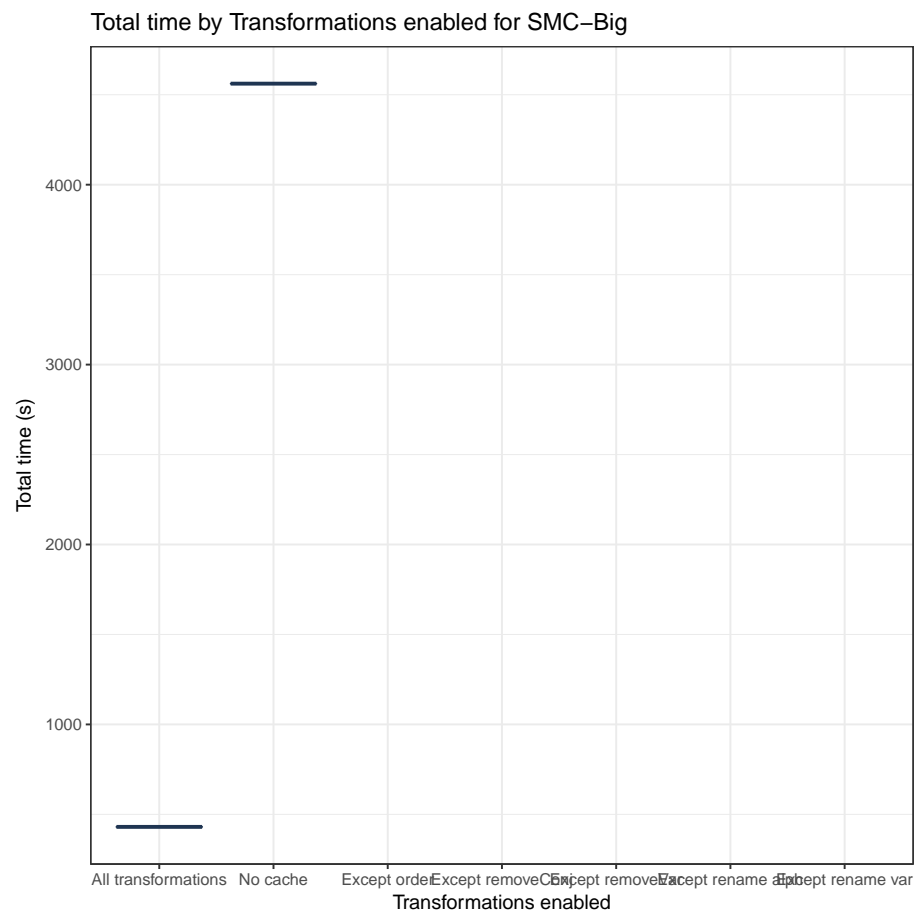


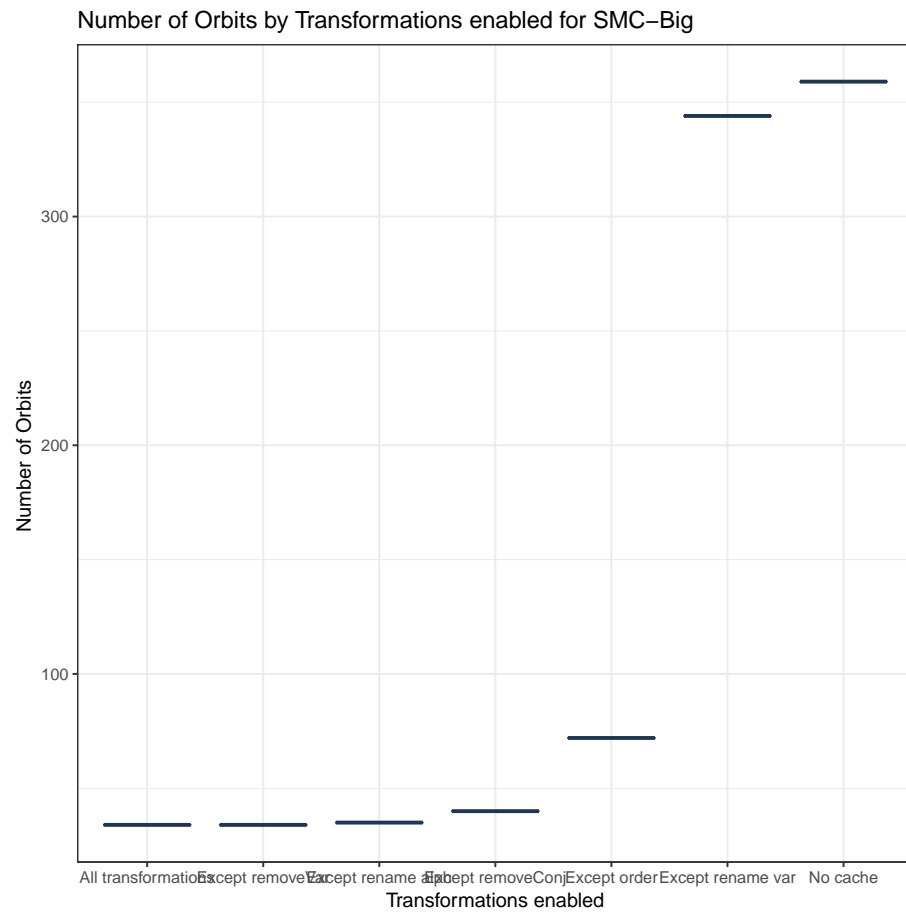


2.1.2 Overview for SMC-Big



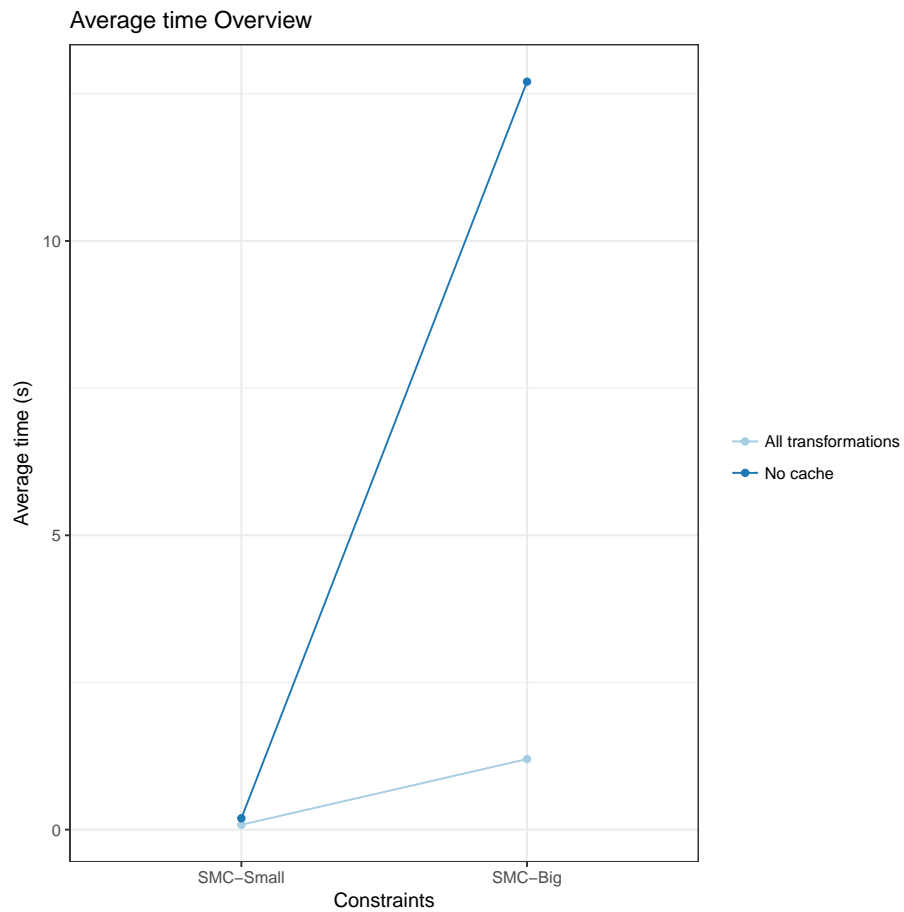






3 Research Hypotheses

- 3.1 RH1: Average time for Cashew is equals than Average time for No Cache

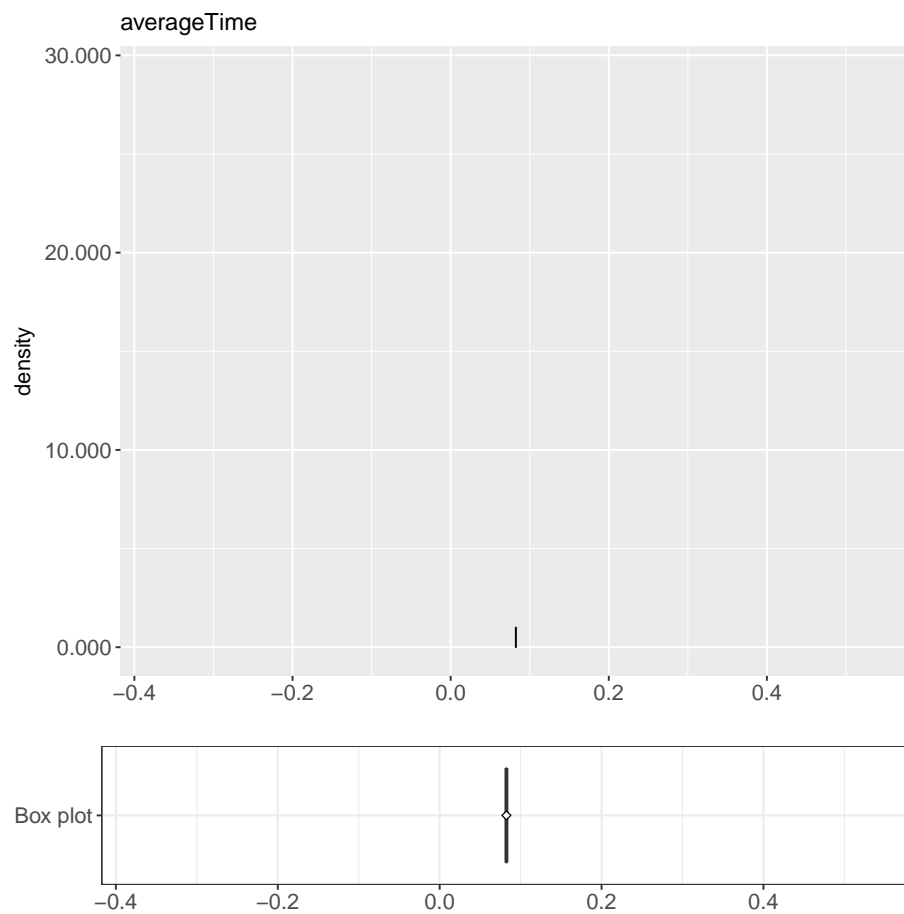


3.1.1 RH1.1: Object SMC-Small

Average time for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.08248 0.08248 0.08248 0.08248 0.08248 0.08248

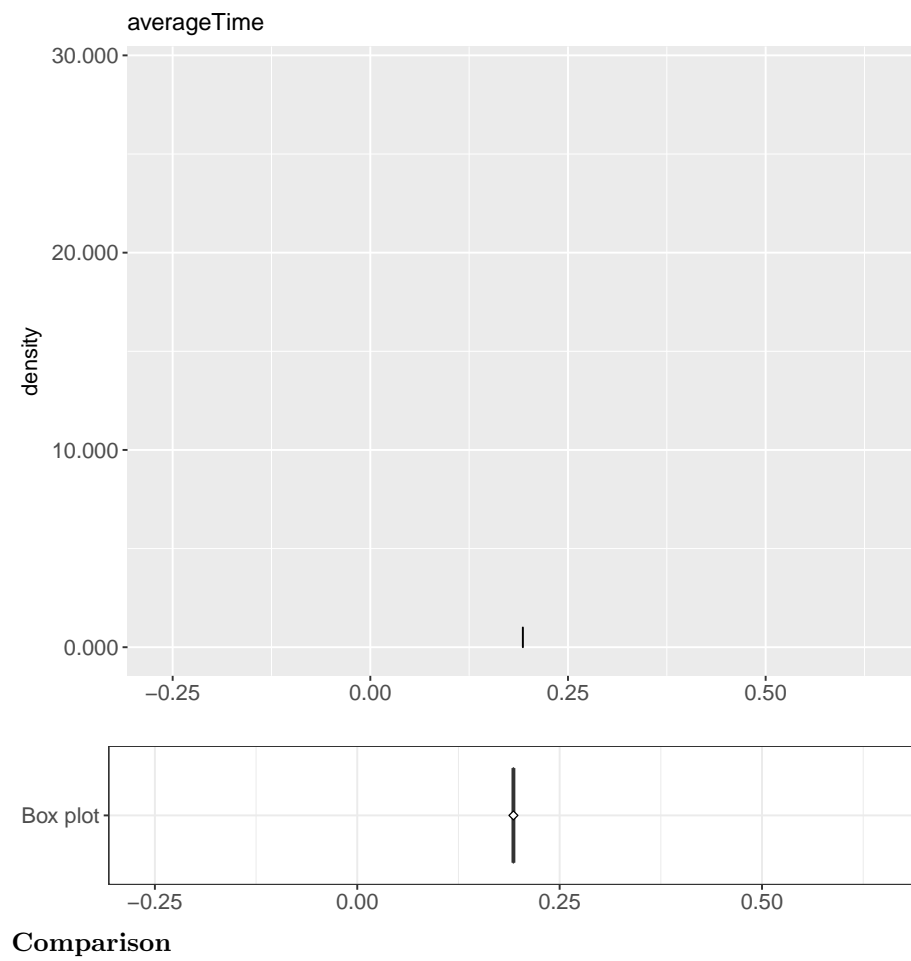
## Error in shapiro.test(subset(json.data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```

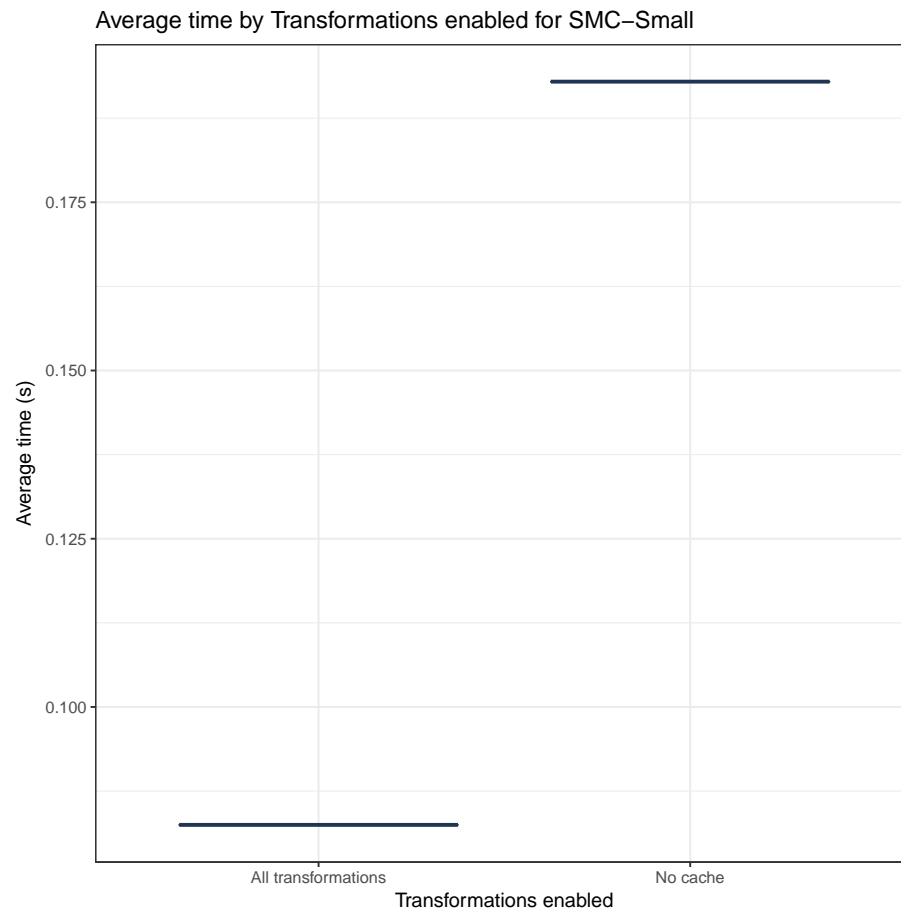


Average time for No cache

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.1929  0.1929  0.1929  0.1929  0.1929  0.1929

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```





```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not found
```

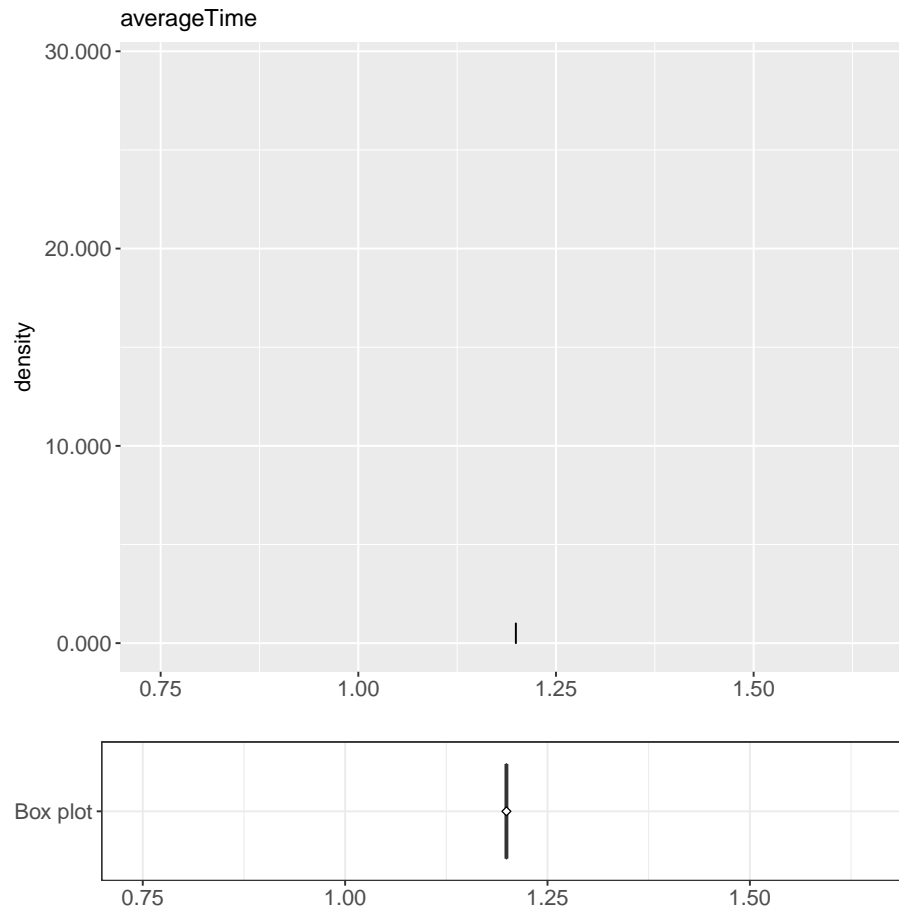
```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Average time for All transformations: 0.0824785"
## [1] "Mean Average time for No cache: 0.192926"
## [1] "Absolute difference: 0.1104475"
## Average time for No cache is 133.910655504162 % greater than
## Average time for All transformations
```

3.1.2 RH1.2: Object SMC-Big

Average time for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      1.199   1.199   1.199   1.199   1.199   1.199

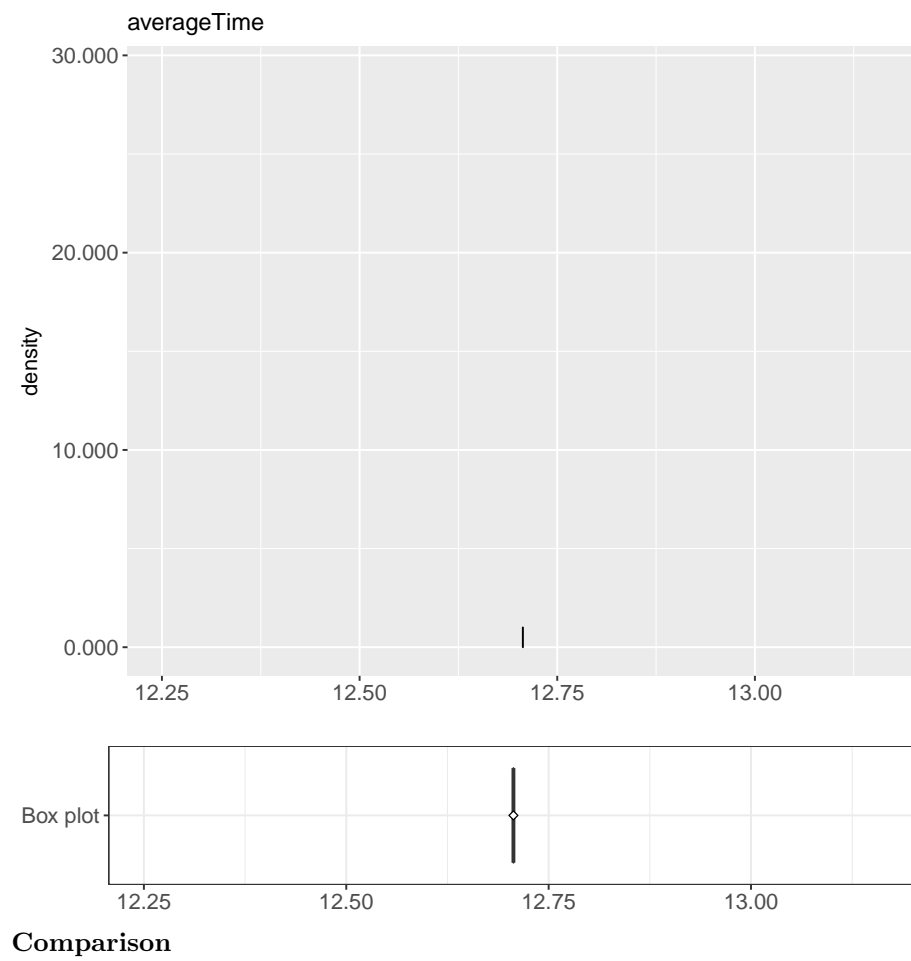
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



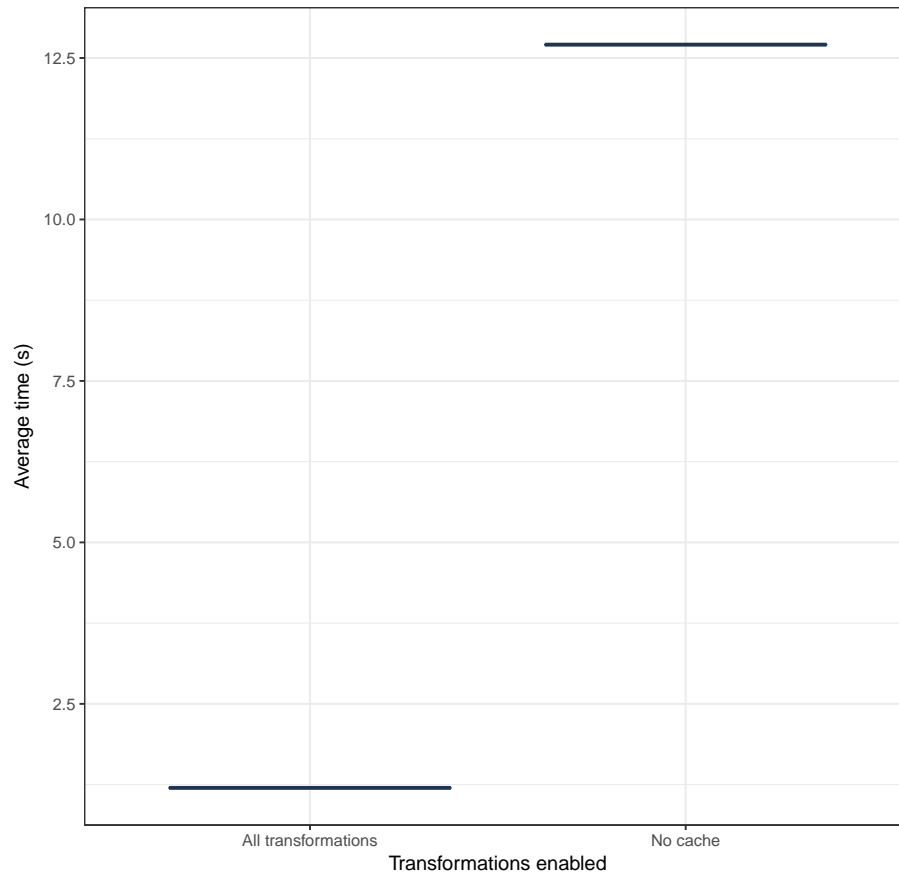
Average time for No cache

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      12.71   12.71   12.71   12.71   12.71   12.71

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Average time by Transformations enabled for SMC-Big



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not found
```

```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Average time for All transformations: 1.19926"
## [1] "Mean Average time for No cache: 12.7065"
## [1] "Absolute difference: 11.50724"
## Average time for No cache is 959.528375831763 % greater than
## Average time for All transformations
```

3.1.3 RH1 Results: Average time All transformations = No cache

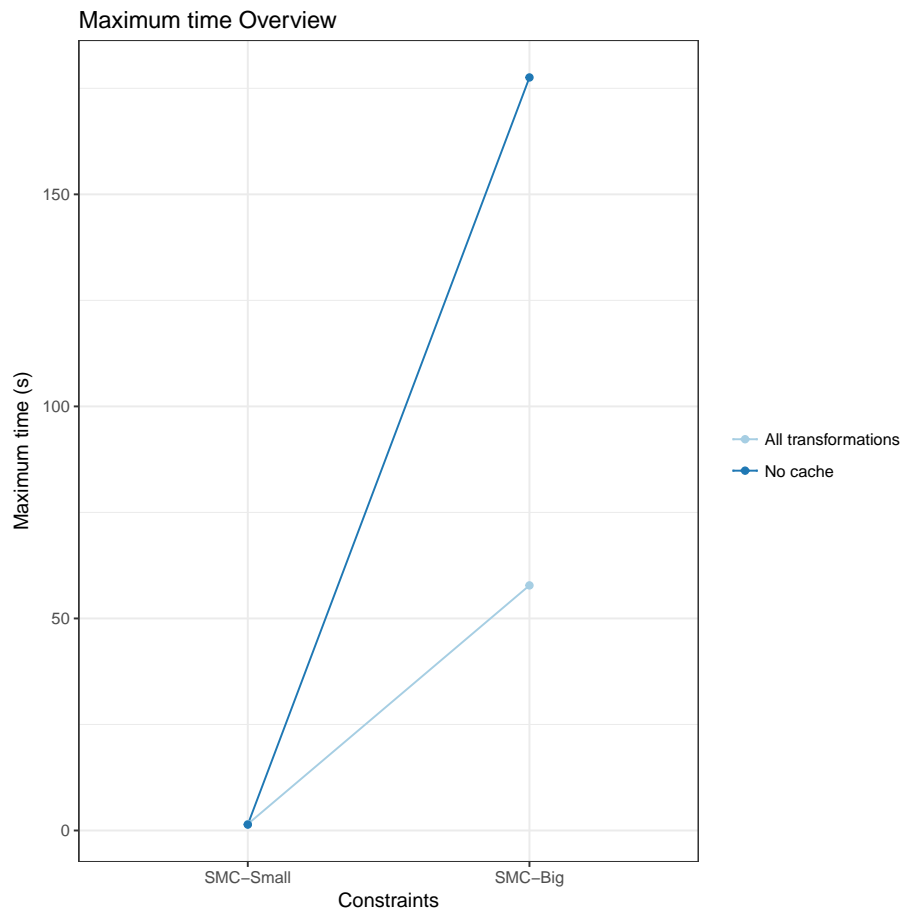
Table 1: RH1 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 2: RH1 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

3.2 RH2: Maximum time for Cashew is equals than Average time for No Cache

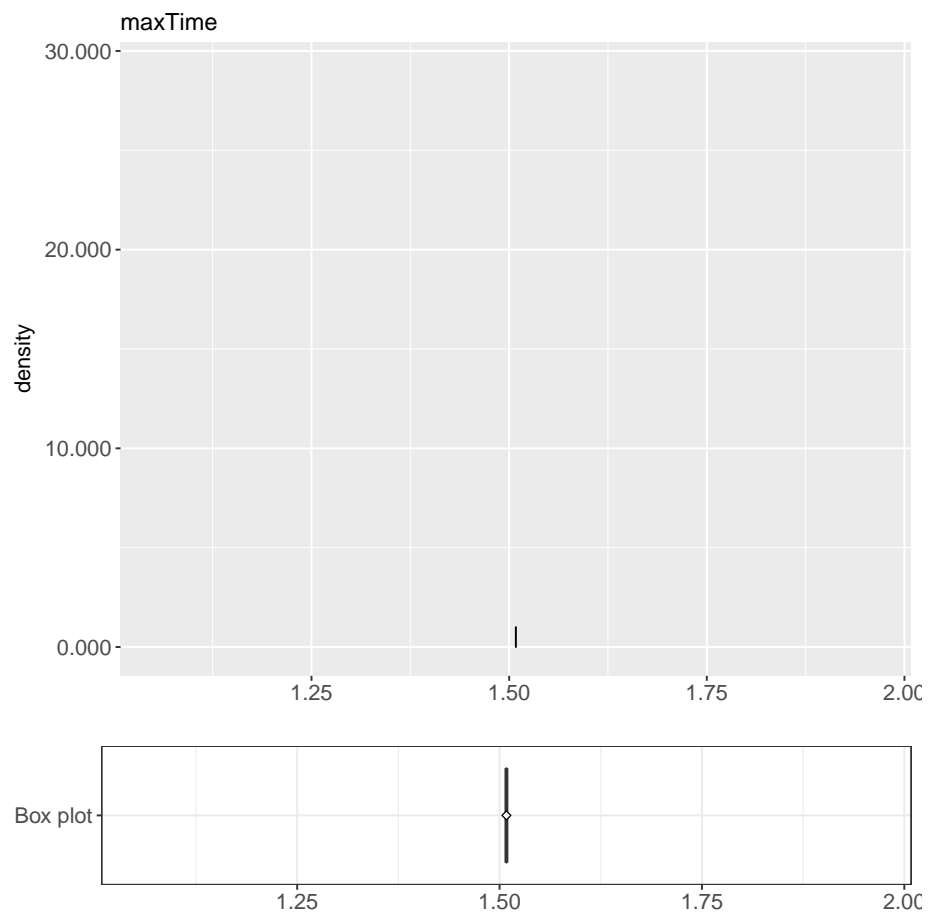


3.2.1 RH2.1: Object SMC-Small

Maximum time for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.508   1.508   1.508   1.508   1.508   1.508

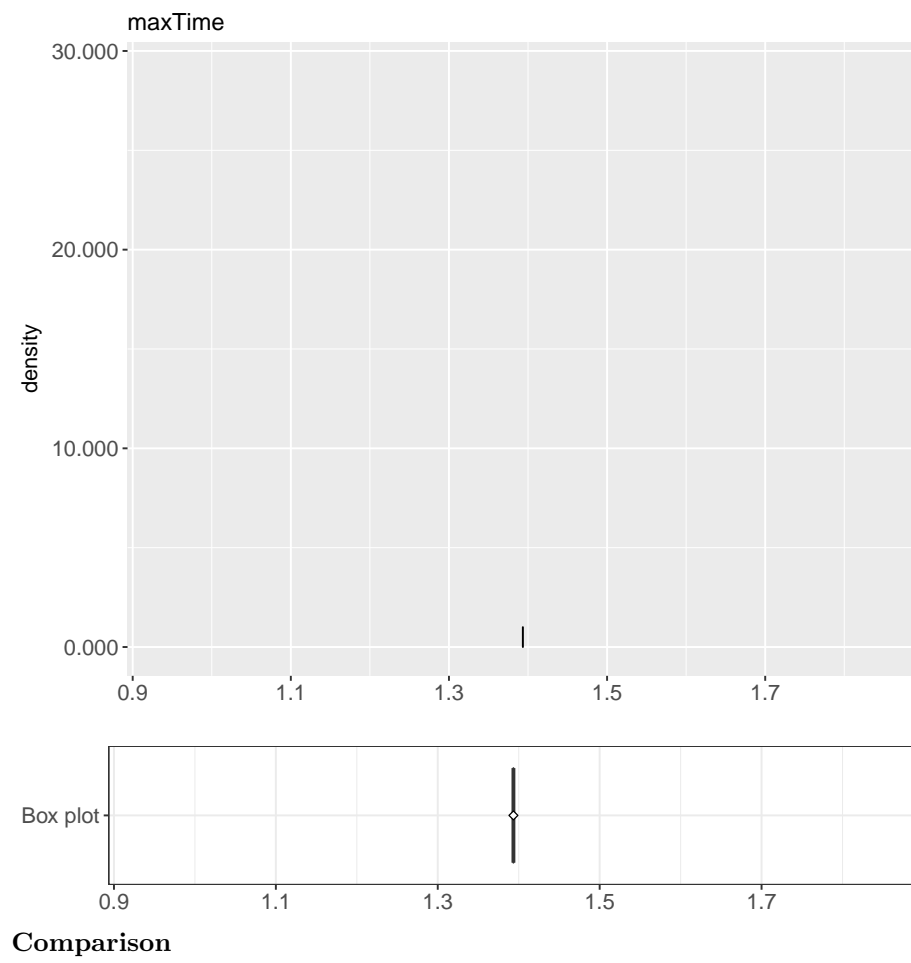
## Error in shapiro.test(subset(json.data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



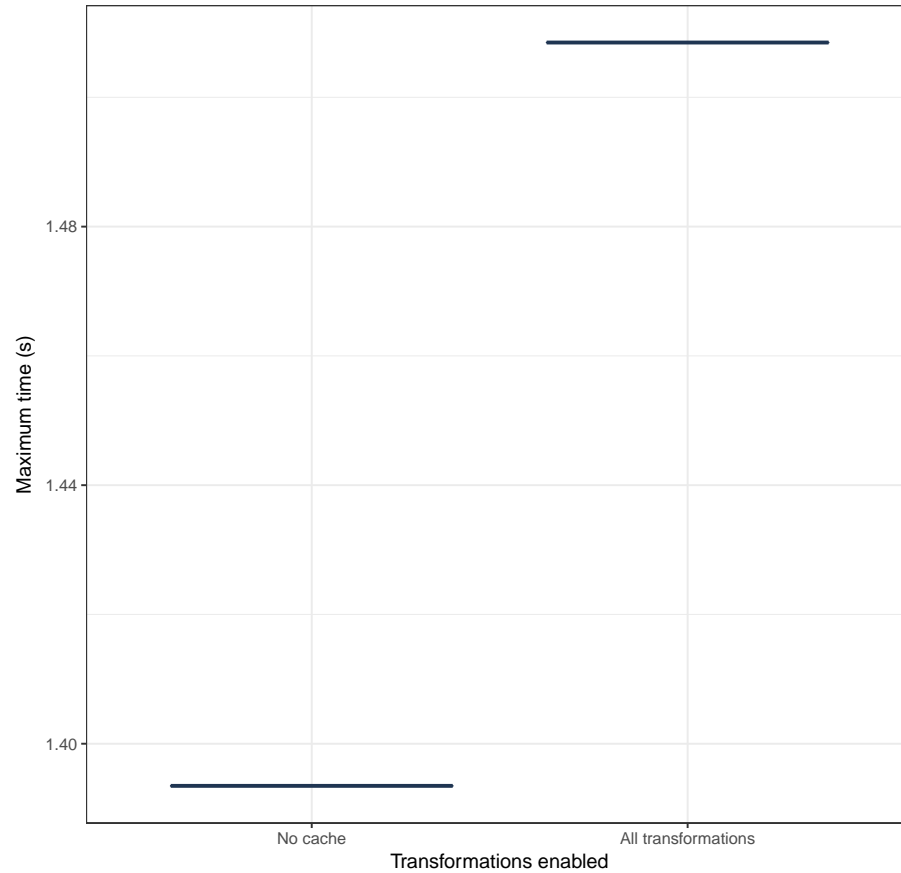
Maximum time for No cache

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.393   1.393   1.393   1.393   1.393   1.393

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Maximum time by Transformations enabled for SMC–Small



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

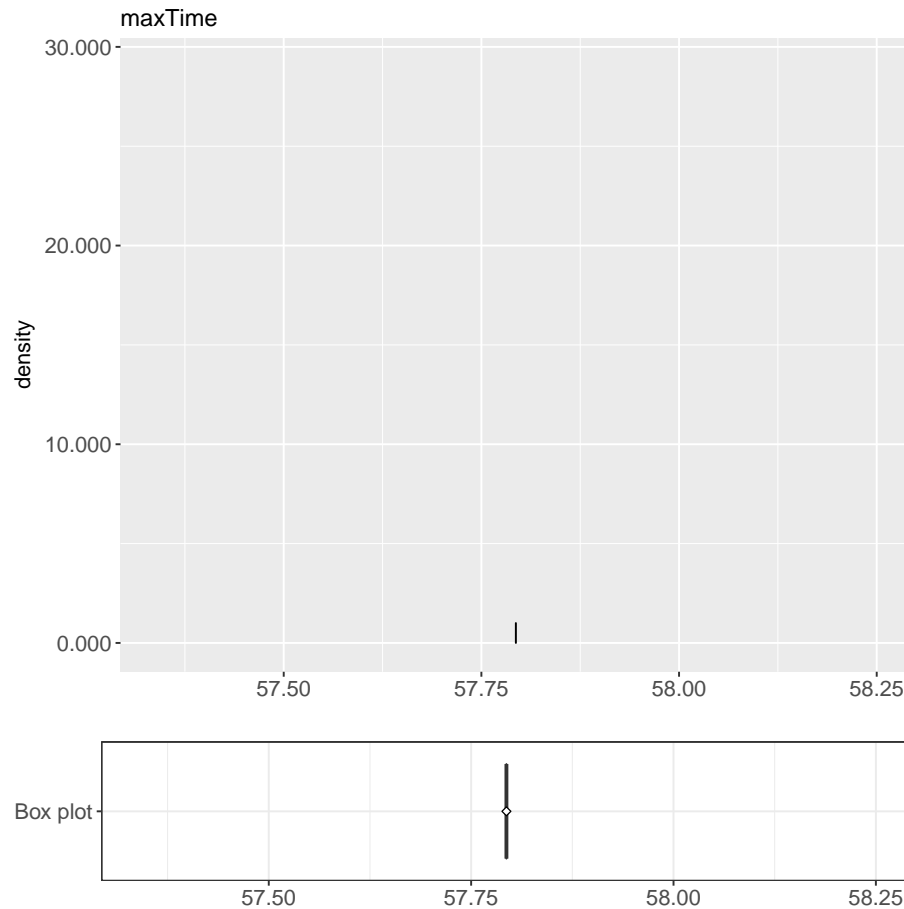
## [1] ""
## [1] "Means comparison"
## [1] "Mean Maximum time for All transformations: 1.50848"
## [1] "Mean Maximum time for No cache: 1.39348"
## [1] "Absolute difference: 0.115"
## Maximum time for All transformations is 8.25271980939805 % greater than
## Maximum time for No cache
```

3.2.2 RH2.2: Object SMC-Big

Maximum time for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      57.79   57.79   57.79   57.79   57.79   57.79

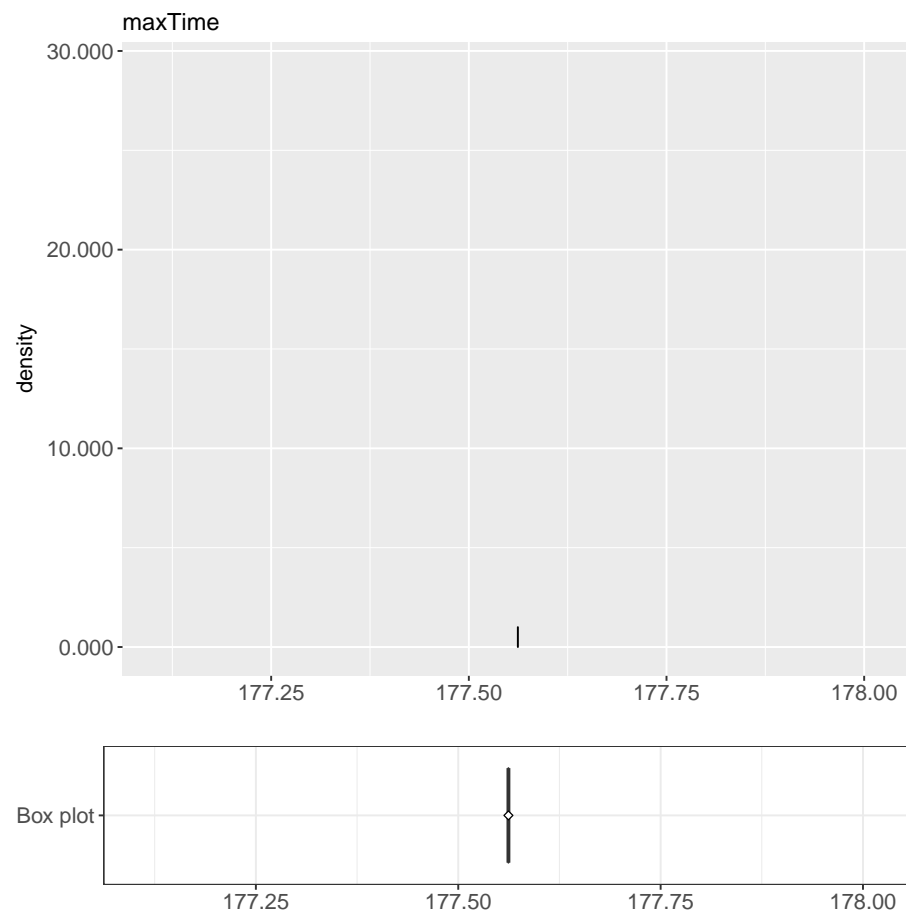
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



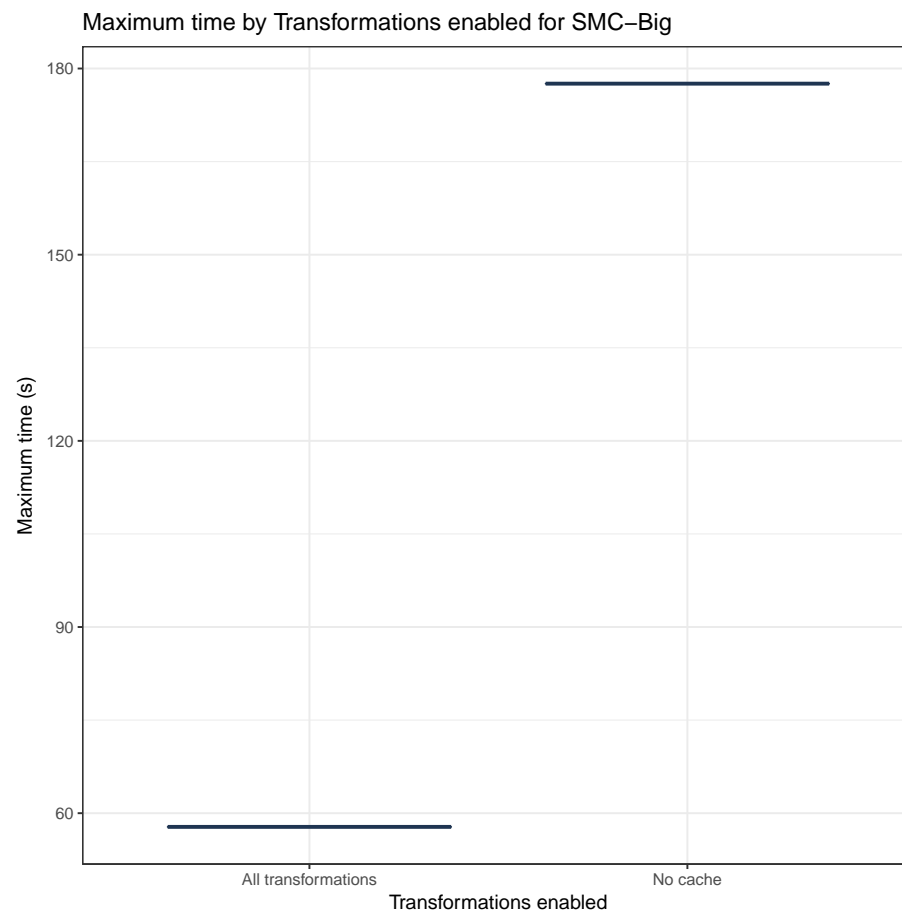
Maximum time for No cache

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      177.6   177.6   177.6   177.6   177.6   177.6

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not found
```

```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Maximum time for All transformations: 57.7936"
## [1] "Mean Maximum time for No cache: 177.562"
## [1] "Absolute difference: 119.7684"
## Maximum time for No cache is 207.234711109881 % greater than
## Maximum time for All transformations
```

3.2.3 RH2 Results: Maximum time All transformations = No cache

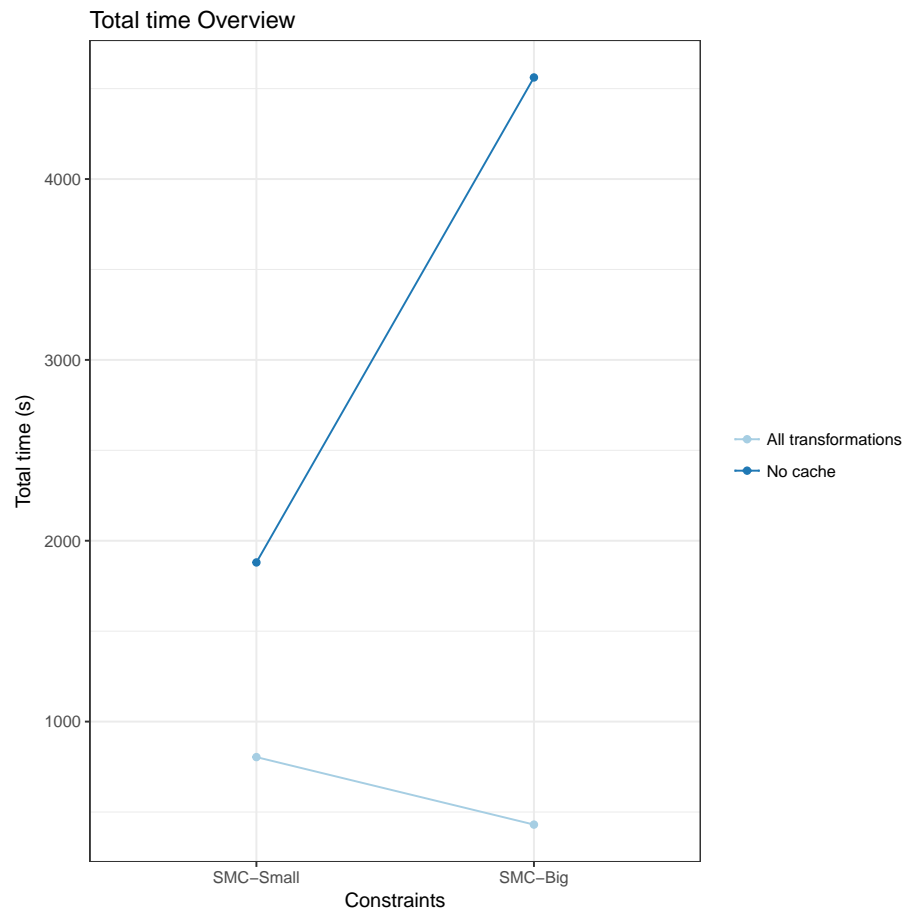
Table 3: RH2 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 4: RH2 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

3.3 RH3: Total time for Cashew is equals than Average time for No Cache

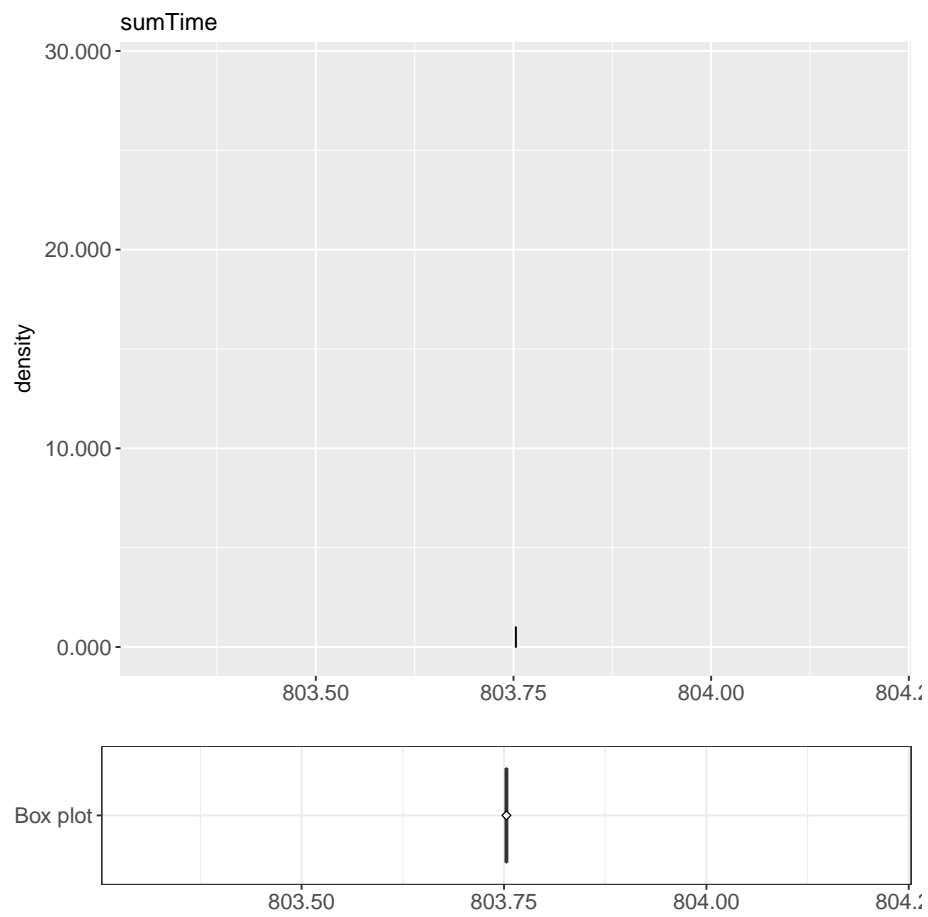


3.3.1 RH3.1: Object SMC-Small

Total time for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   803.8   803.8   803.8   803.8   803.8   803.8

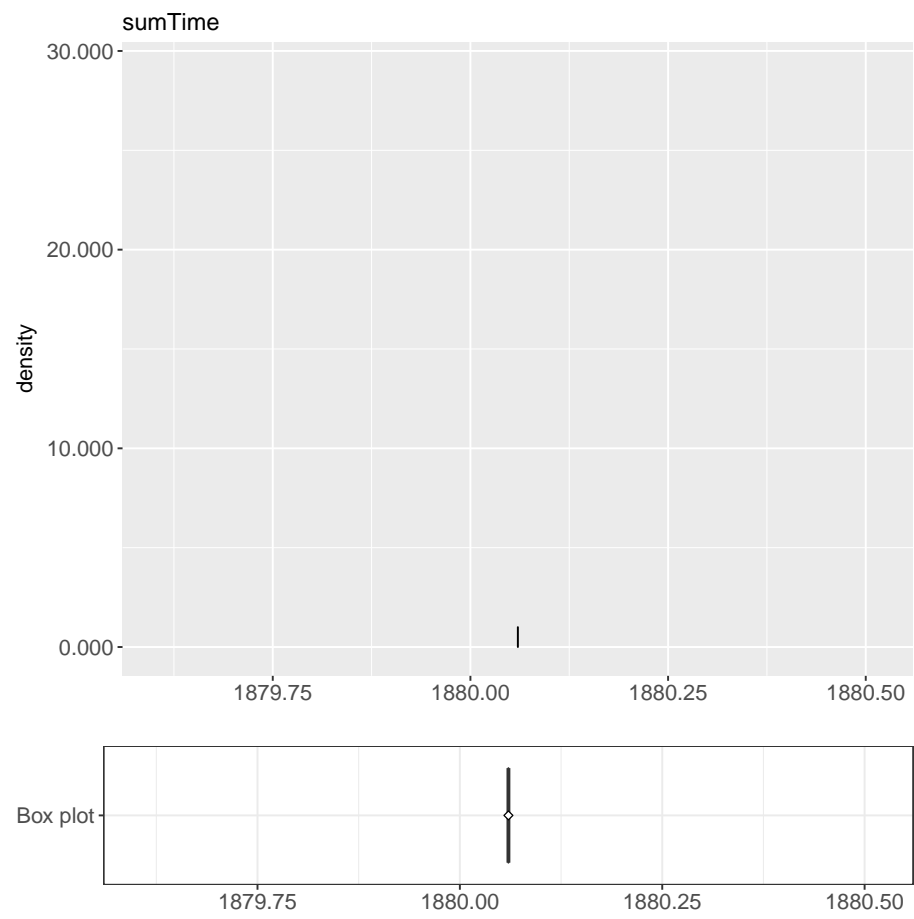
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



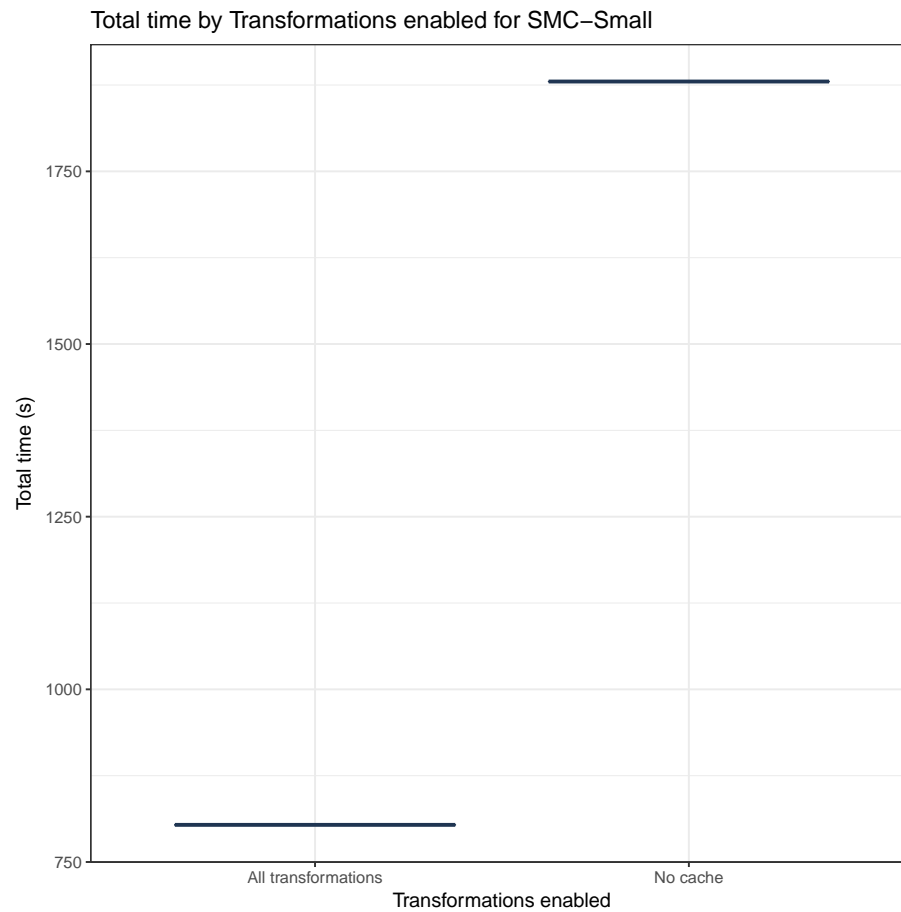
Total time for No cache

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1880   1880   1880   1880   1880   1880

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not found
```

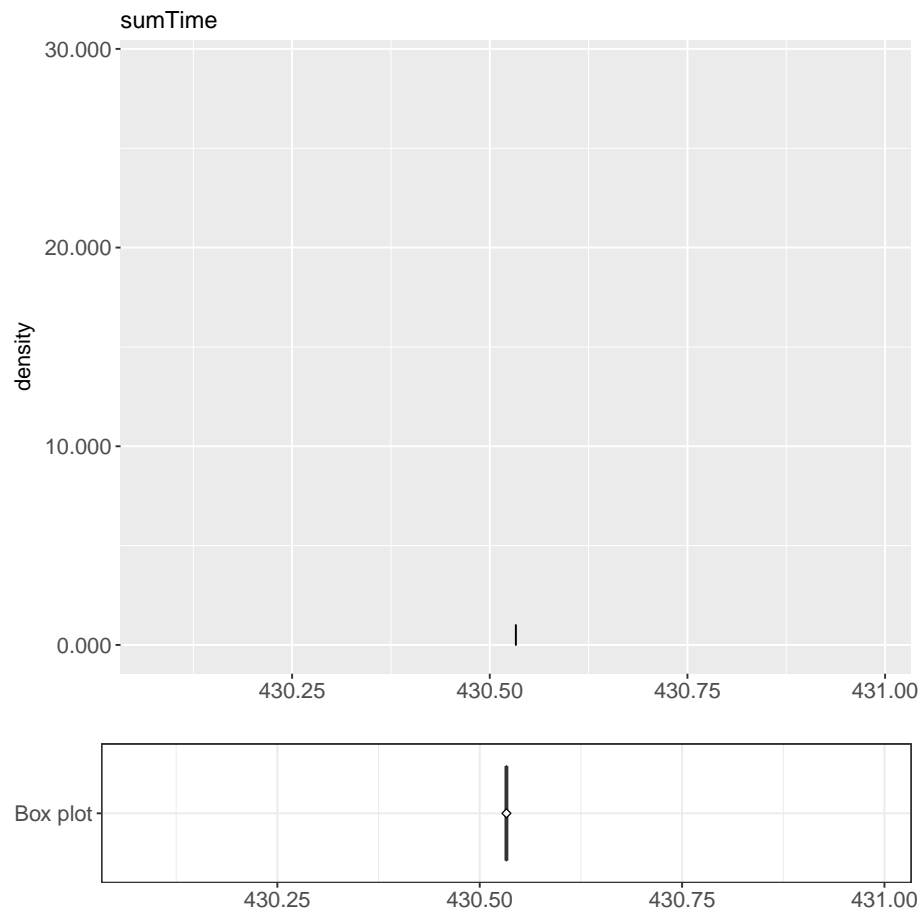
```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Total time for All transformations: 803.753"
## [1] "Mean Total time for No cache: 1880.06"
## [1] "Absolute difference: 1076.307"
## Total time for No cache is 133.910168920054 % greater than
## Total time for All transformations
```

3.3.2 RH3.2: Object SMC-Big

Total time for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    430.5   430.5   430.5   430.5   430.5   430.5

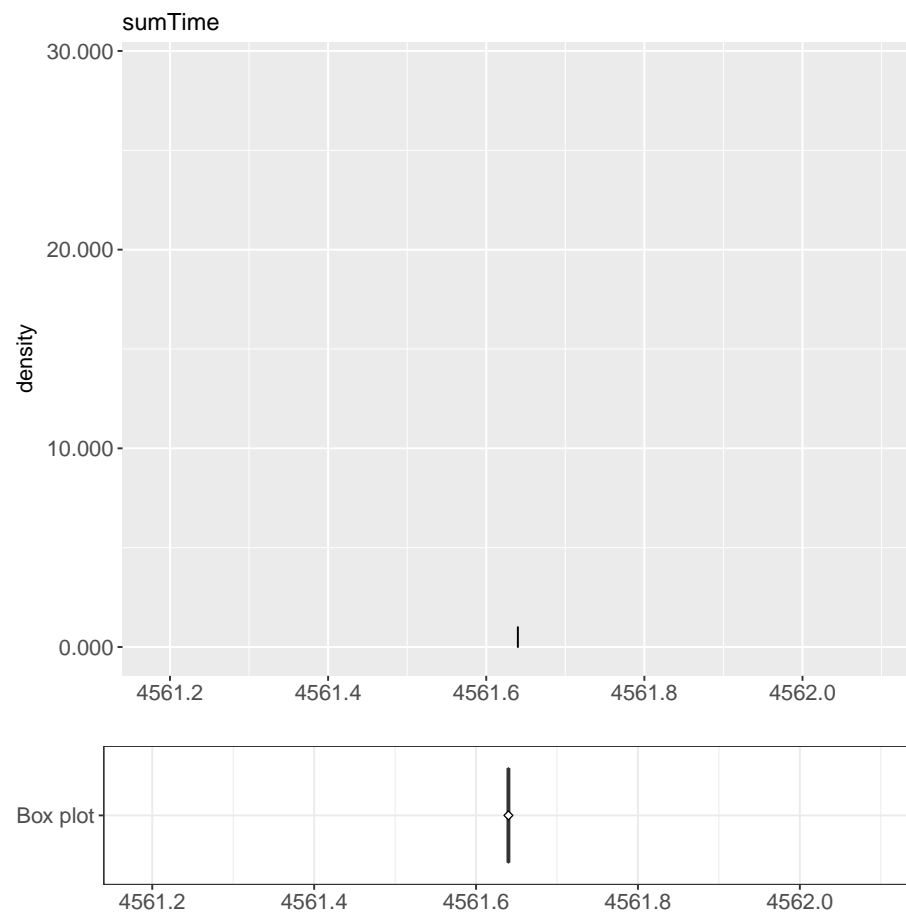
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



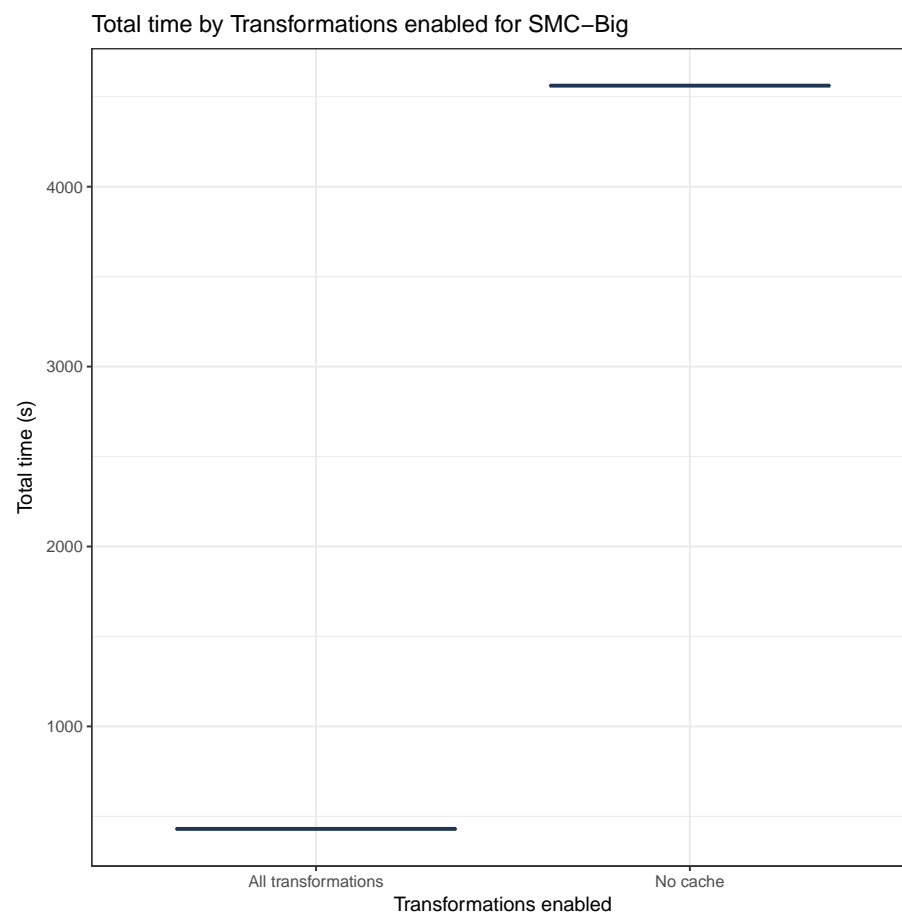
Total time for No cache

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    4562   4562   4562   4562   4562   4562

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not found
```

```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Total time for All transformations: 430.533"
## [1] "Mean Total time for No cache: 4561.64"
## [1] "Absolute difference: 4131.107"
## Total time for No cache is 959.533183286763 % greater than
## Total time for All transformations
```

3.3.3 RH3 Results: Total time All transformations = No cache

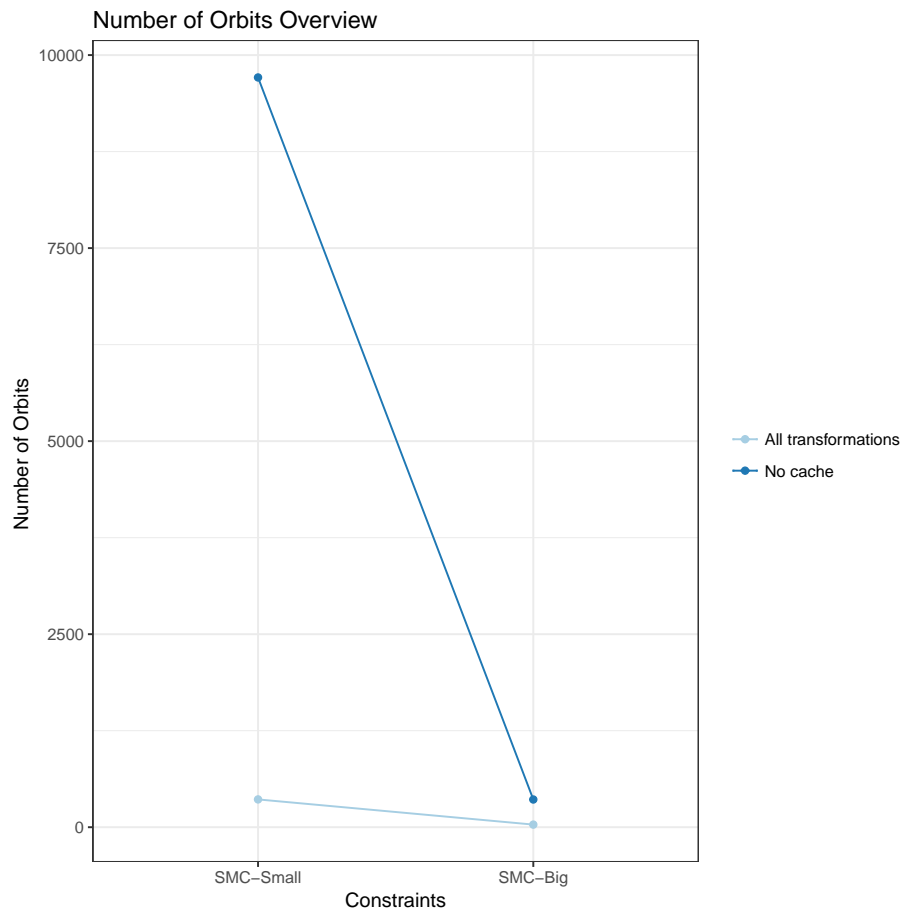
Table 5: RH3 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 6: RH3 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

3.4 RH4: Number of Orbits for Cashew is equals than the Number of Orbits for No Cache

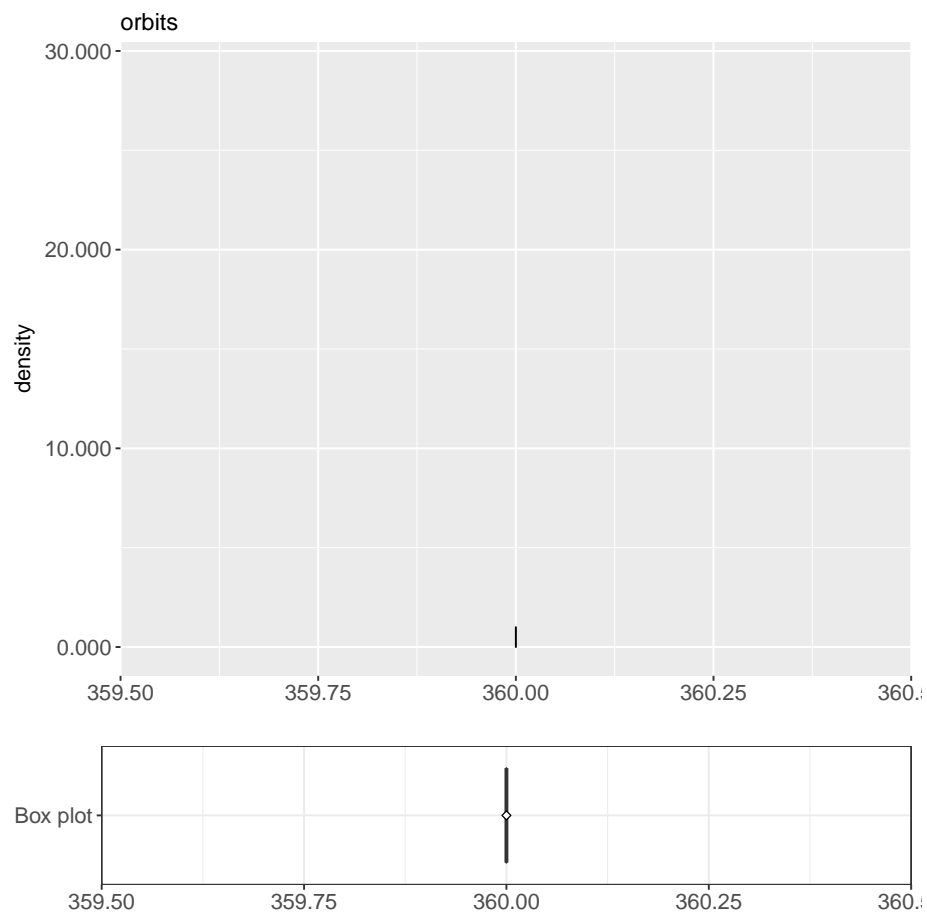


3.4.1 RH4.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

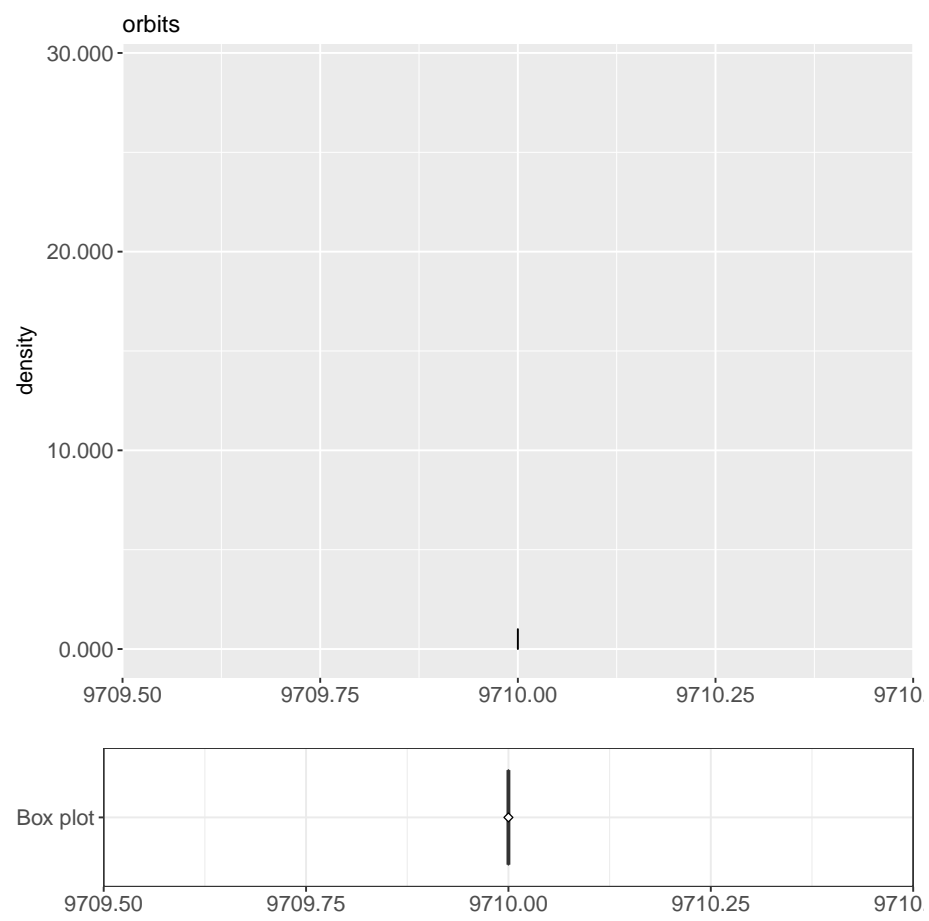
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



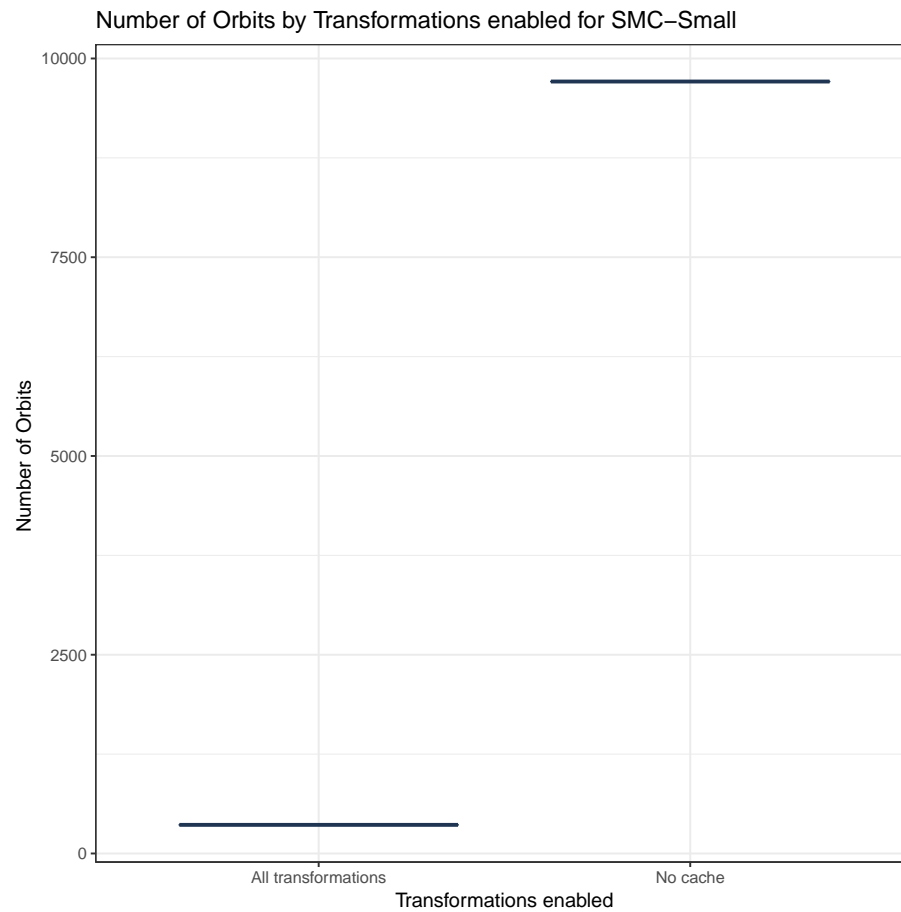
Number of Orbits for No cache

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      9710    9710    9710    9710    9710    9710

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not found
```

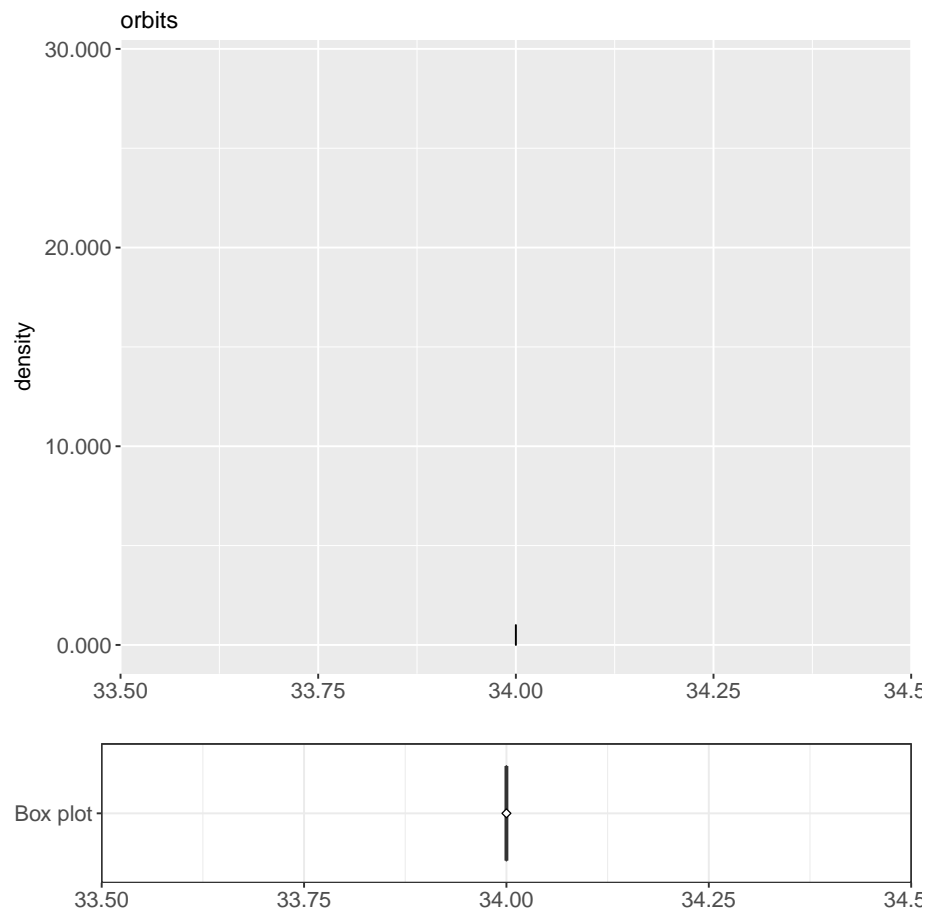
```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for No cache: 9710"
## [1] "Absolute difference: 9350"
## Number of Orbits for No cache is 2597.2222222222 % greater than
## Number of Orbits for All transformations
```

3.4.2 RH4.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

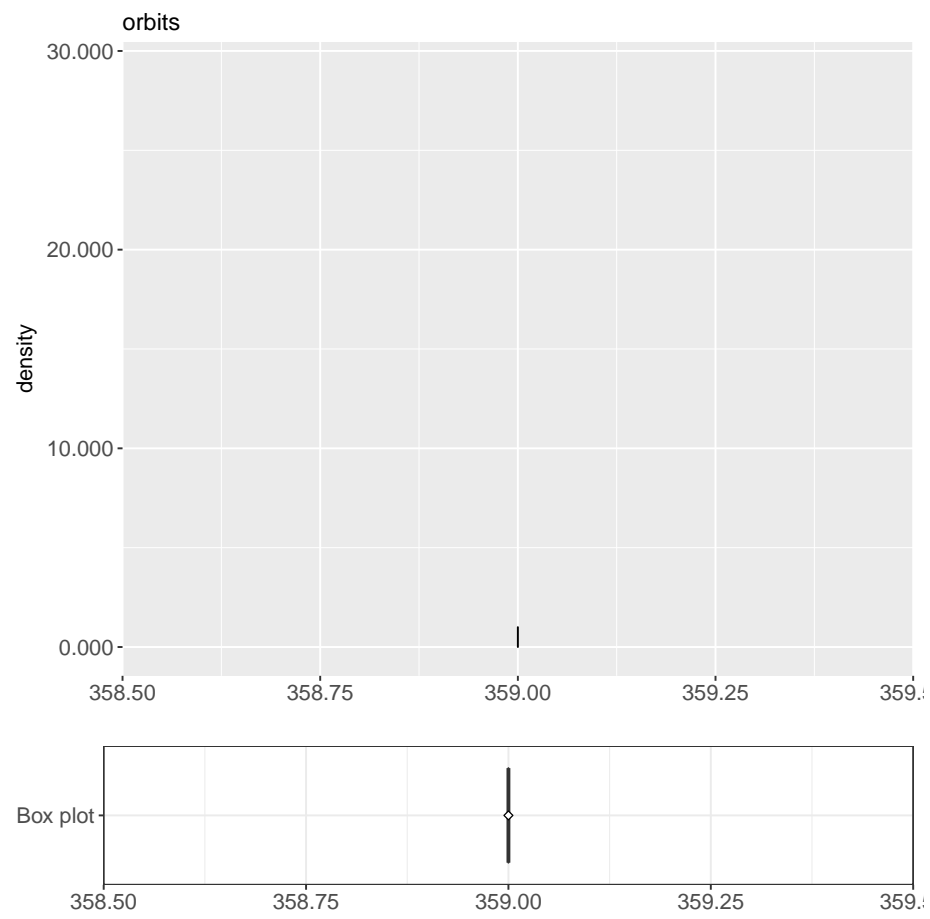
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



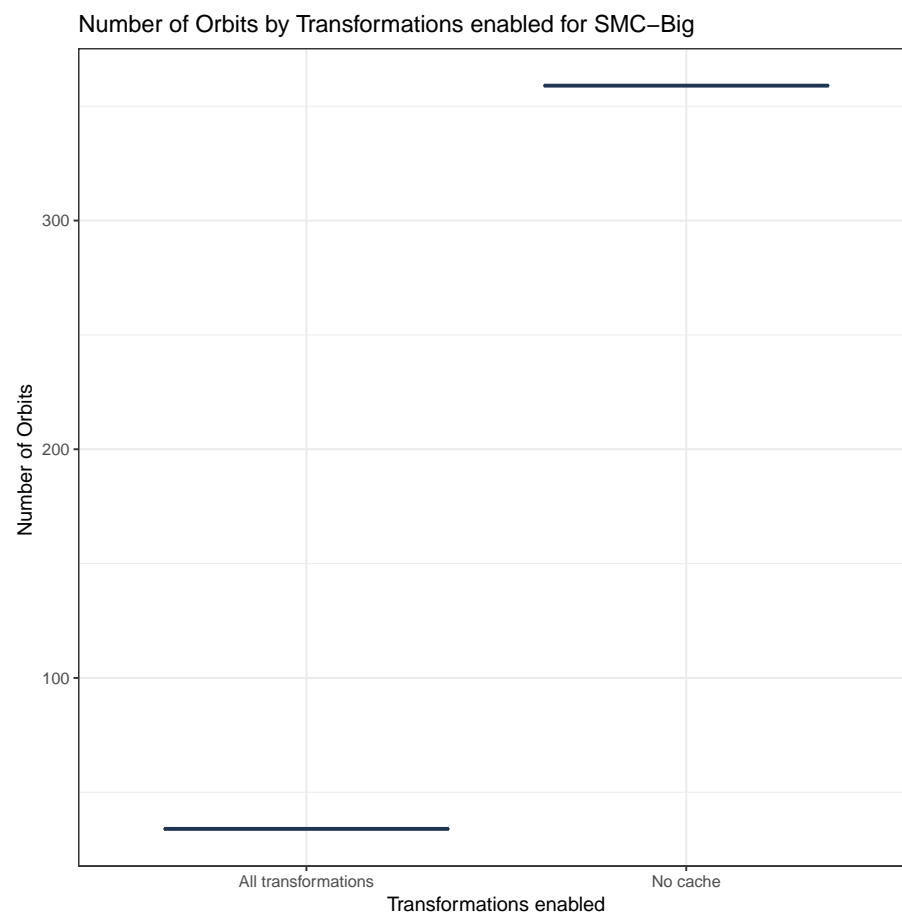
Number of Orbits for No cache

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       359      359      359      359      359      359

## Error in shapiro.test(subset(json_data, treatment == "noCache" &
## object == : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not
found

## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for No cache: 359"
## [1] "Absolute difference: 325"
## Number of Orbits for No cache is 955.882352941176 % greater than
## Number of Orbits for All transformations
```

3.4.3 RH4 Results: Number of Orbits All transformations = No cache

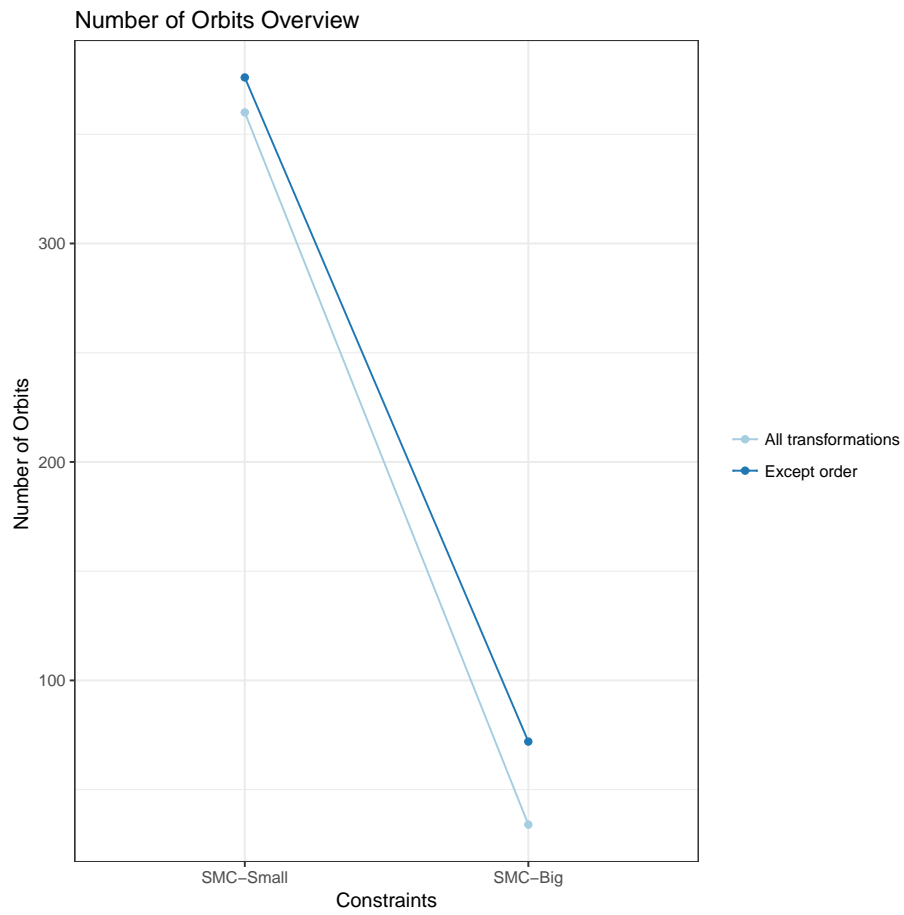
Table 7: RH4 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 8: RH4 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

3.5 RH5: Number of Orbits for Cashew is equals than the Number of Orbits for Cashew Except Order

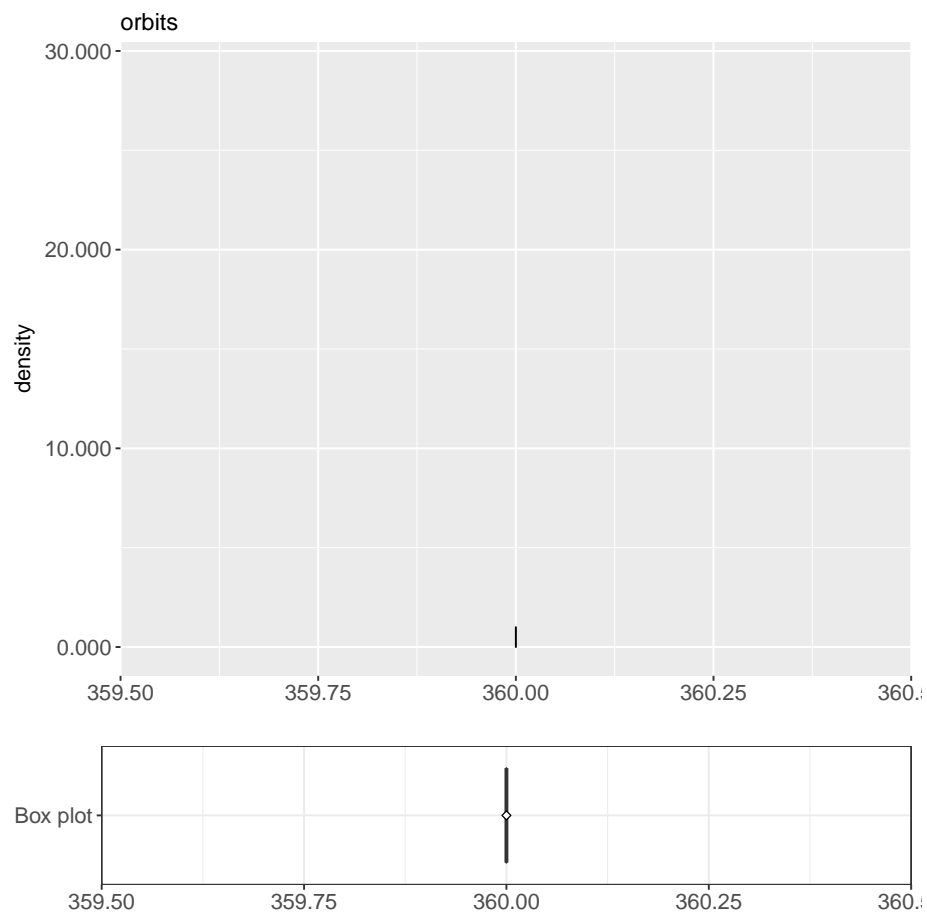


3.5.1 RH5.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

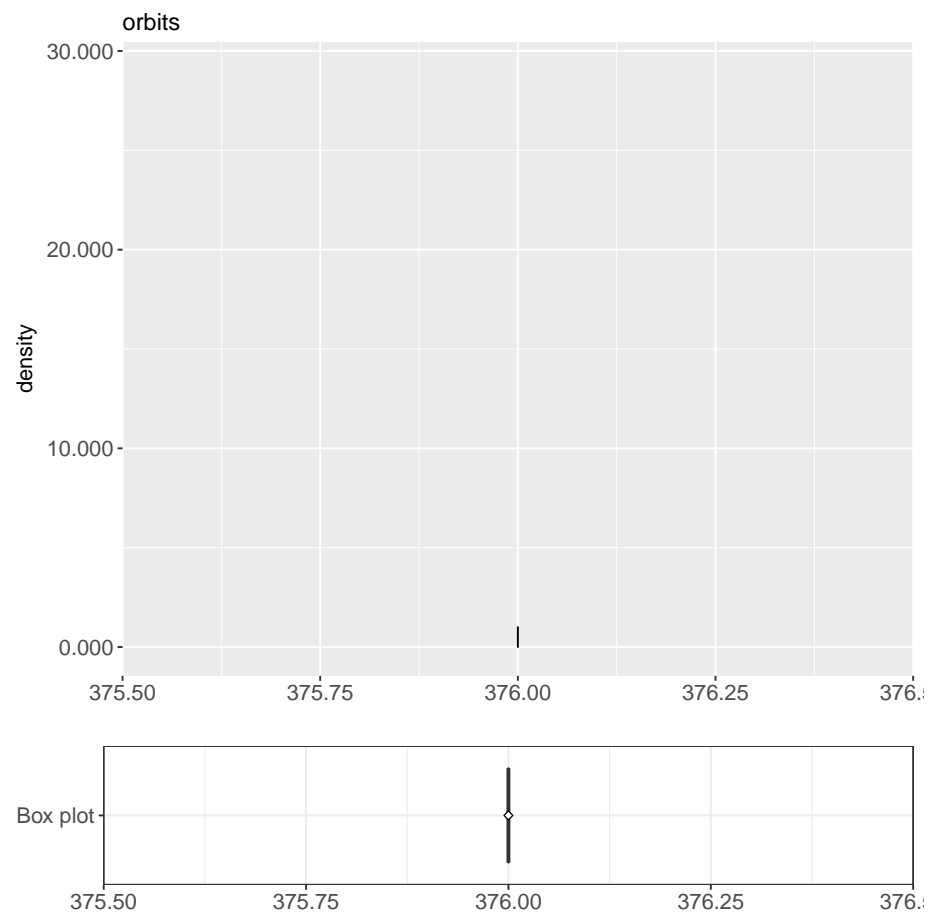
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



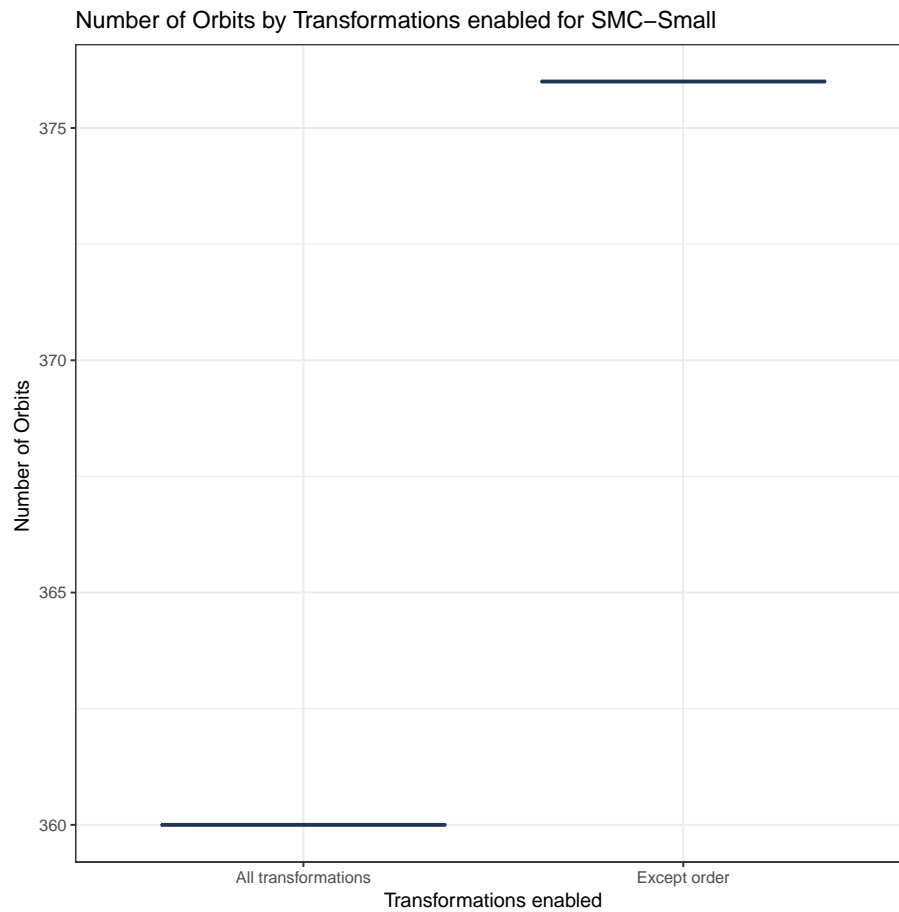
Number of Orbits for Except order

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   376     376     376     376     376     376

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptOrder"
& : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

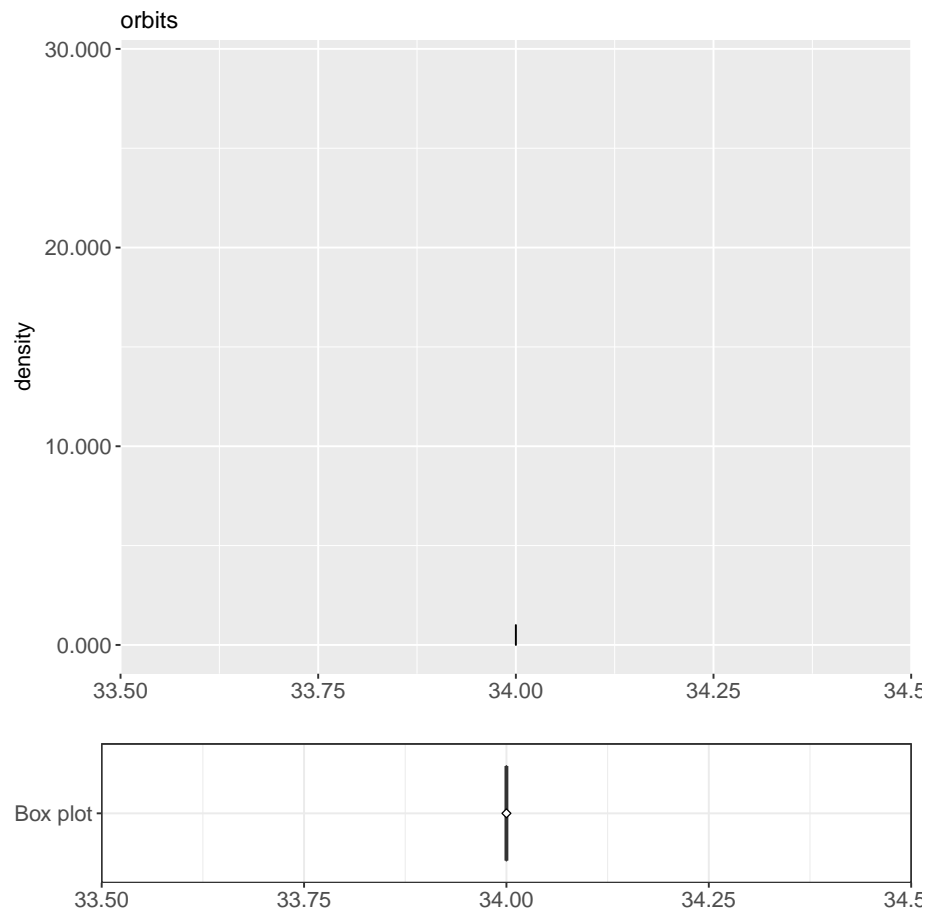
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for Except order: 376"
## [1] "Absolute difference: 16"
## Number of Orbits for Except order is 4.4444444444444 % greater than
## Number of Orbits for All transformations
```

3.5.2 RH5.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

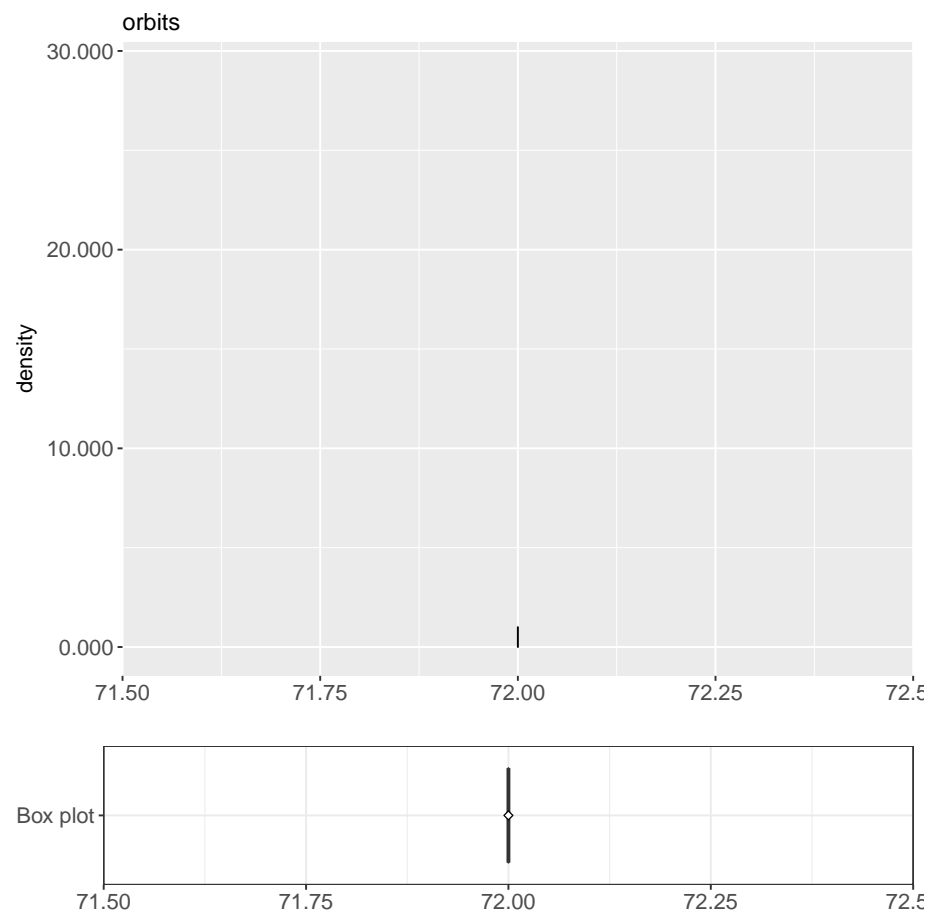
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



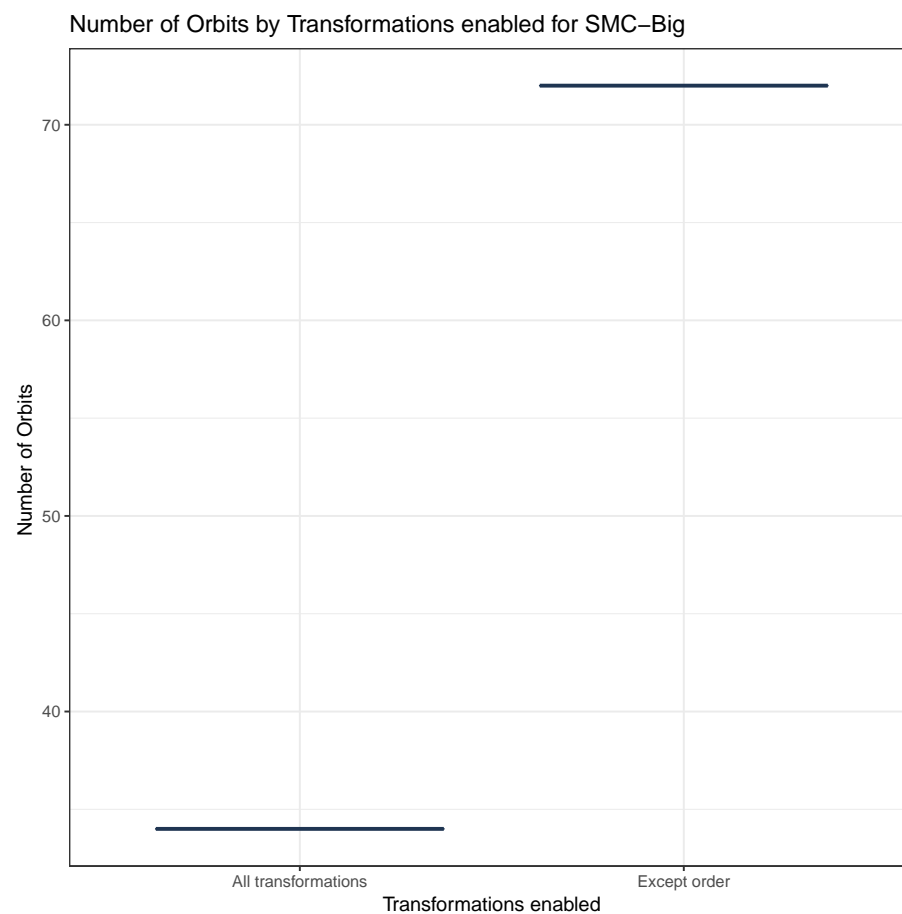
Number of Orbits for Except order

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       72      72      72      72      72      72

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptOrder"
## & : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not
found

## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for Except order: 72"
## [1] "Absolute difference: 38"
## Number of Orbits for Except order is 111.764705882353 % greater than
## Number of Orbits for All transformations
```

3.5.3 RH5 Results: Number of Orbits All transformations = Except order

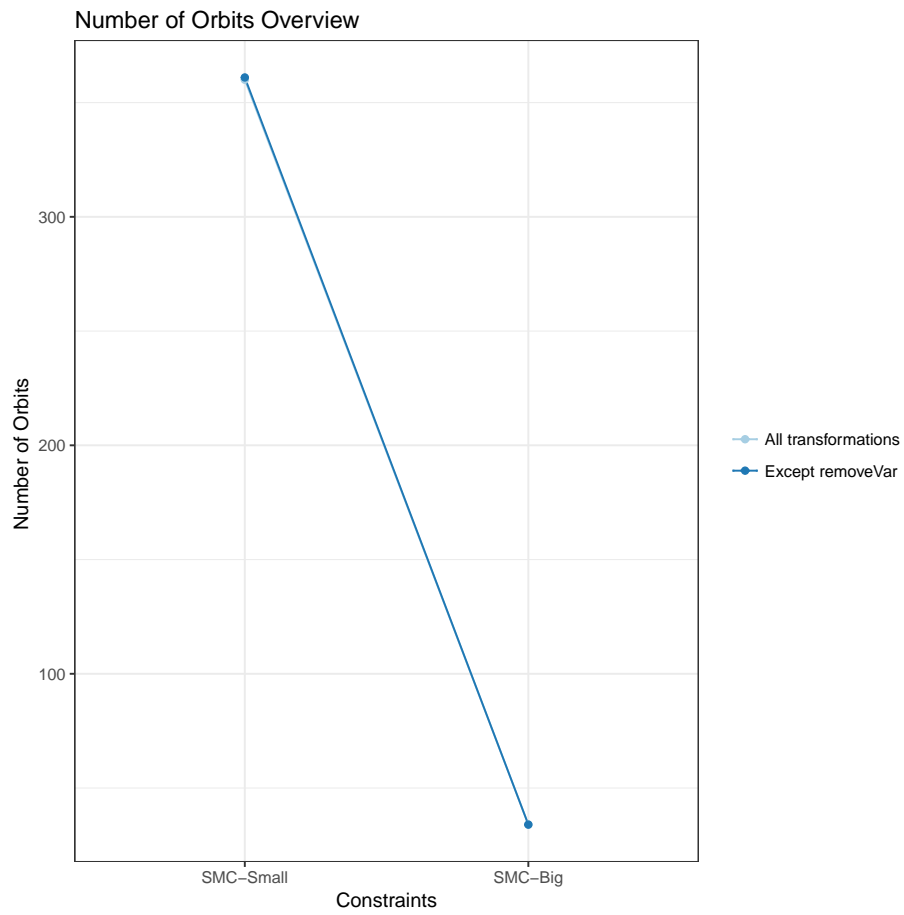
Table 9: RH5 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 10: RH5 Results Summary

All transformations < Except order:	0%
All transformations > Except order:	0%
All transformations:	0%
Except order:	0%
None:	0%
Inconclusive:	100%

3.6 RH6: Number of Orbits for Cashew is equals than the Number of Orbits for Cashew Except Reduce

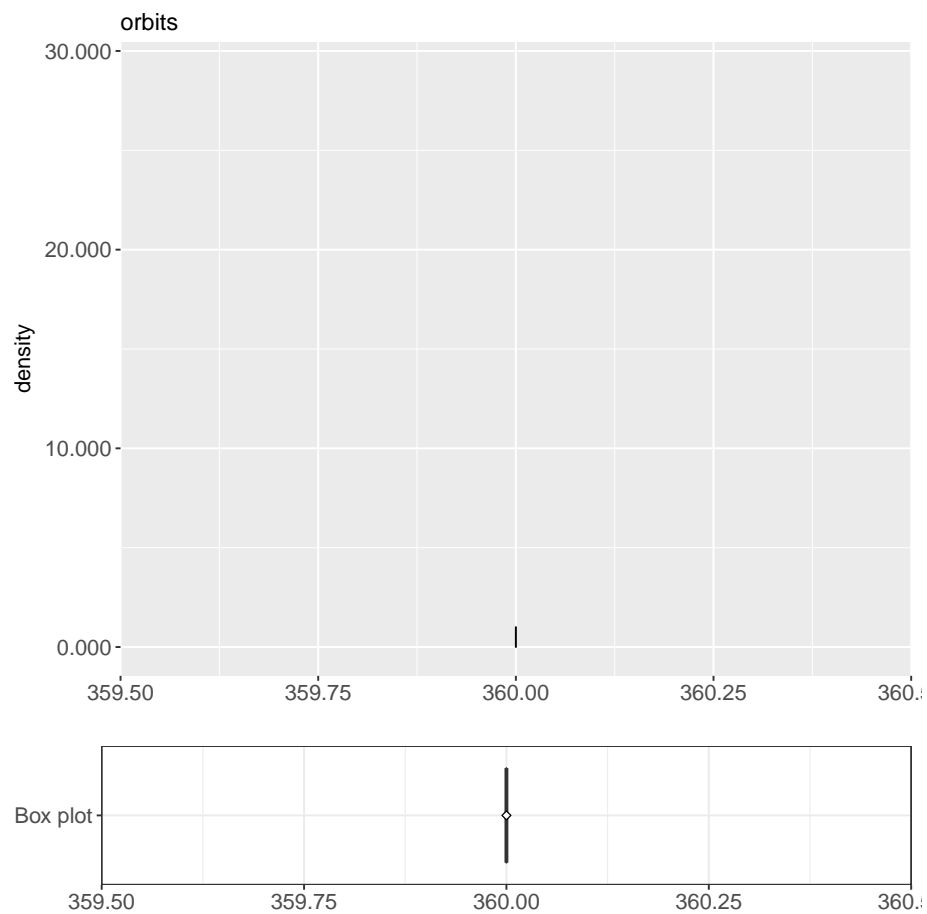


3.6.1 RH6.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

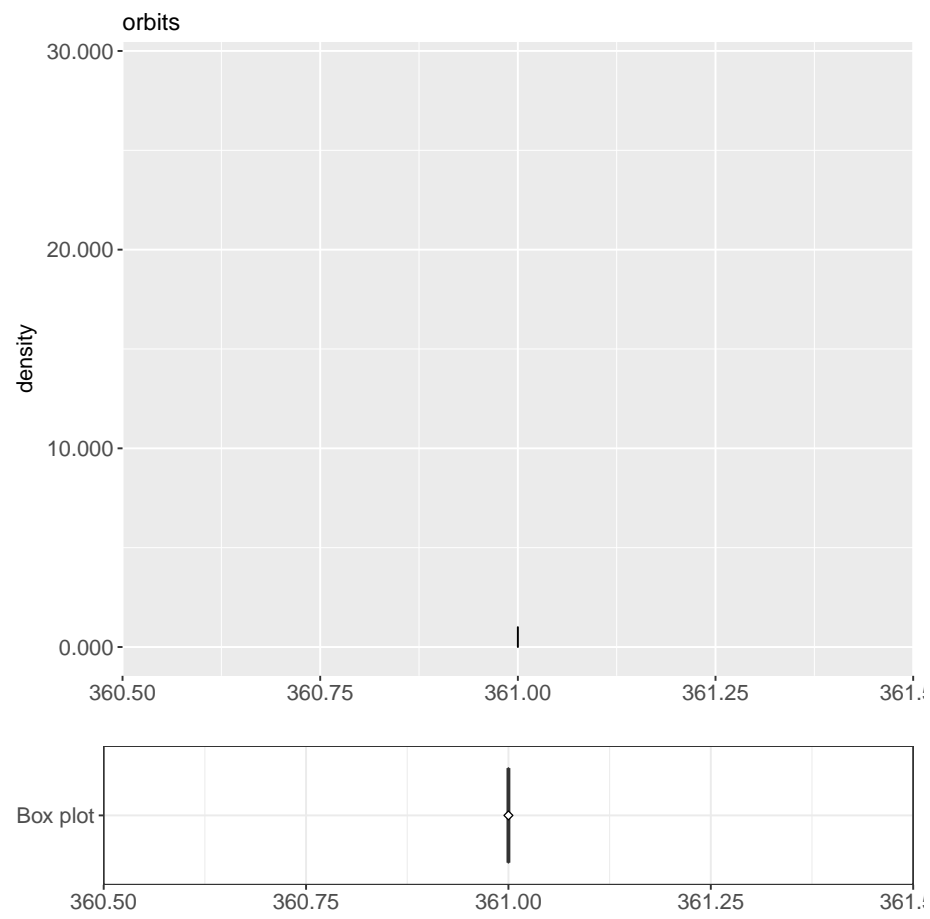
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



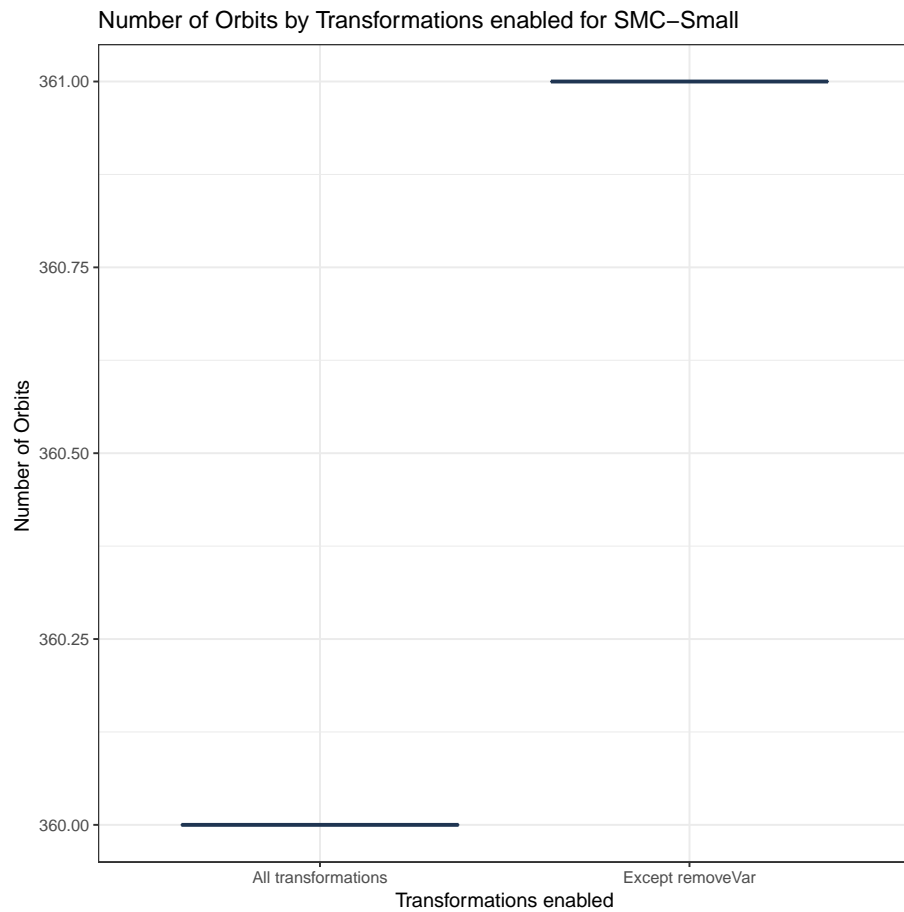
Number of Orbits for Except removeVar

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   361     361     361     361     361     361

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptReduce"
& : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

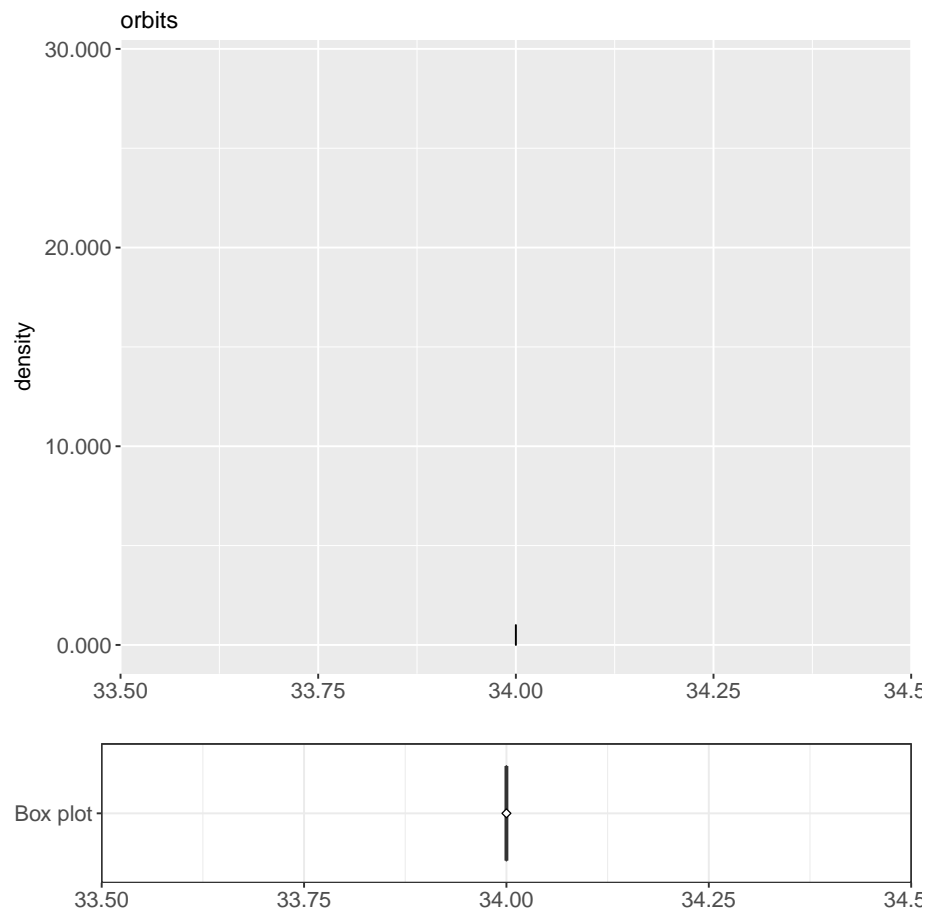
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for Except removeVar: 361"
## [1] "Absolute difference: 1"
## Number of Orbits for Except removeVar is 0.27777777777778 % greater than
## Number of Orbits for All transformations
```

3.6.2 RH6.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

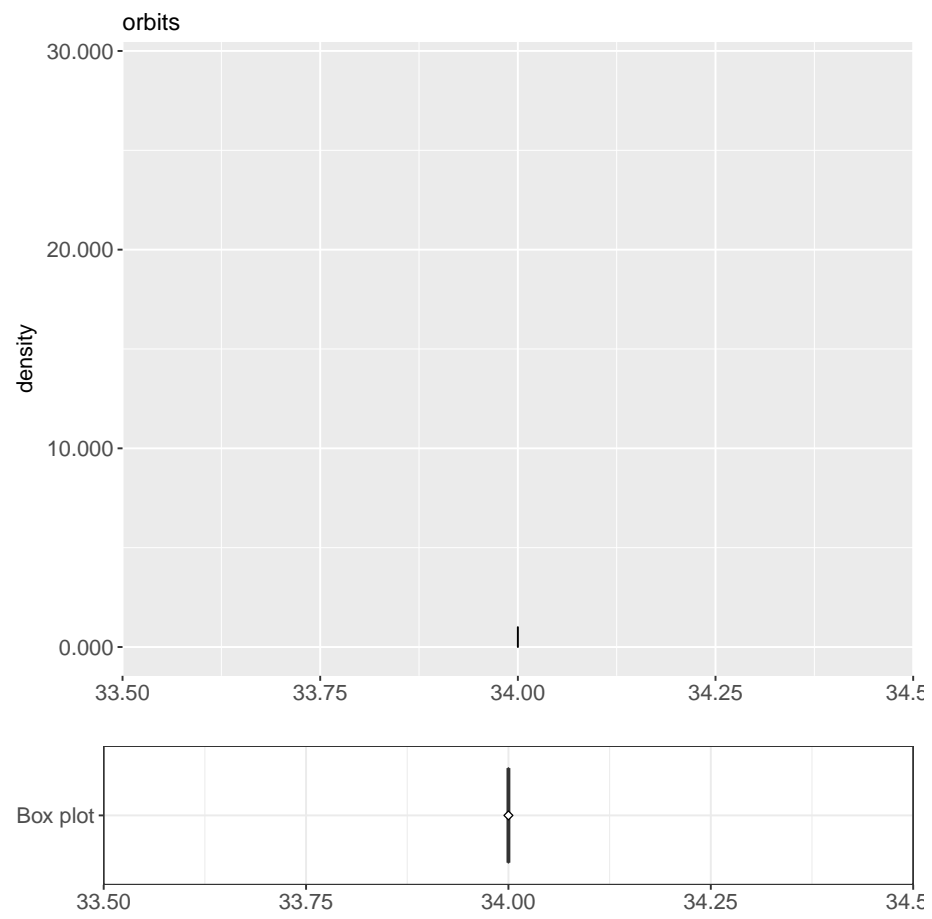
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



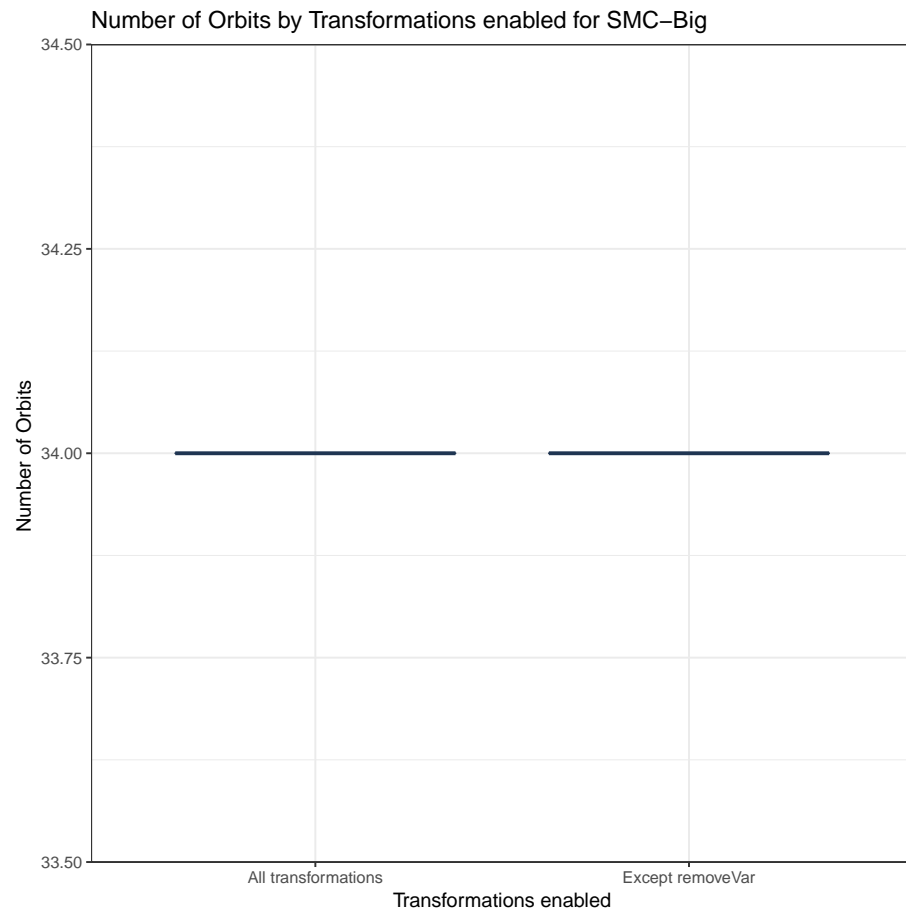
Number of Orbits for Except removeVar

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptReduce"
## & : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not found
```

```
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for Except removeVar: 34"
## [1] "Absolute difference: 0"
## Number of Orbits for Except removeVar is 0 % greater than
## Number of Orbits for All transformations
```

3.6.3 RH6 Results: Number of Orbits All transformations = Except removeVar

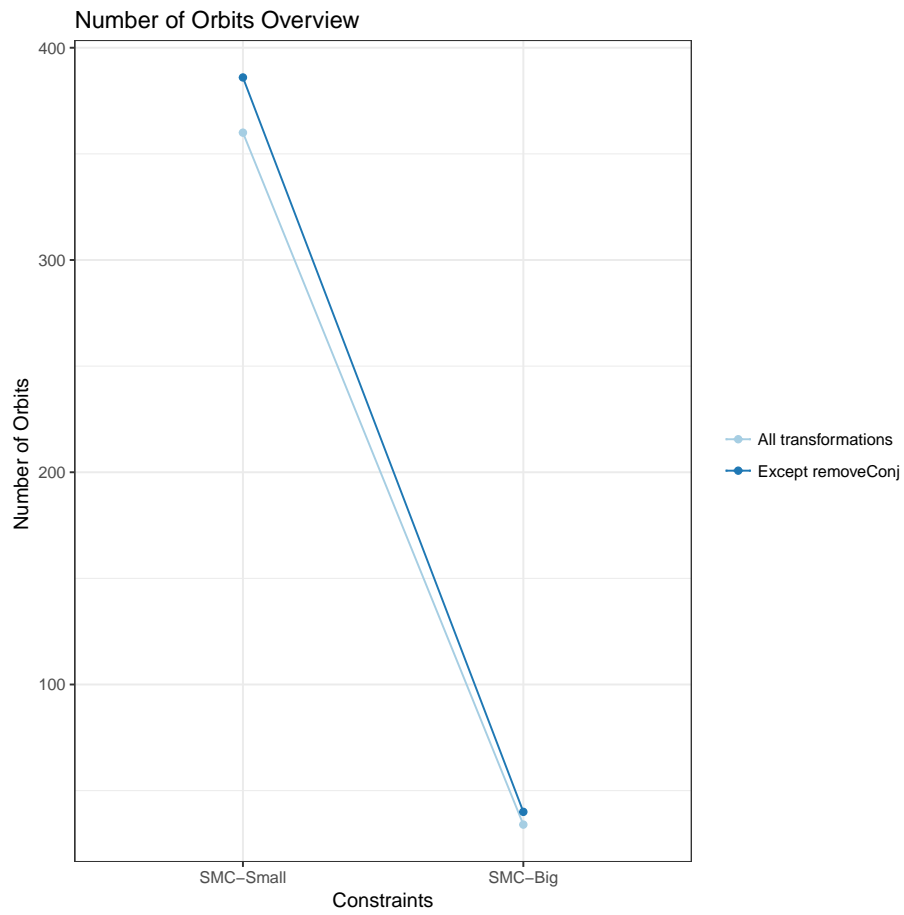
Table 11: RH6 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 12: RH6 Results Summary

All transformations < Except removeVar:	0%
All transformations > Except removeVar:	0%
All transformations:	0%
Except removeVar:	0%
None:	0%
Inconclusive:	100%

3.7 RH7: Number of Orbits for Cashew is equals than the Number of Orbits for Cashew Except Remove

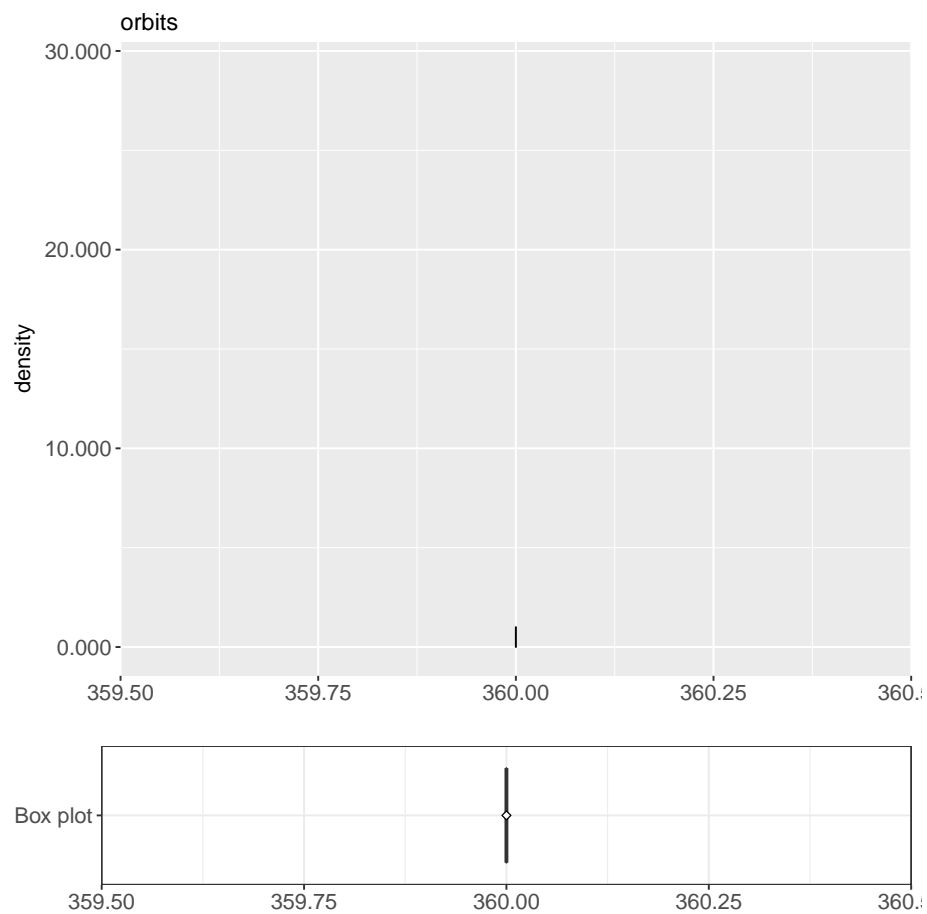


3.7.1 RH7.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

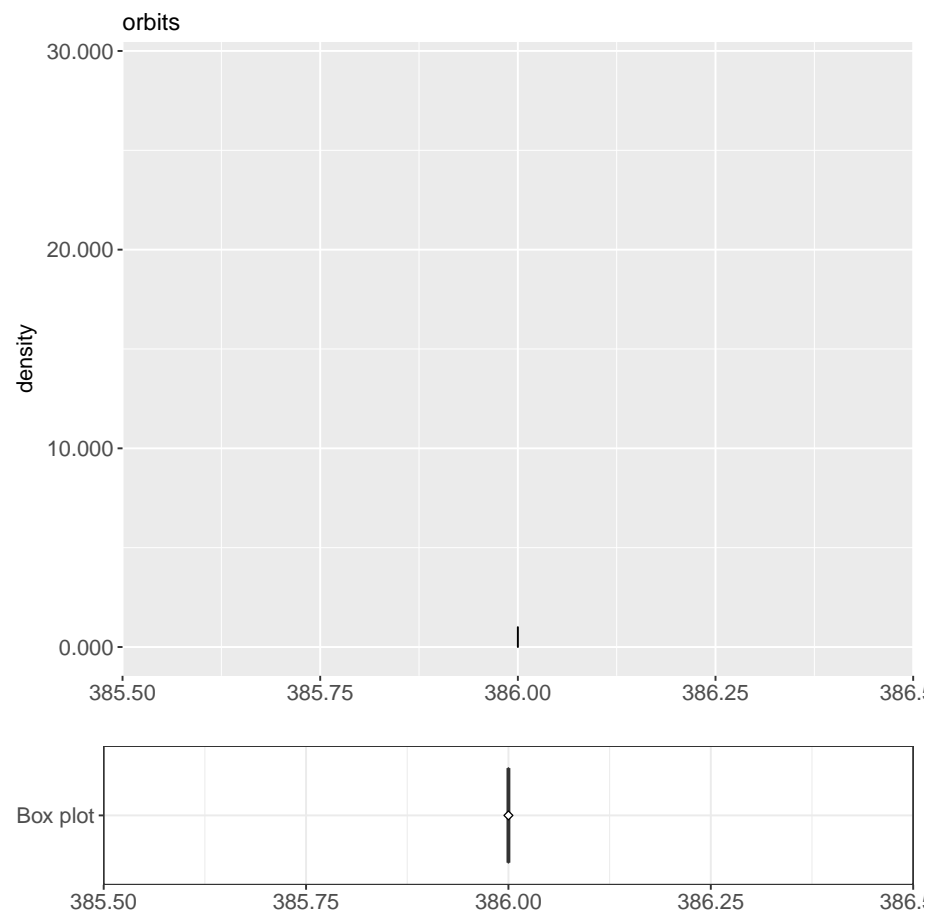
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



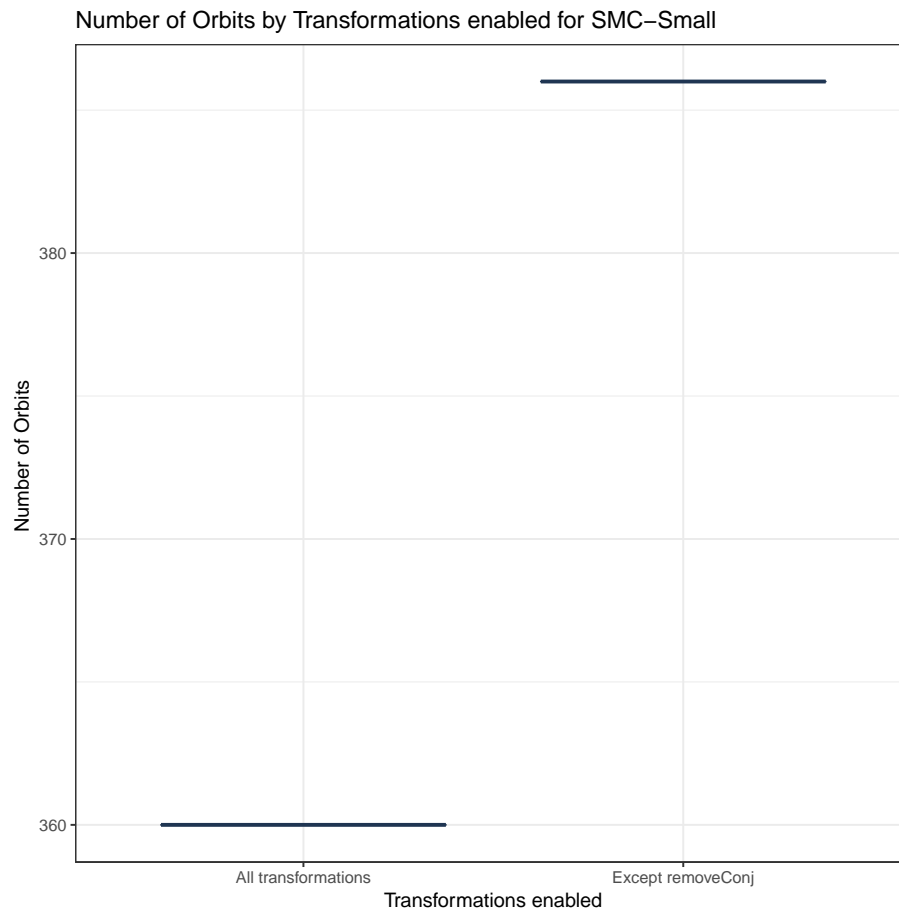
Number of Orbits for Except removeConj

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   386     386     386     386     386     386

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRemove"
& : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

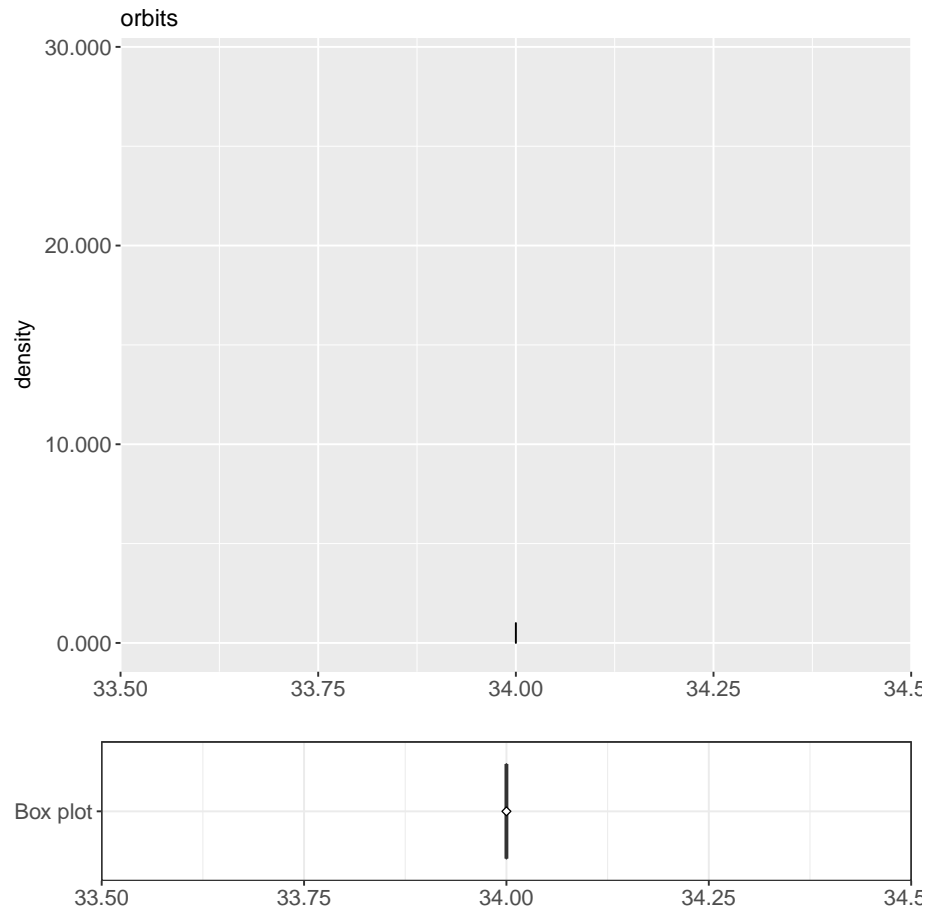
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for Except removeConj: 386"
## [1] "Absolute difference: 26"
## Number of Orbits for Except removeConj is 7.2222222222222 % greater than
## Number of Orbits for All transformations
```

3.7.2 RH7.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

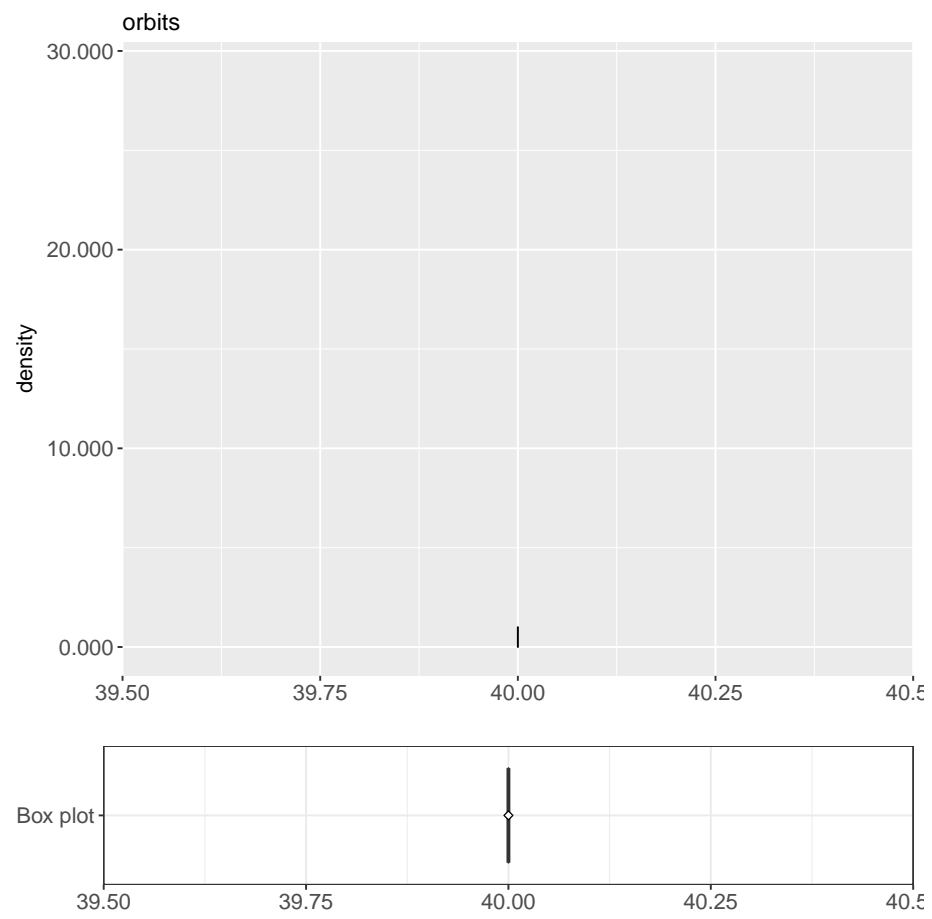
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



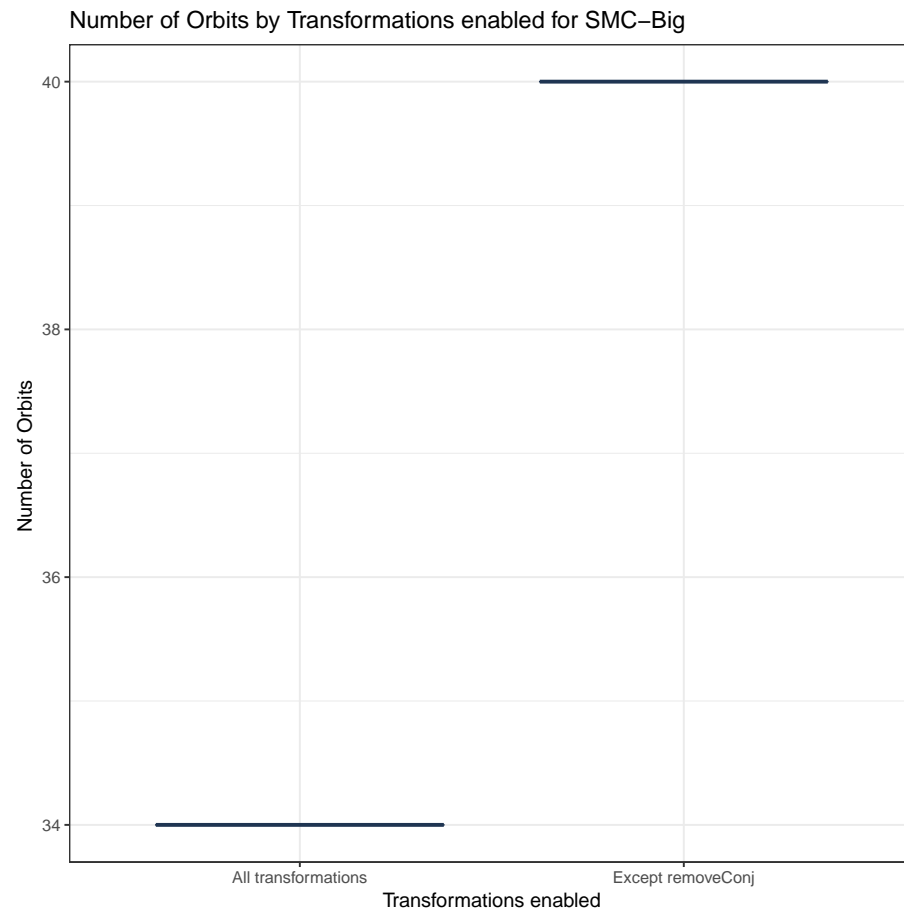
Number of Orbits for Except removeConj

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       40      40      40      40      40      40

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRemove"
## & : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not
found

## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for Except removeConj: 40"
## [1] "Absolute difference: 6"
## Number of Orbits for Except removeConj is 17.6470588235294 % greater than
## Number of Orbits for All transformations
```

3.7.3 RH7 Results: Number of Orbits All transformations = Except removeConj

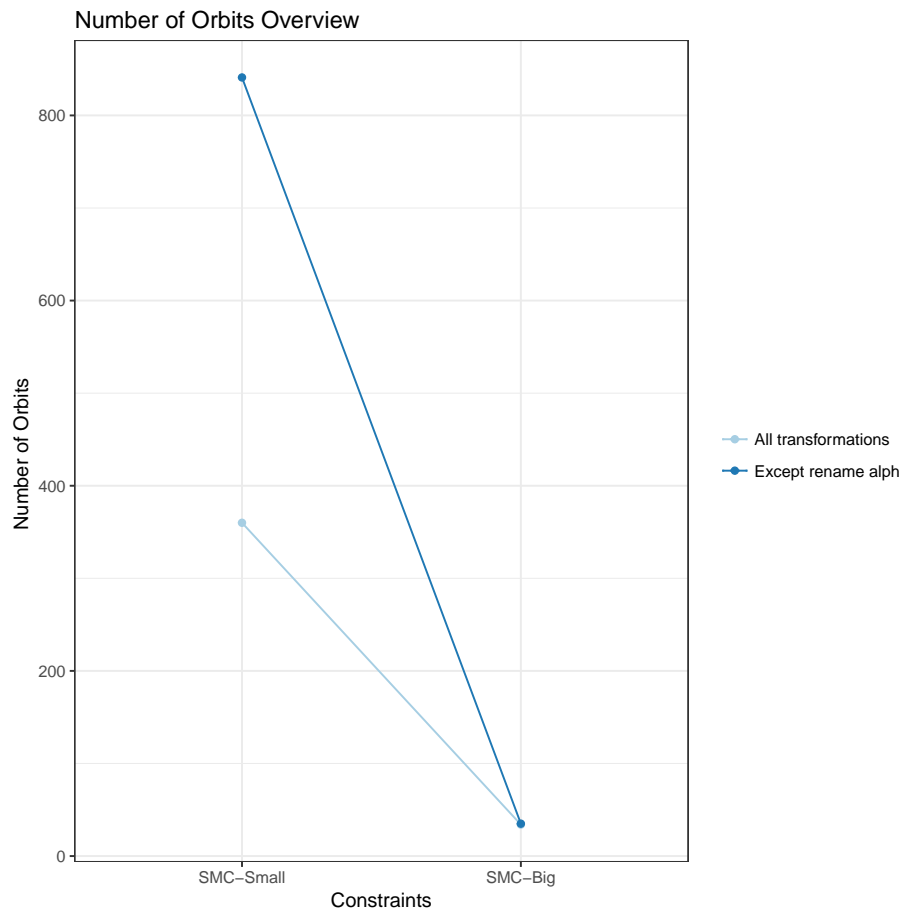
Table 13: RH7 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 14: RH7 Results Summary

All transformations < Except removeConj:	0%
All transformations > Except removeConj:	0%
All transformations:	0%
Except removeConj:	0%
None:	0%
Inconclusive:	100%

3.8 RH8: Number of Orbits for Cashew is equals than the Number of Orbits for Cashew Except Rename Alph

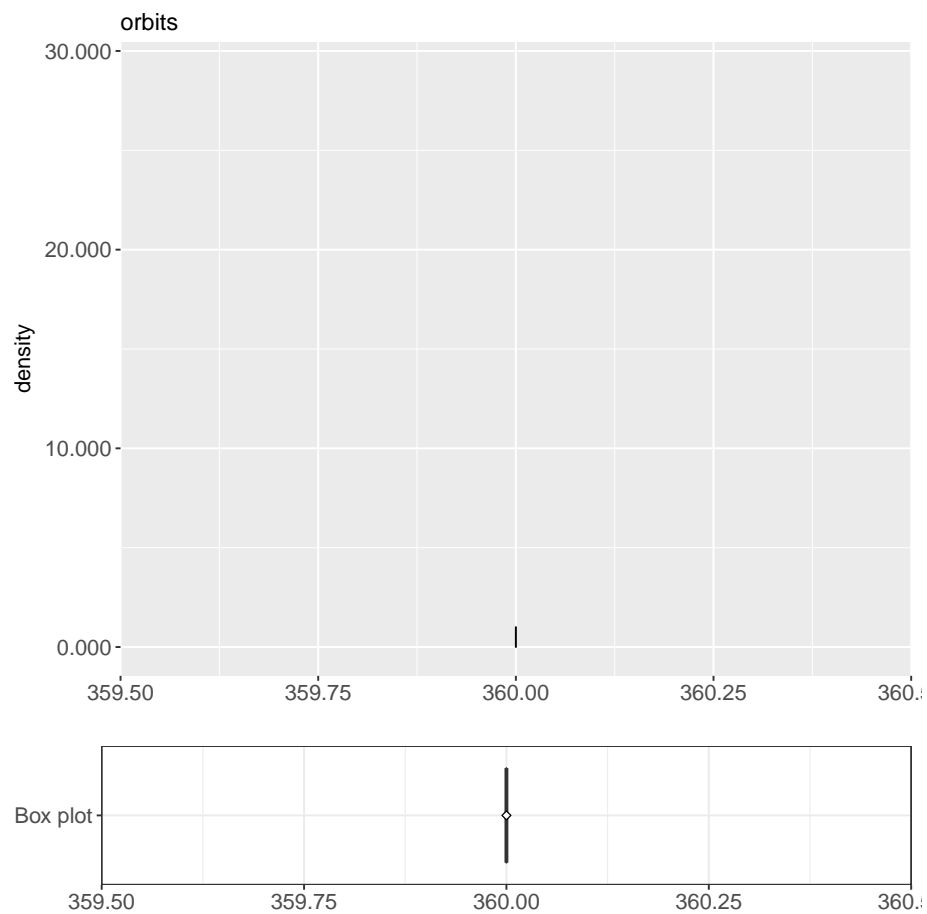


3.8.1 RH8.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

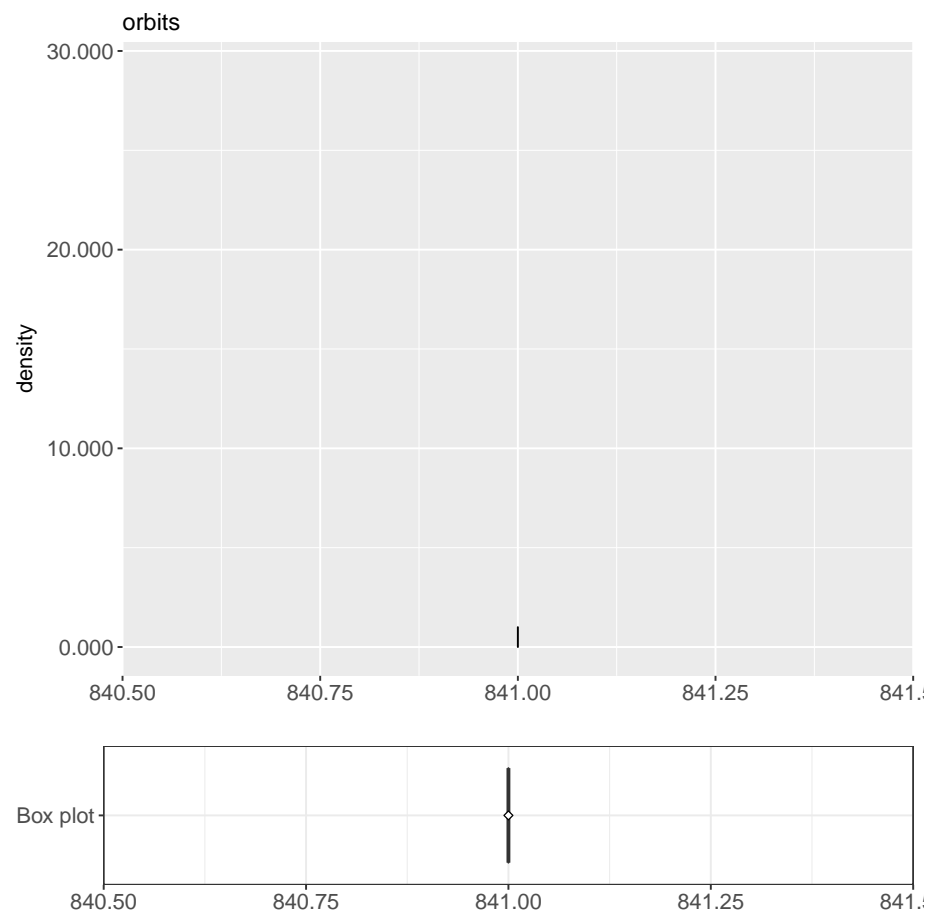
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



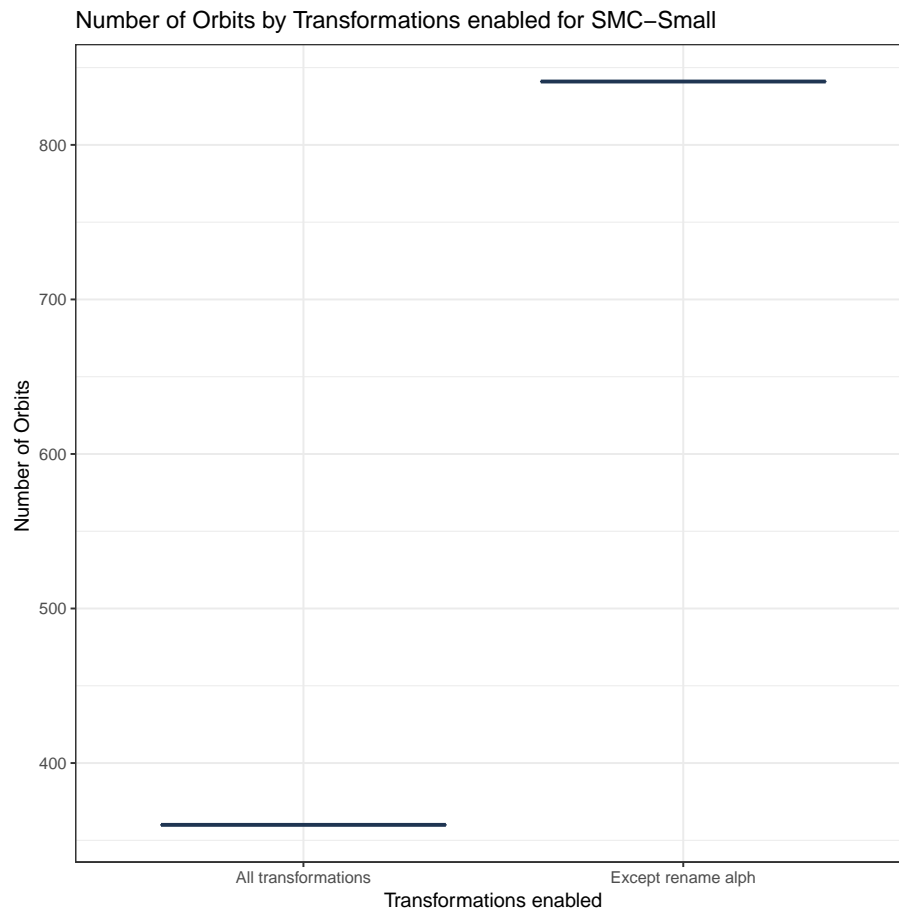
Number of Orbits for Except rename alph

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    841     841     841     841     841     841

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRenameAlph"
& : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

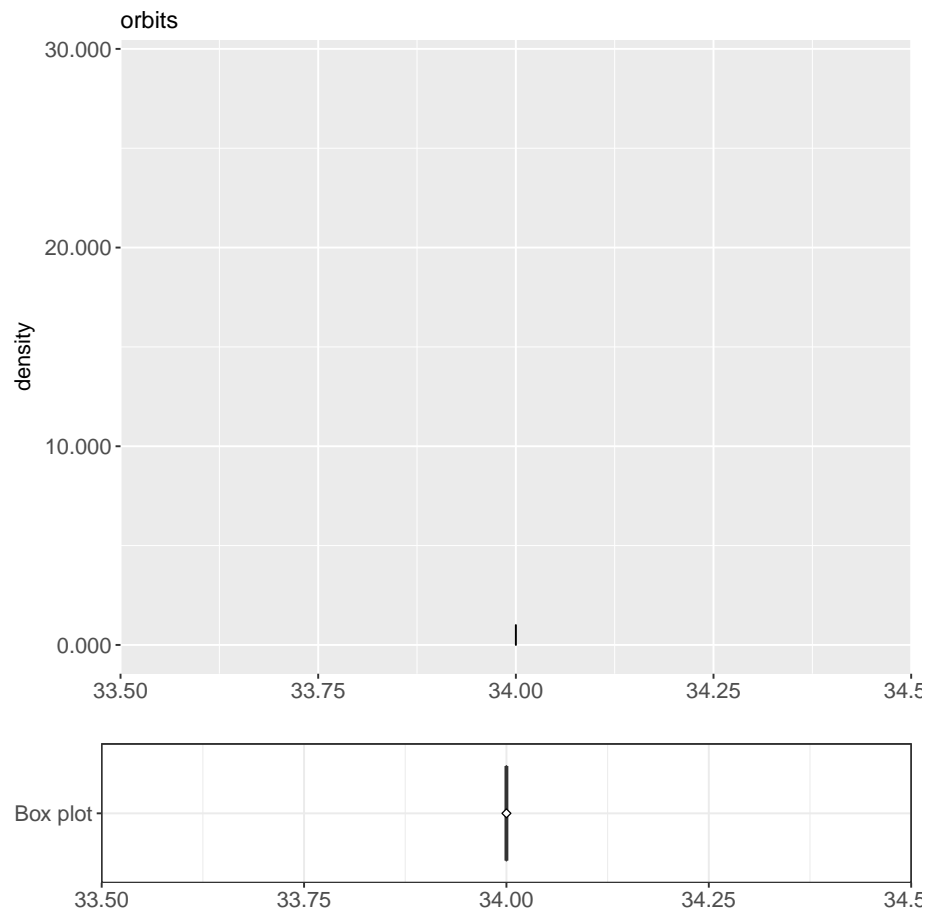
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for Except rename alph: 841"
## [1] "Absolute difference: 481"
## Number of Orbits for Except rename alph is 133.611111111111 % greater than
## Number of Orbits for All transformations
```

3.8.2 RH8.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

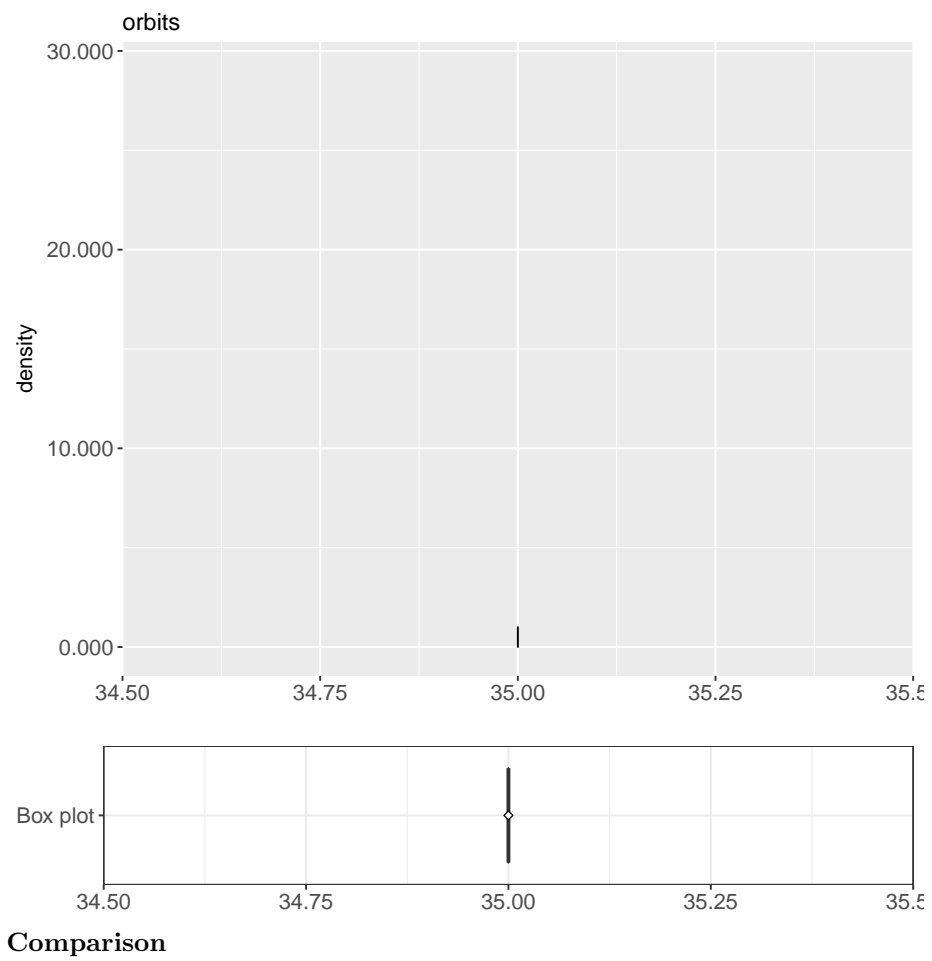
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```

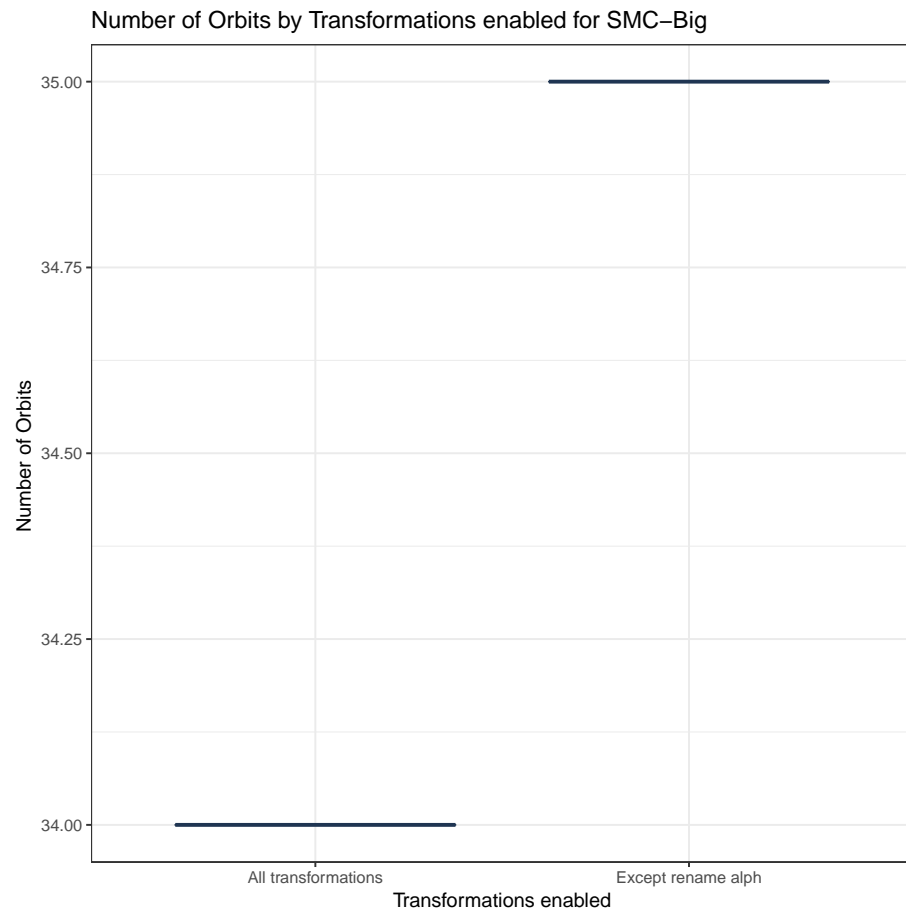


Number of Orbits for Except rename alph

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       35      35      35      35      35      35

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRenameAlph"
## & : sample size must be between 3 and 5000
```





```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not
found

## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for Except rename alph: 35"
## [1] "Absolute difference: 1"
## Number of Orbits for Except rename alph is 2.94117647058824 % greater than
## Number of Orbits for All transformations
```

3.8.3 RH8 Results: Number of Orbits All transformations = Except rename alph

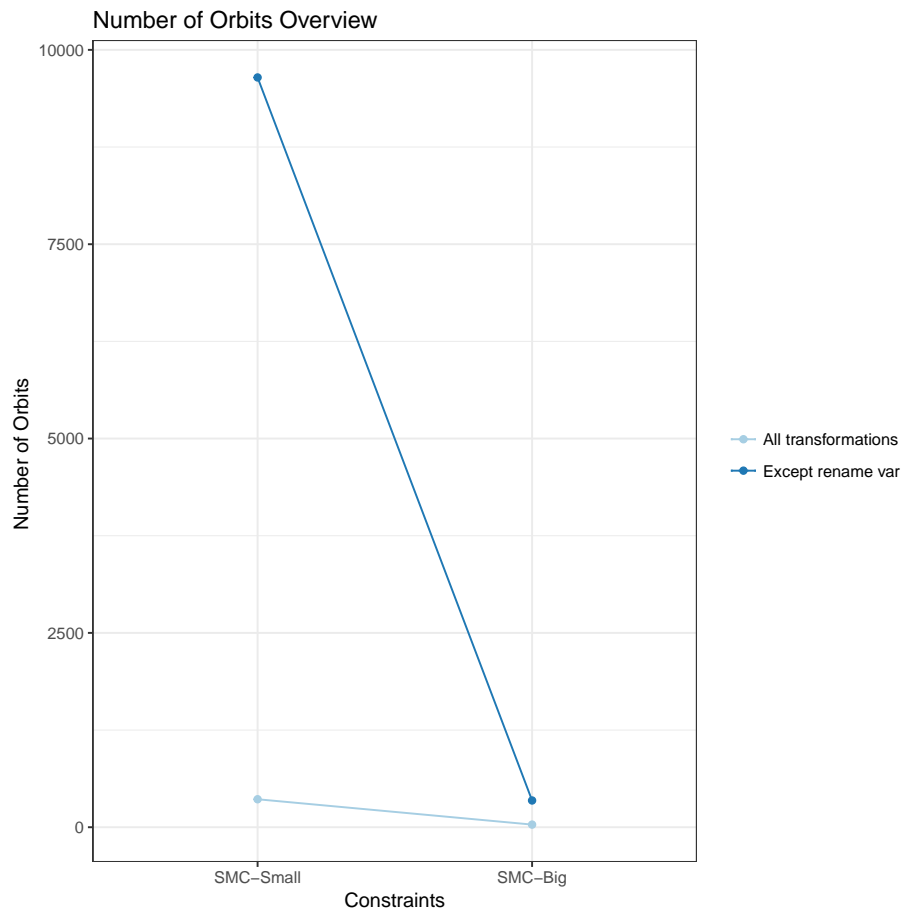
Table 15: RH8 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 16: RH8 Results Summary

All transformations < Except rename alph:	0%
All transformations > Except rename alph:	0%
All transformations:	0%
Except rename alph:	0%
None:	0%
Inconclusive:	100%

3.9 RH9: Number of Orbits for Cashew is equals than the Number of Orbits for Cashew Except Rename Var

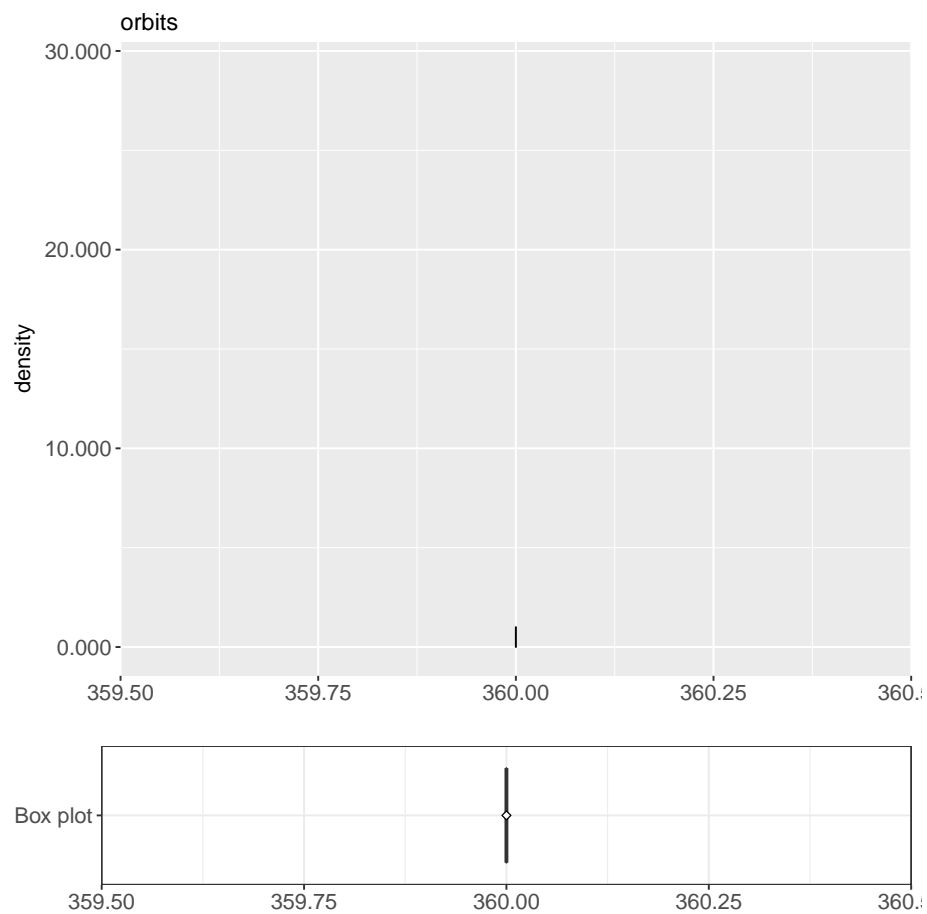


3.9.1 RH9.1: Object SMC-Small

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   360     360     360     360     360     360

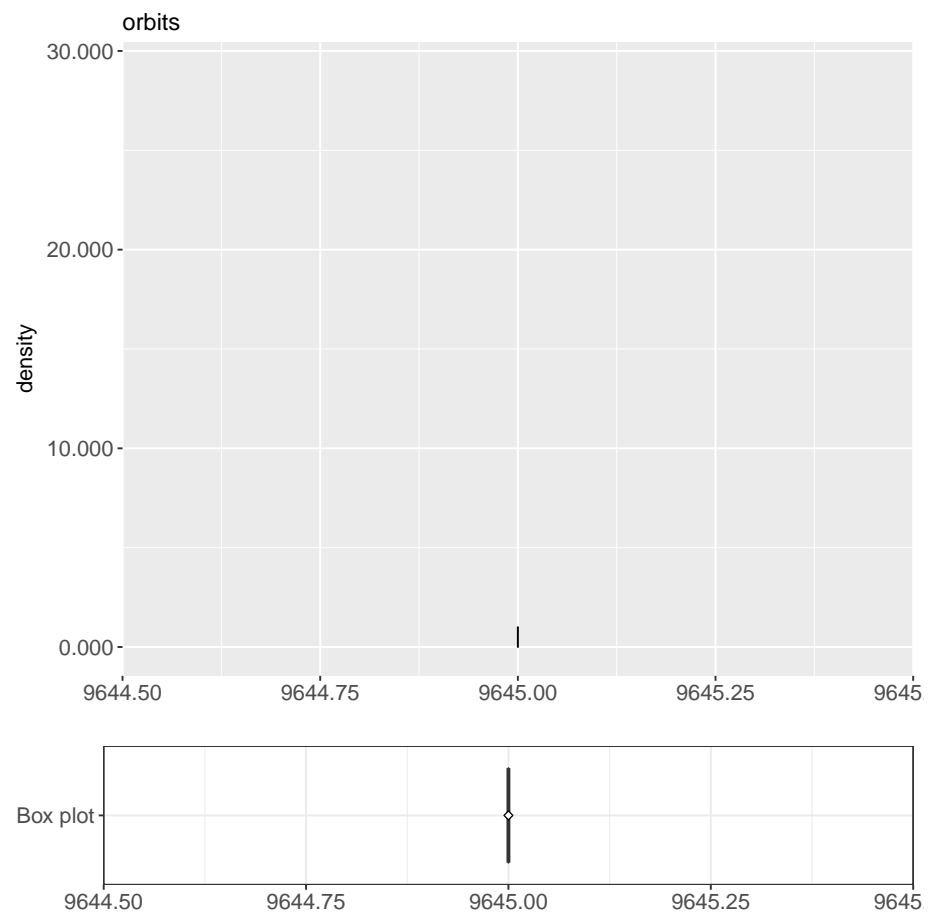
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



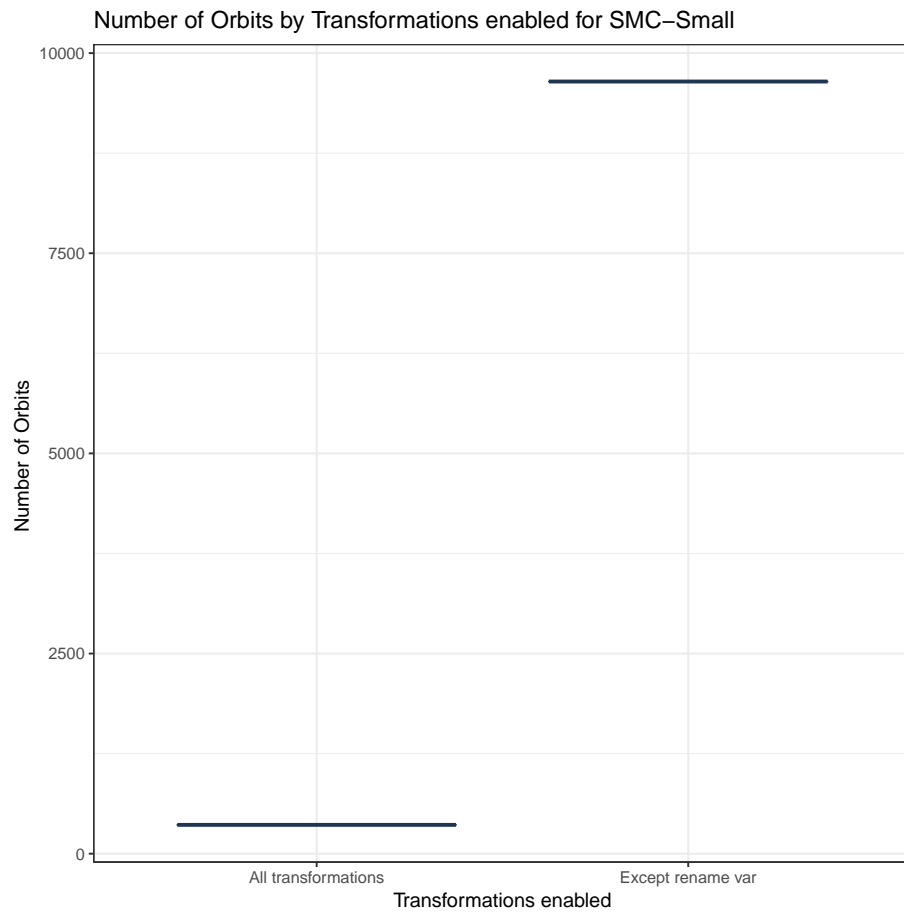
Number of Orbits for Except rename var

```
## [1] "Sample size: 1"
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   9645    9645    9645    9645    9645    9645

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRenameVar"
& : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_small' not
found

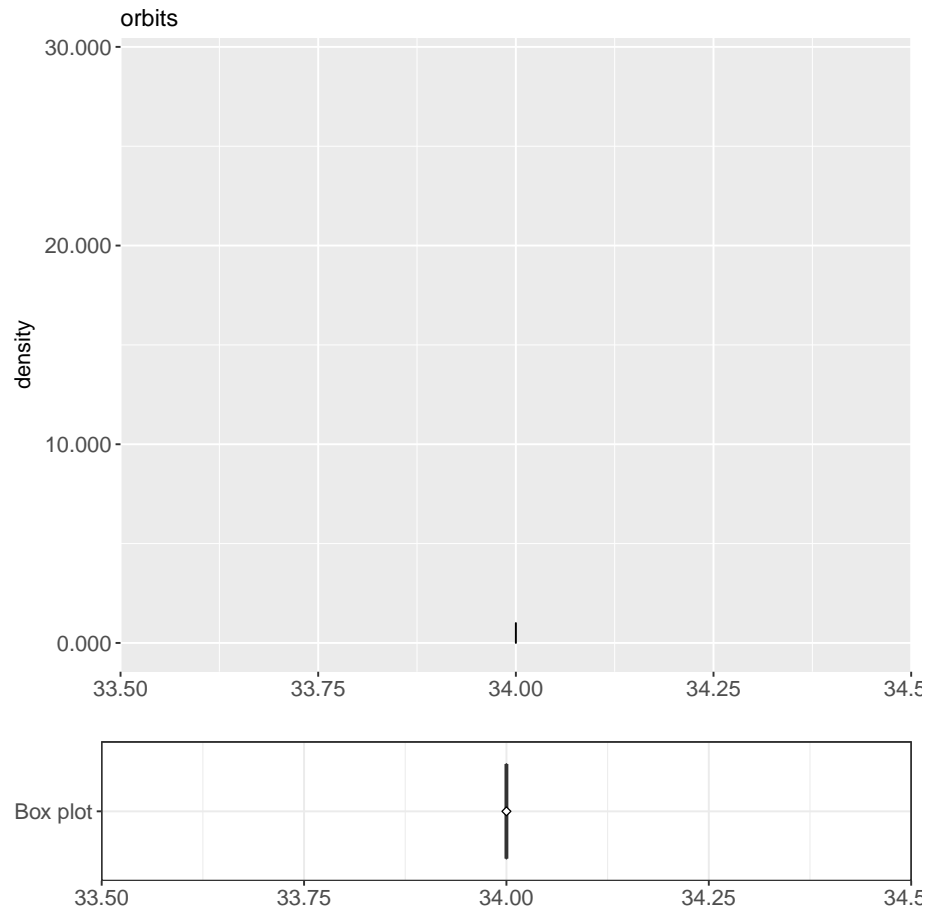
## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 360"
## [1] "Mean Number of Orbits for Except rename var: 9645"
## [1] "Absolute difference: 9285"
## Number of Orbits for Except rename var is 2579.16666666667 % greater than
## Number of Orbits for All transformations
```

3.9.2 RH9.2: Object SMC-Big

Number of Orbits for All transformations

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       34      34      34      34      34      34

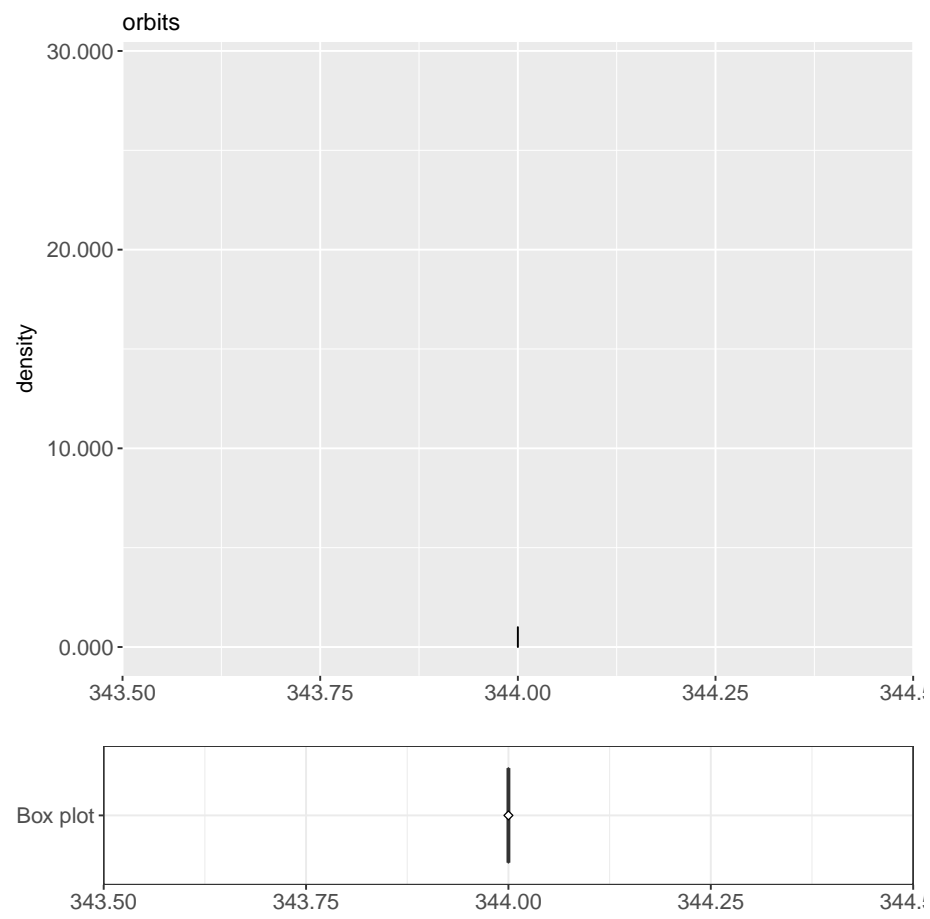
## Error in shapiro.test(subset(json_data, treatment == "cashew" &
## object == : sample size must be between 3 and 5000
```



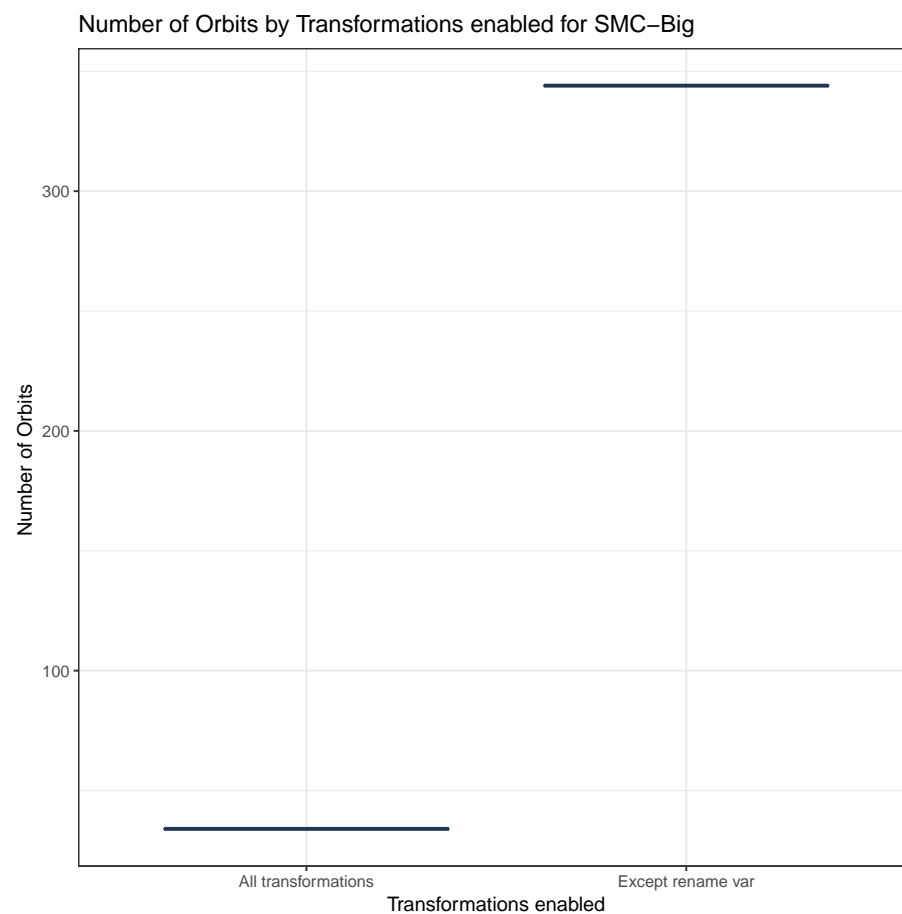
Number of Orbits for Except rename var

```
## [1] "Sample size: 1"
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##      344      344      344      344      344      344

## Error in shapiro.test(subset(json_data, treatment == "cashewExceptRenameVar"
## & : sample size must be between 3 and 5000
```



Comparison



```
## Error in eval(expr, envir, enclos): object 'shap.cashew_big' not
found

## [1] ""
## [1] "Means comparison"
## [1] "Mean Number of Orbits for All transformations: 34"
## [1] "Mean Number of Orbits for Except rename var: 344"
## [1] "Absolute difference: 310"
## Number of Orbits for Except rename var is 911.764705882353 % greater than
## Number of Orbits for All transformations
```

3.9.3 RH9 Results: Number of Orbits All transformations = Except rename var

Table 17: RH9 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 18: RH9 Results Summary

All transformations < Except rename var:	0%
All transformations > Except rename var:	0%
All transformations:	0%
Except rename var:	0%
None:	0%
Inconclusive:	100%

4 Result Summary

4.1 Research Hypotheses

4.1.1 RH1 Results: Average time All transformations = No cache

Table 19: RH1 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 20: RH1 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

4.1.2 RH2 Results: Maximum time All transformations = No cache

Table 21: RH2 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 22: RH2 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

4.1.3 RH3 Results: Total time All transformations = No cache

Table 23: RH3 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 24: RH3 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

4.1.4 RH4 Results: Number of Orbits All transformations = No cache

Table 25: RH4 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 26: RH4 Results Summary

All transformations < No cache:	0%
All transformations > No cache:	0%
All transformations:	0%
No cache:	0%
None:	0%
Inconclusive:	100%

4.1.5 RH5 Results: Number of Orbits All transformations = Except order

Table 27: RH5 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 28: RH5 Results Summary

All transformations < Except order:	0%
All transformations > Except order:	0%
All transformations:	0%
Except order:	0%
None:	0%
Inconclusive:	100%

4.1.6 RH6 Results: Number of Orbits All transformations = Except removeVar

Table 29: RH6 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 30: RH6 Results Summary

All transformations < Except removeVar:	0%
All transformations > Except removeVar:	0%
All transformations:	0%
Except removeVar:	0%
None:	0%
Inconclusive:	100%

4.1.7 RH7 Results: Number of Orbits All transformations = Except removeConj

Table 31: RH7 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 32: RH7 Results Summary

All transformations < Except removeConj:	0%
All transformations > Except removeConj:	0%
All transformations:	0%
Except removeConj:	0%
None:	0%
Inconclusive:	100%

4.1.8 RH8 Results: Number of Orbits All transformations = Except rename alph

Table 33: RH8 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 34: RH8 Results Summary

All transformations < Except rename alph:	0%
All transformations > Except rename alph:	0%
All transformations:	0%
Except rename alph:	0%
None:	0%
Inconclusive:	100%

4.1.9 RH9 Results: Number of Orbits All transformations = Except rename var

Table 35: RH9 Results per Object

SMC-Small	Inconclusive
SMC-Big	Inconclusive

Table 36: RH9 Results Summary

All transformations < Except rename var:	0%
All transformations > Except rename var:	0%
All transformations:	0%
Except rename var:	0%
None:	0%
Inconclusive:	100%

A Session Information

```
## R version 3.3.1 (2016-06-21)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 16.10
##
## locale:
##  [1] LC_CTYPE=pt_BR.UTF-8      LC_NUMERIC=C
##  [3] LC_TIME=pt_BR.UTF-8      LC_COLLATE=en_US.UTF-8
##  [5] LC_MONETARY=pt_BR.UTF-8  LC_MESSAGES=en_US.UTF-8
##  [7] LC_PAPER=pt_BR.UTF-8     LC_NAME=C
##  [9] LC_ADDRESS=C             LC_TELEPHONE=C
## [11] LC_MEASUREMENT=pt_BR.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods    base
##
## other attached packages:
## [1] plyr_1.8.4      jsonlite_1.5    ggplot2_2.2.1    reproducer_0.1.8
## [5] knitr_1.17
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_0.12.16      digest_0.6.12    grid_3.3.1
##  [4] gtable_0.2.0      magrittr_1.5     evaluate_0.10
##  [7] scales_0.4.1      rlang_0.2.0      stringi_1.1.5
## [10] lazyeval_0.2.0    labeling_0.3     RColorBrewer_1.1-2
## [13] tools_3.3.1       stringr_1.2.0    munsell_0.4.3
## [16] colorspace_1.3-2  gridExtra_2.2.1  tibble_1.3.1
```