09_pre-post-CURE-exploration

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Apple Biology It is likely/unlikely that.... Q8. Apple trees can grow from seeds as well as from attaching (grafting) a clipped branch to the base of another tree. Minor improvement

Q9. There are more than 2,500 kinds of known apple trees presently growing in the United States. Full improvement Q10. Most apple trees are self-incompatible, so you need two apple trees of the exact same kind to promote outcrossing.

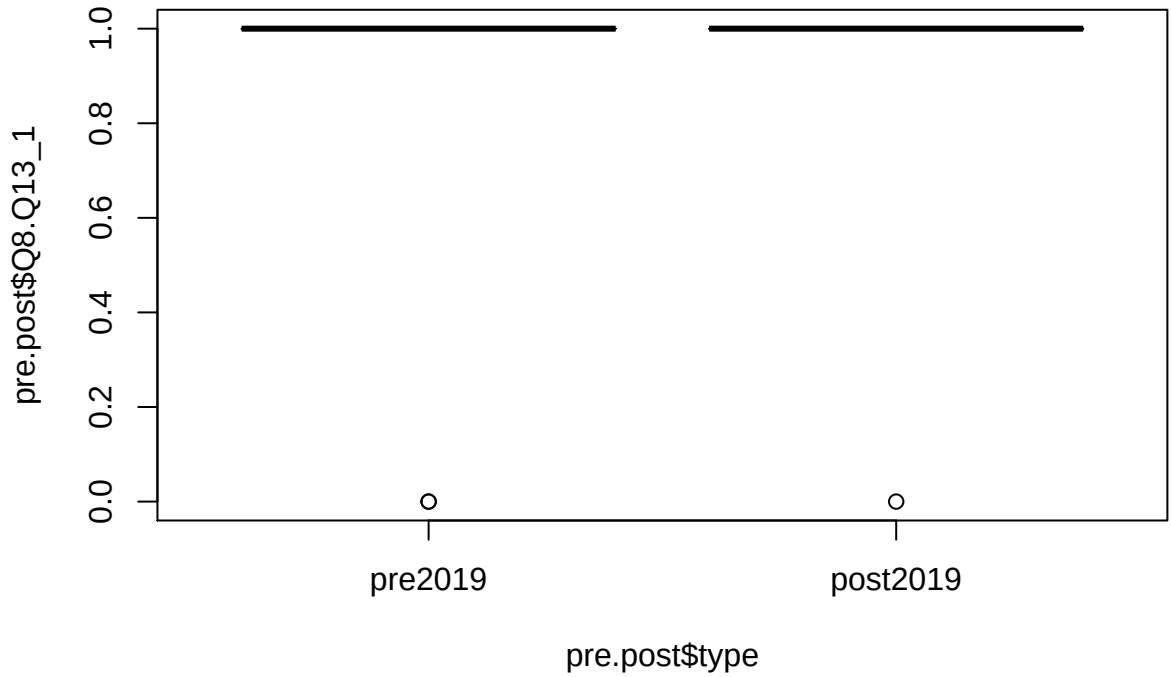
Improvement Q11. Fallen fruits can lead to human/wildlife conflicts and often require city governing policies.

Minorly regressive Q12. Apple trees should be pruned to reduce disease and promote more fruit production. Minor improvement Q13. Pollinators always have a positive effect on apple trees. Minorly regressive

```
# Q8. Apple trees can grow from seeds as well as from attaching (grafting) a clipped branch to the base
# Q8 _ not sig
t.test(pre.post$Q8.Q13_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_1 by pre.post$type
## t = -0.45525, df = 21.957, p-value = 0.6534
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3496793  0.2238052
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.8461538              0.9090909
```

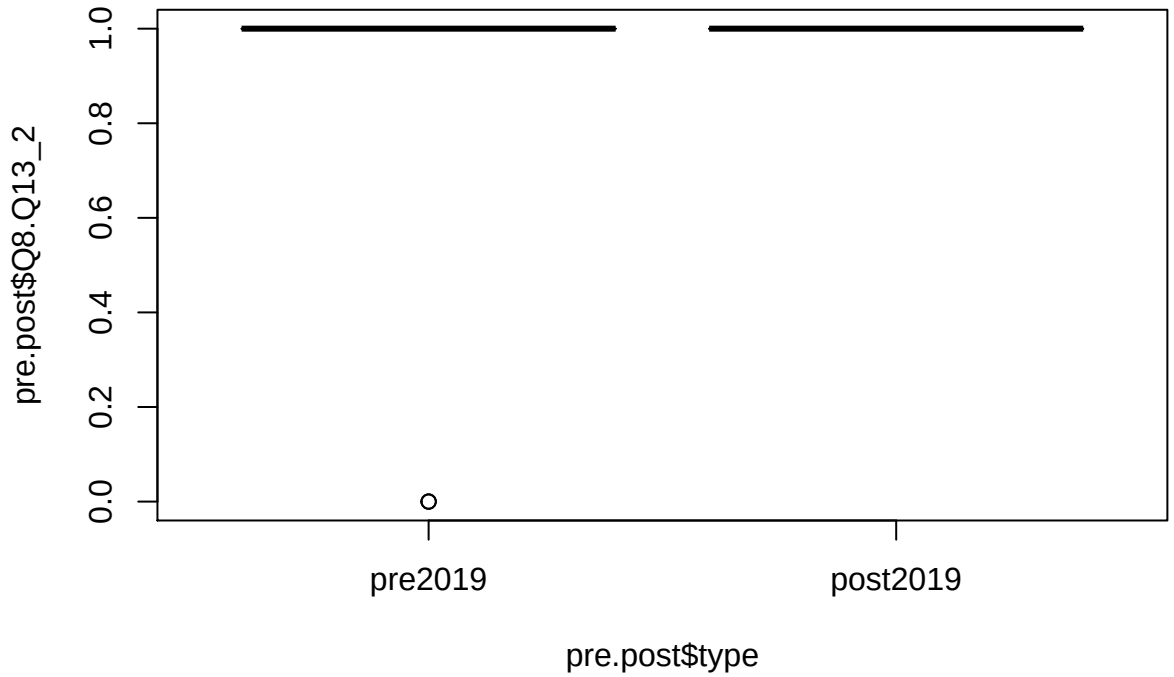
```
boxplot(pre.post$Q8.Q13_1 ~ pre.post$type)
```




```
# Q9. There are more than 2,500 kinds of known apple trees presently growing in the United States.
# Q9 -  not  sig
t.test(pre.post$Q8.Q13_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_2 by pre.post$type
## t = -1.4771, df = 12, p-value = 0.1654
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.38077896  0.07308666
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.8461538              1.0000000
```

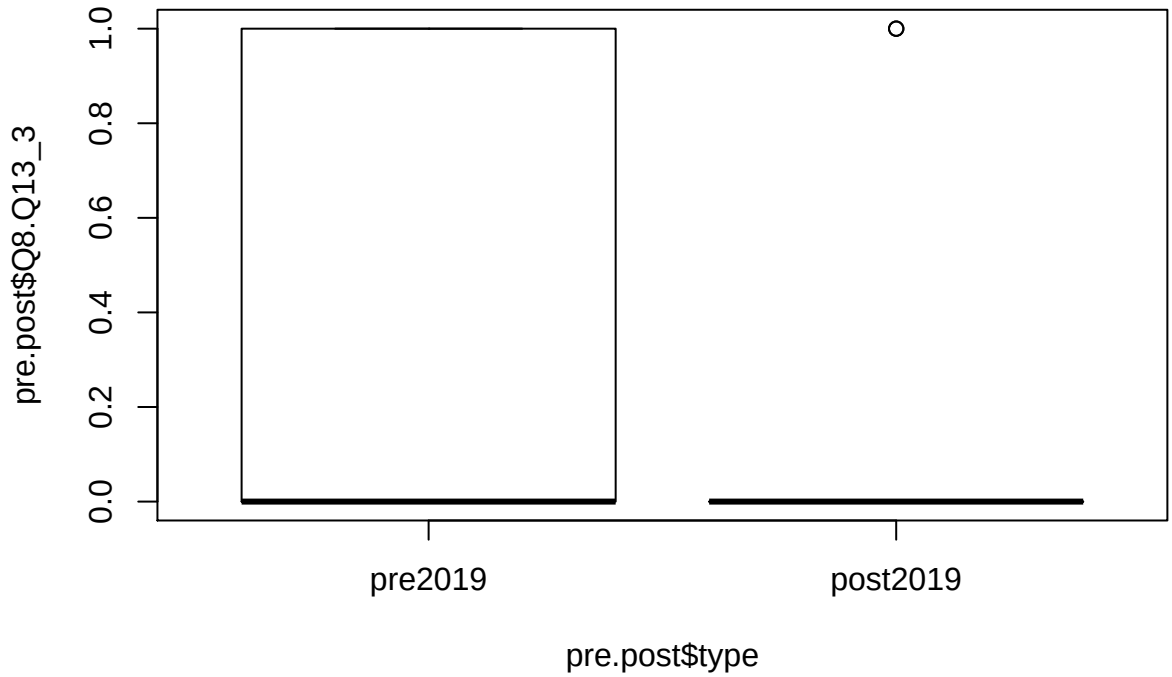
```
boxplot(pre.post$Q8.Q13_2 ~ pre.post$type)
```




```
# Q10. Most apple trees are self-incompatible, so you need two apple trees of the exact same kind to pr
# Q10 _ not sig
t.test(pre.post$Q8.Q13_3 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_3 by pre.post$type
## t = 1.0902, df = 21.946, p-value = 0.2874
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1830195  0.5886139
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.3846154              0.1818182
```

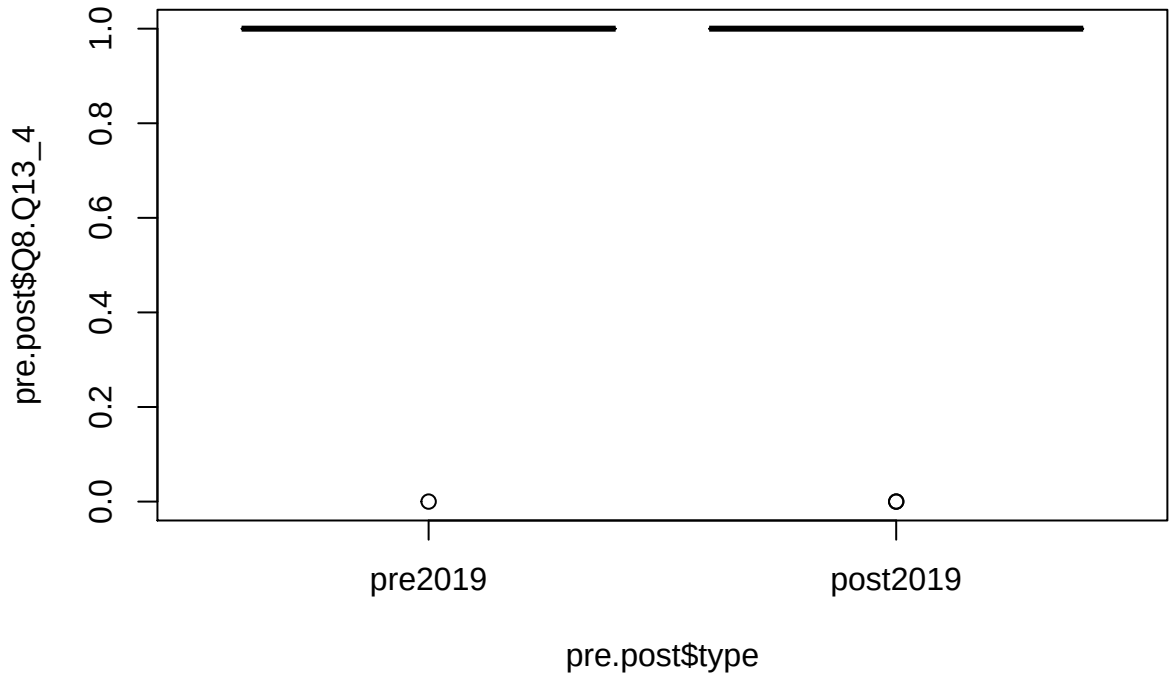
```
boxplot(pre.post$Q8.Q13_3 ~ pre.post$type)
```




```
# Q11. Fallen fruits can lead to human/wildlife conflicts and often require city governing policies.
# Q11 _ not sig
t.test(pre.post$Q8.Q13_4 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_4 by pre.post$type
## t = 0.72744, df = 17.262, p-value = 0.4767
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1989862  0.4087764
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.9230769              0.8181818
```

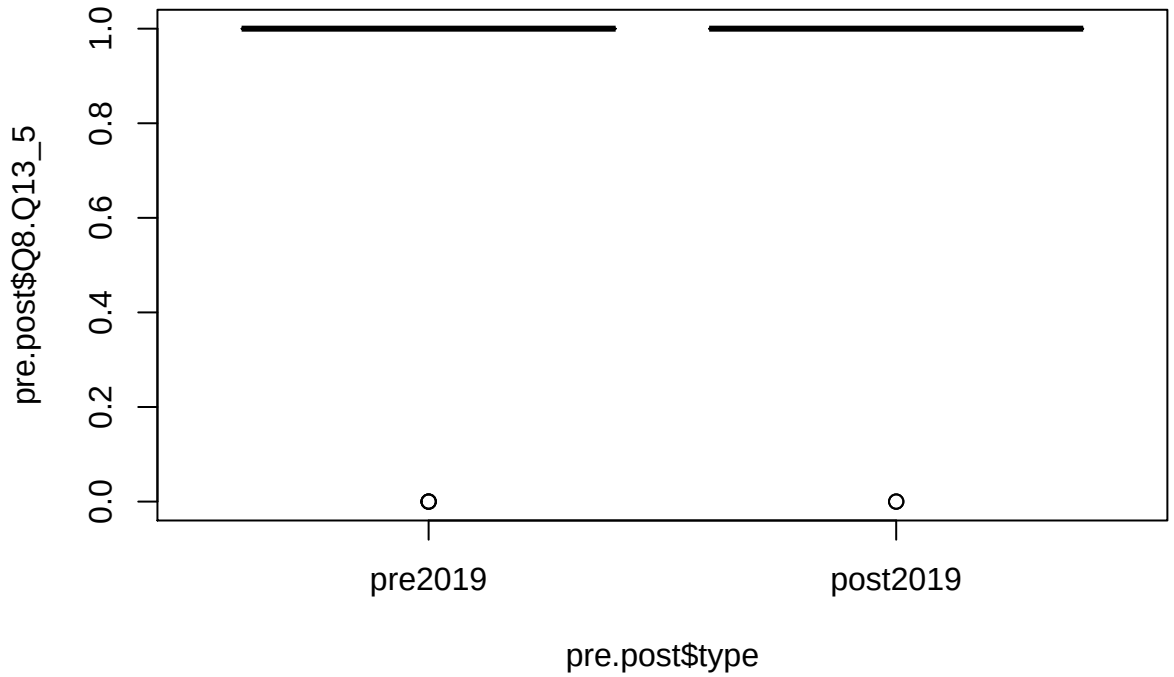
```
boxplot(pre.post$Q8.Q13_4 ~ pre.post$type)
```




```
# Q12. Apple trees should be pruned to reduce disease and promote more fruit production.
# Q12 _ not sig, but less variation in the post test
t.test(pre.post$Q8.Q13_5 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_5 by pre.post$type
## t = -0.28419, df = 21.807, p-value = 0.7789
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4063524  0.3084503
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.7692308              0.8181818
```

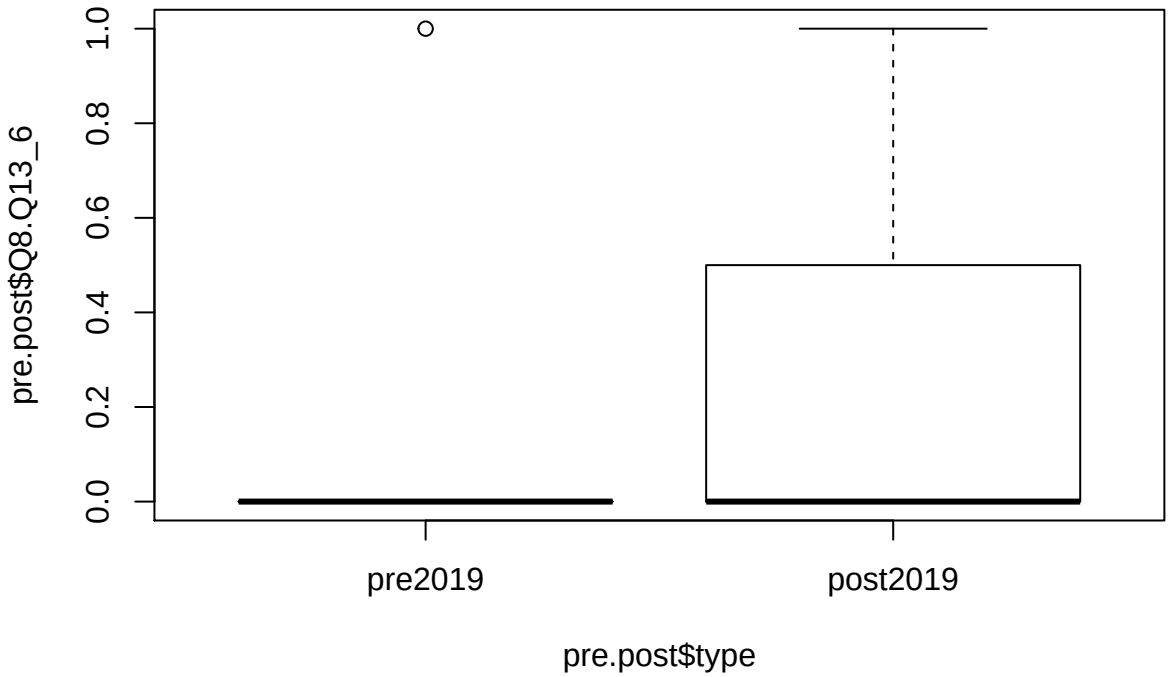
```
boxplot(pre.post$Q8.Q13_5 ~ pre.post$type)
```




```
# Q13. Pollinators always have a positive effect on apple trees.
# Q13 _ not sig
t.test(pre.post$Q8.Q13_6 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q8.Q13_6 by pre.post$type
## t = -1.2202, df = 15.693, p-value = 0.2404
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5365360  0.1449276
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             0.07692308             0.27272727
```

```
boxplot(pre.post$Q8.Q13_6 ~ pre.post$type)
```

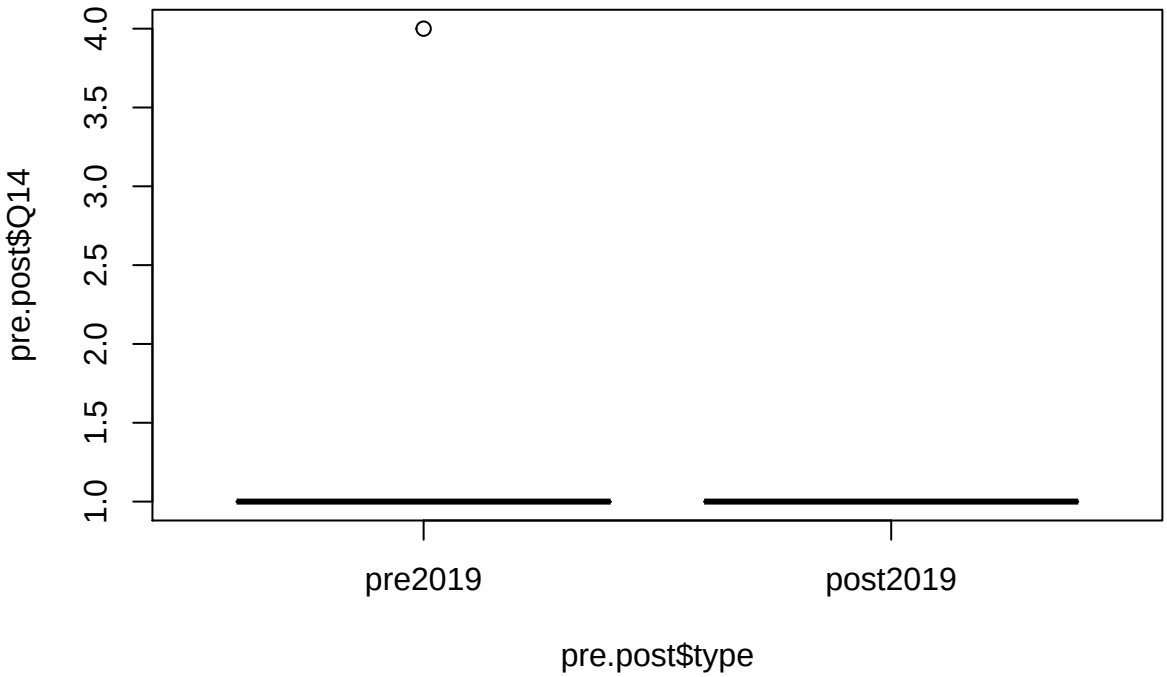


Q14. The photo above shows two branch section of tree leaves with a letter "A" and "B" labeled below each branch. Which set of leaves is most likely from an apple tree? Multiple choices: A, B, A & B, Neither A or B

```
# Q14 _ not sig
t.test(pre.post$Q14 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q14 by pre.post$type
## t = 1, df = 12, p-value = 0.337
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2720337  0.7335722
## sample estimates:
##  mean in group pre2019 mean in group post2019
##               1.230769               1.000000
```

```
boxplot(pre.post$Q14 ~ pre.post$type)
```

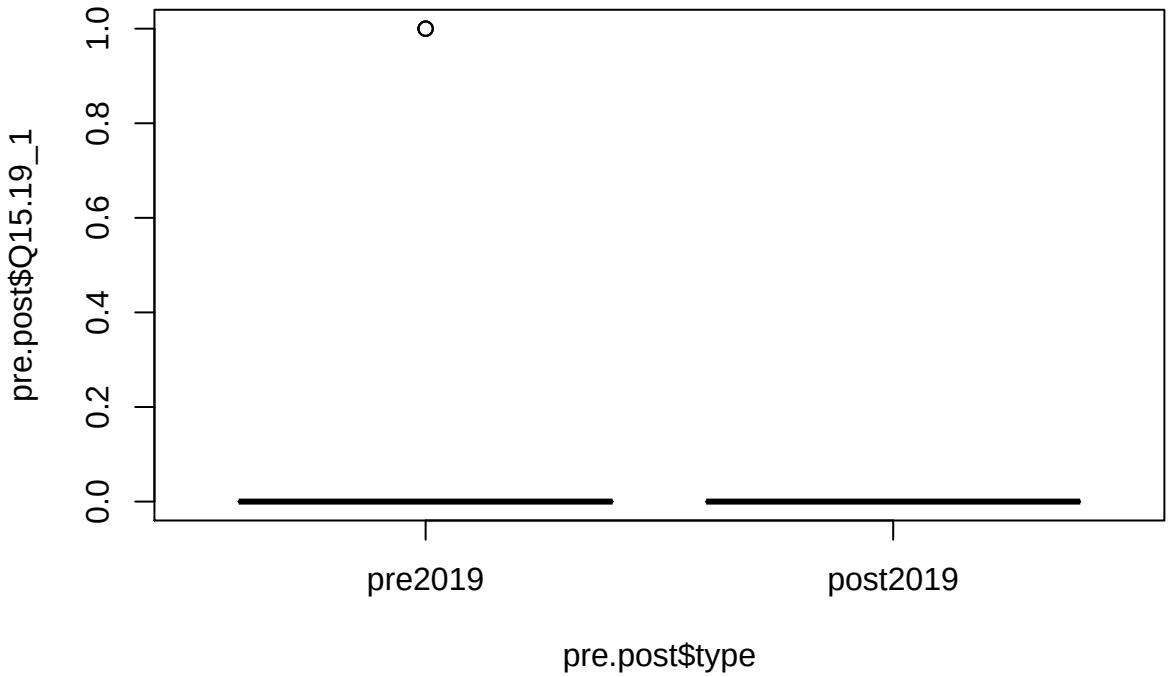


Place-based Ecology It is likely/unlikely that.... Q15. Most apple trees in Boulder were established through natural dispersal Q16. Apple tree survival in Boulder is most threatened by humans who want different kinds of tasting apples Q17. 6,000-19,000 lbs of apple waste may go to waste each year if Community Fruit Rescue didn't lead community harvests Q18. Many of the oldest apple trees in Boulder are 100-150 years old and close to the end of their lifespan. Q19. Fire blight is a disease management concern for fruit trees on the Front Range.

```
# Q15. Most apple trees in Boulder were established through natural dispersal
# Q15 _ not sig
t.test(pre.post$Q15.19_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q15.19_1 by pre.post$type
## t = 1.8974, df = 12, p-value = 0.0821
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.0342312  0.4957697
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.2307692              0.0000000
```

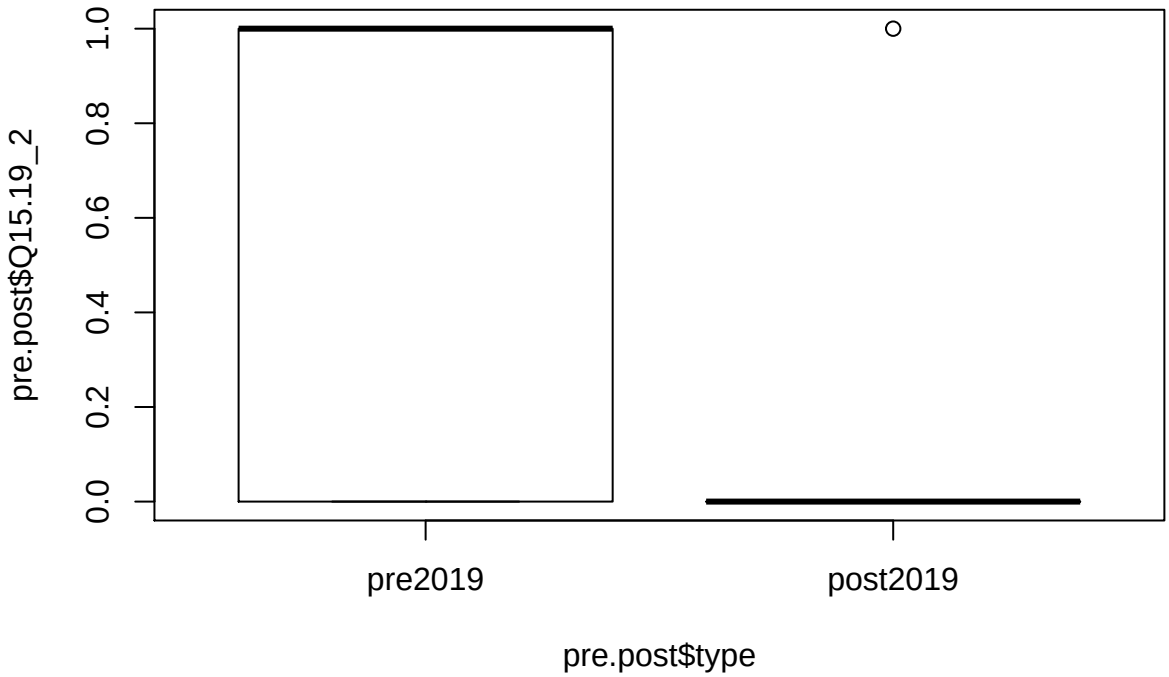
```
boxplot(pre.post$Q15.19_1 ~ pre.post$type)
```



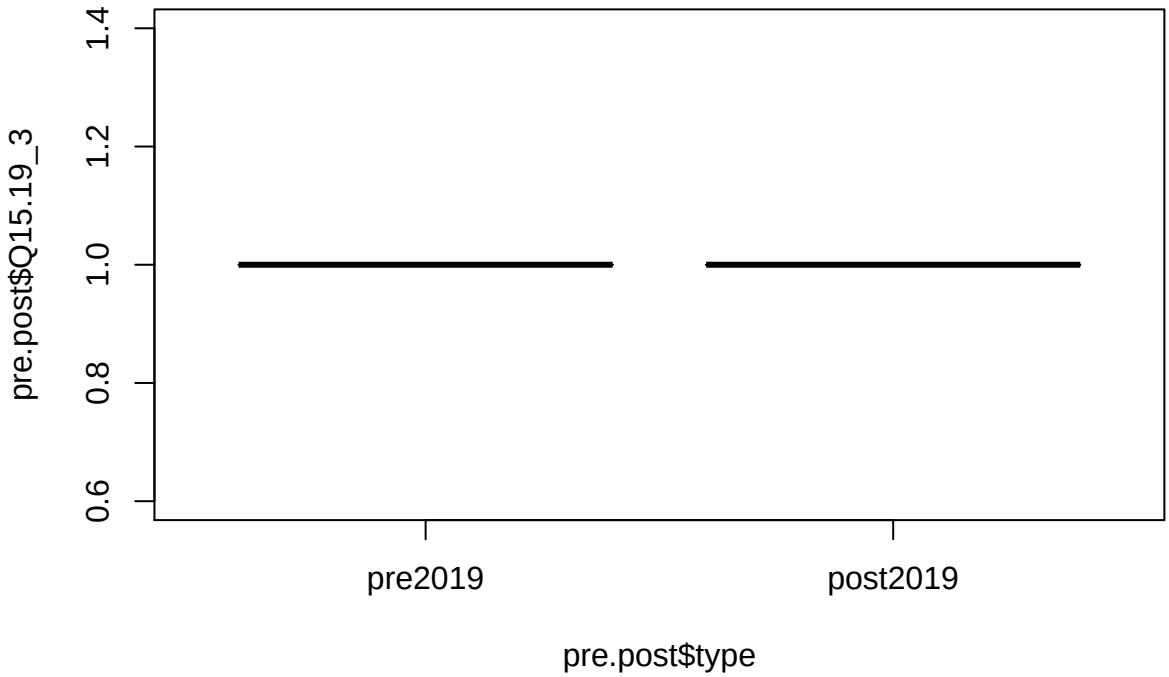

```
# Q16. Apple tree survival in Boulder is most threatened by humans who want different kinds of tasting
# Q16 _ significant diff
t.test(pre.post$Q15.19_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q15.19_2 by pre.post$type
## t = 2.6293, df = 19.72, p-value = 0.01619
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.09215817 0.80294673
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             0.53846154             0.09090909
```

```
boxplot(pre.post$Q15.19_2 ~ pre.post$type)
```




```
# Q17. 6,000-19,000 lbs of apple waste may go to waste each year if Community Fruit Rescue didn't lead
# Q17 _ not sig
# t.test(pre.post$Q15.19_3 ~ pre.post$type)
boxplot(pre.post$Q15.19_3 ~ pre.post$type)
```

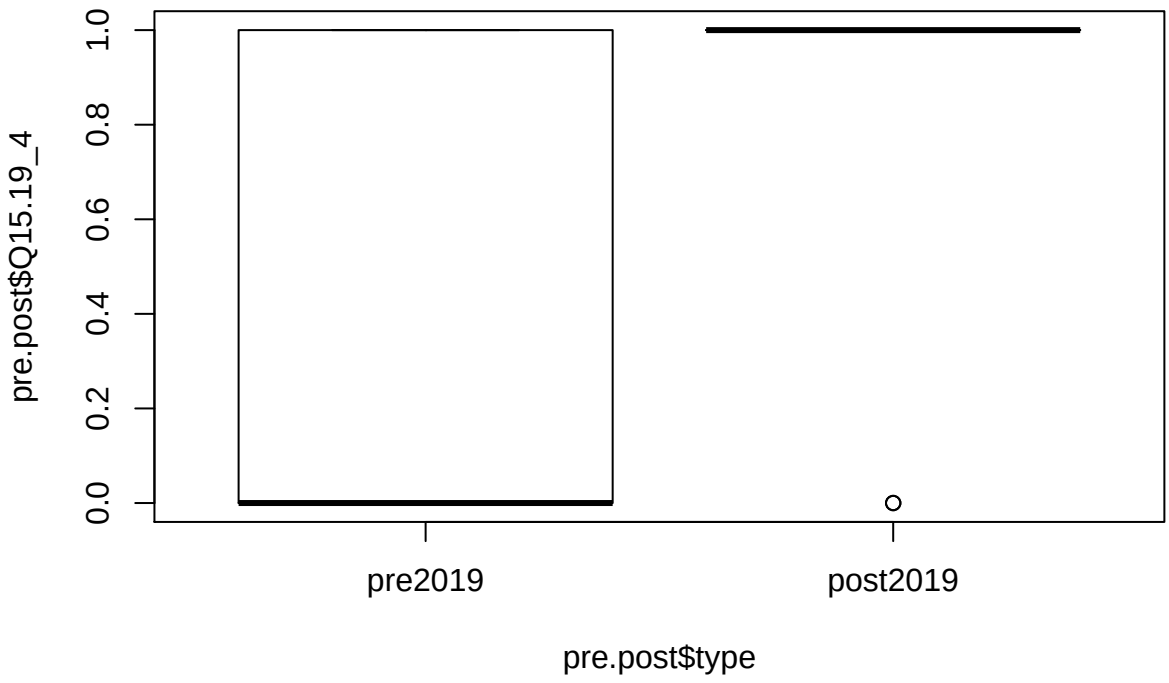



```
# Q18. Many of the oldest apple trees in Boulder are 100-150 years old and close to the end of their li
# Q18 _ significant difference
t.test(pre.post$Q15.19_4 ~ pre.post$type)
```

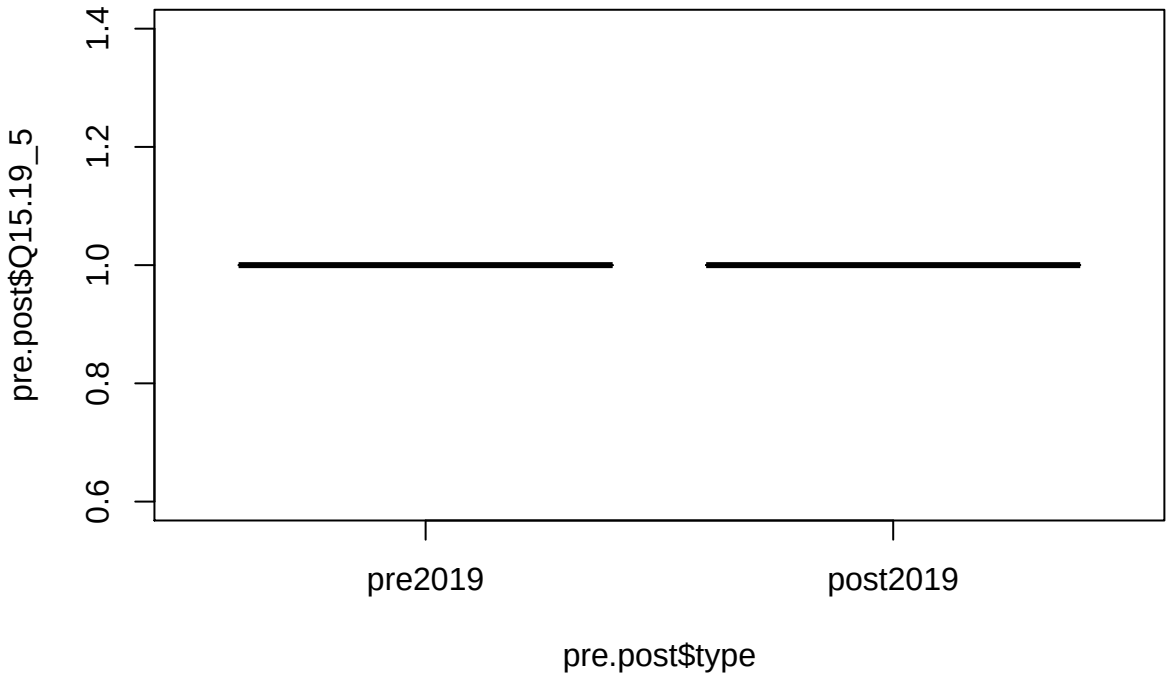
```
##
##  Welch Two Sample t-test
```

```
##
## data:  pre.post$Q15.19_4 by pre.post$type
## t = -1.8906, df = 21.882, p-value = 0.072
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.74798653  0.03469982
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.4615385              0.8181818
```

```
boxplot(pre.post$Q15.19_4 ~ pre.post$type)
```




```
# Q19. Fire blight is a disease management concern for fruit trees on the Front Range.
# Q19 _ signficant difference
# t.test(pre.post$Q15.19_5 ~ pre.post$type)
boxplot(pre.post$Q15.19_5 ~ pre.post$type)
```

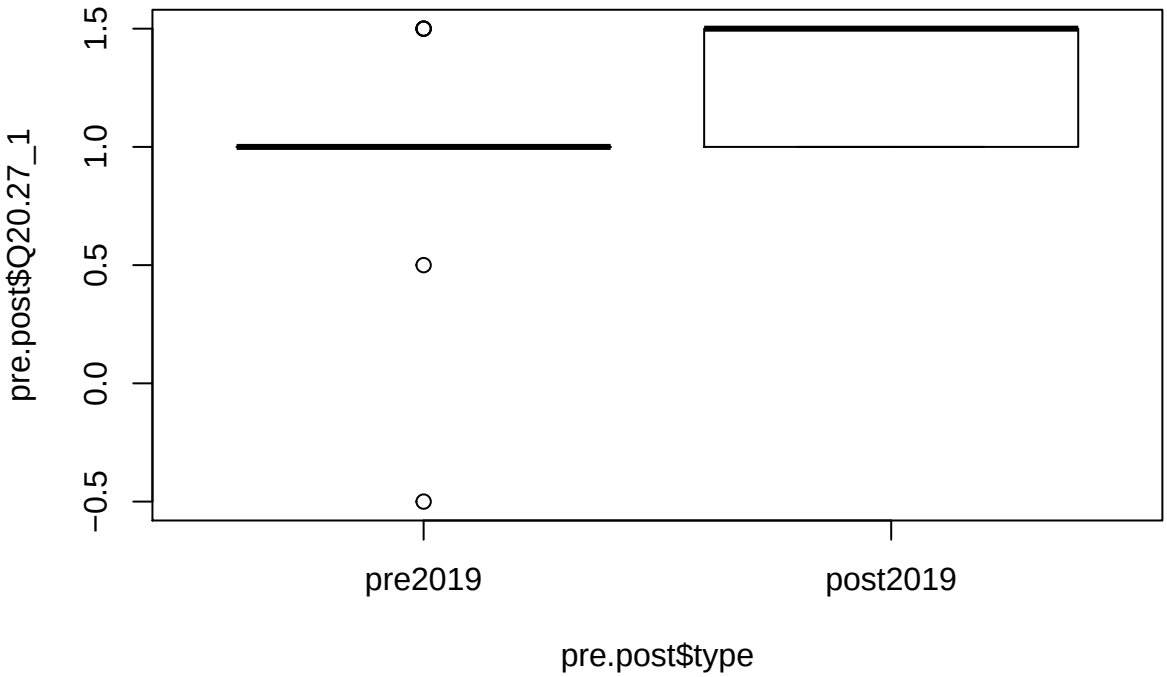


Non-content questions (SALG) Presently I Can... Scale Response Category 1 = I gained nothing/not at all 2 = I gained a little 3 = I gained somewhat 4 = I gained a lot 5 = I gained a great deal [different scale than Pre-Assessment] Q20. Find articles relevant to a particular problem in professional journals or elsewhere Q21. Critically read articles about issues raised in class Q22. Identify patterns in data Q23. Recognize a sound argument and appropriate use of evidence Q24. Develop a logical argument Q25. Write documents in discipline-appropriate style and format Q26. Work effectively with others Q27. Prepare and give oral presentations

```
# Q20. Find articles relevant to a particular problem in professional journals or elsewhere
# Q20 _ not sig
t.test(pre.post$Q20.27_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_1 by pre.post$type
## t = -1.8971, df = 18.292, p-value = 0.07372
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.65542594  0.03304832
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.9615385              1.2727273
```

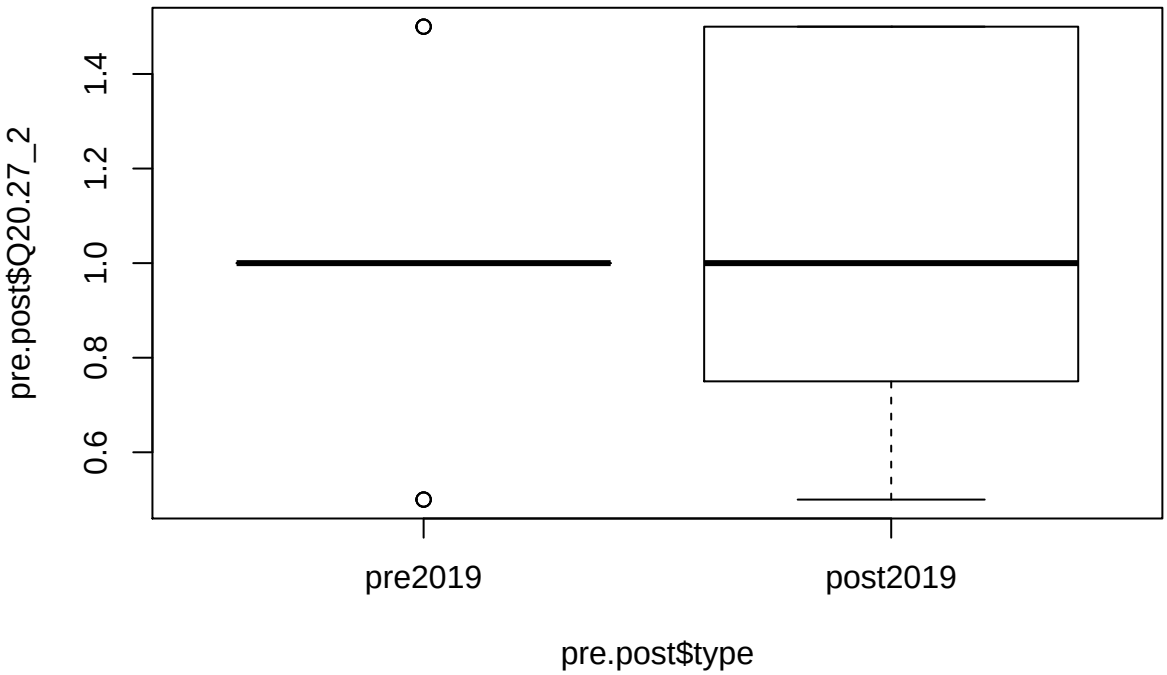
```
boxplot(pre.post$Q20.27_1 ~ pre.post$type)
```




```
# Q21. Critically read articles about issues raised in class
# Q21 _ not sig
t.test(pre.post$Q20.27_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_2 by pre.post$type
## t = -0.55355, df = 19.231, p-value = 0.5863
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4343625  0.2525443
## sample estimates:
##  mean in group pre2019 mean in group post2019
##               1.000000               1.090909
```

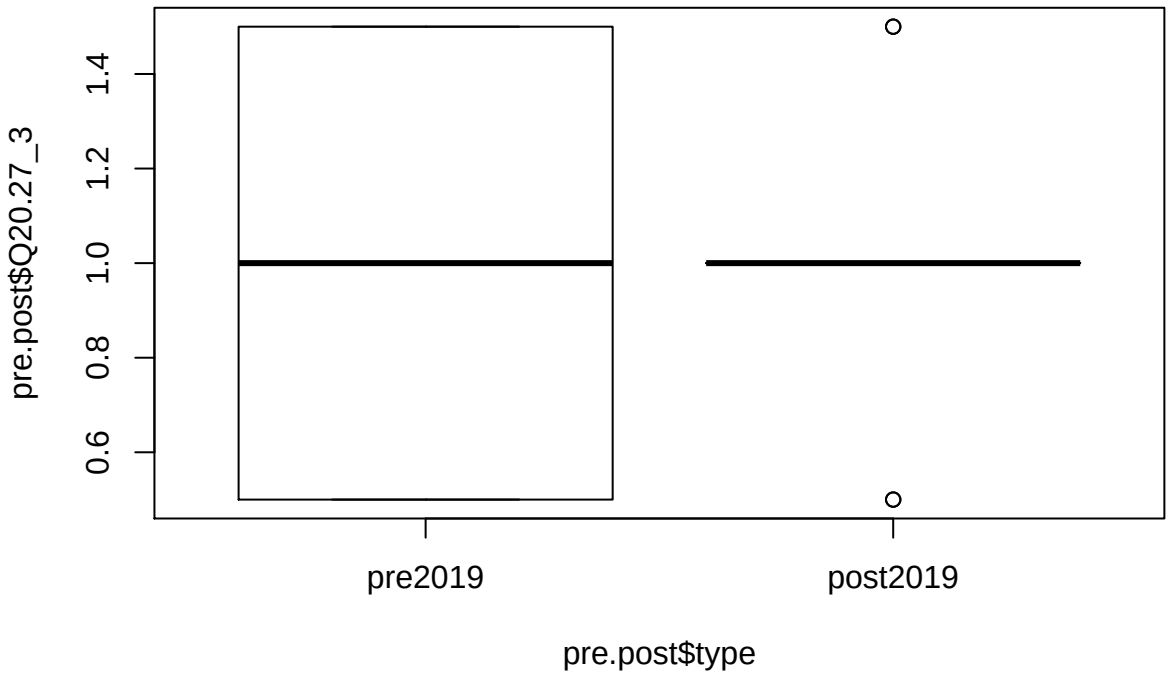
```
boxplot(pre.post$Q20.27_2 ~ pre.post$type)
```




```
# Q22. Identify patterns in data
# Q22 _ not sig - same pre/post
t.test(pre.post$Q20.27_3 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_3 by pre.post$type
## t = 0, df = 21.861, p-value = 1
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3070981  0.3070981
## sample estimates:
##  mean in group pre2019 mean in group post2019
##                      1                      1
```

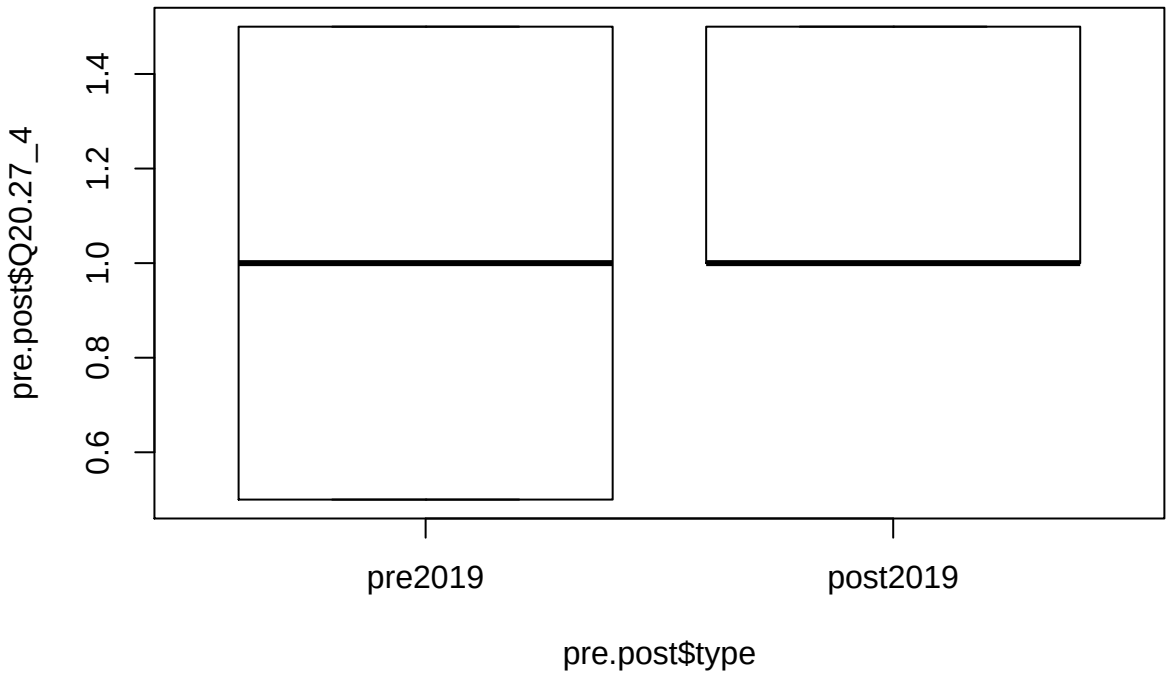
```
boxplot(pre.post$Q20.27_3 ~ pre.post$type)
```




```
# Q23. Recognize a sound argument and appropriate use of evidence
# Q23 _ not sig
t.test(pre.post$Q20.27_4 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_4 by pre.post$type
## t = -1.5543, df = 19.787, p-value = 0.136
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.51610911  0.07554967
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.9615385              1.1818182
```

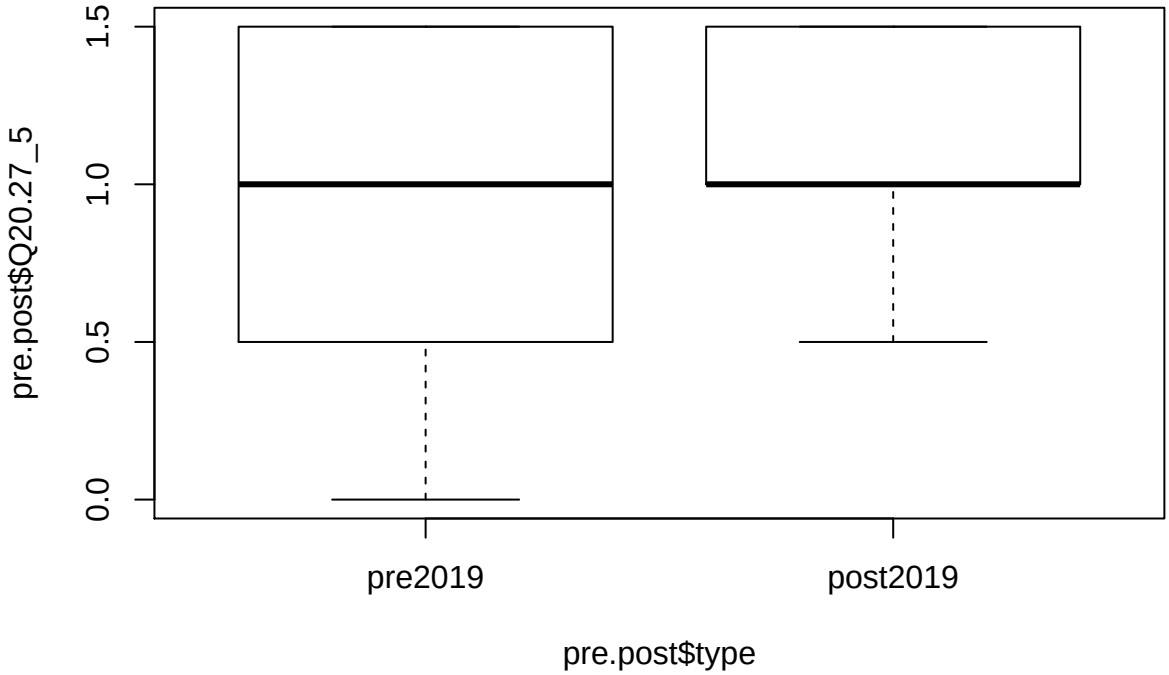
```
boxplot(pre.post$Q20.27_4 ~ pre.post$type)
```




```
# Q24. Develop a logical argument
# Q24 _ not sig
t.test(pre.post$Q20.27_5 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_5 by pre.post$type
## t = -1.0575, df = 21.062, p-value = 0.3023
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5393108  0.1756744
## sample estimates:
##  mean in group pre2019 mean in group post2019
##               1.000000               1.181818
```

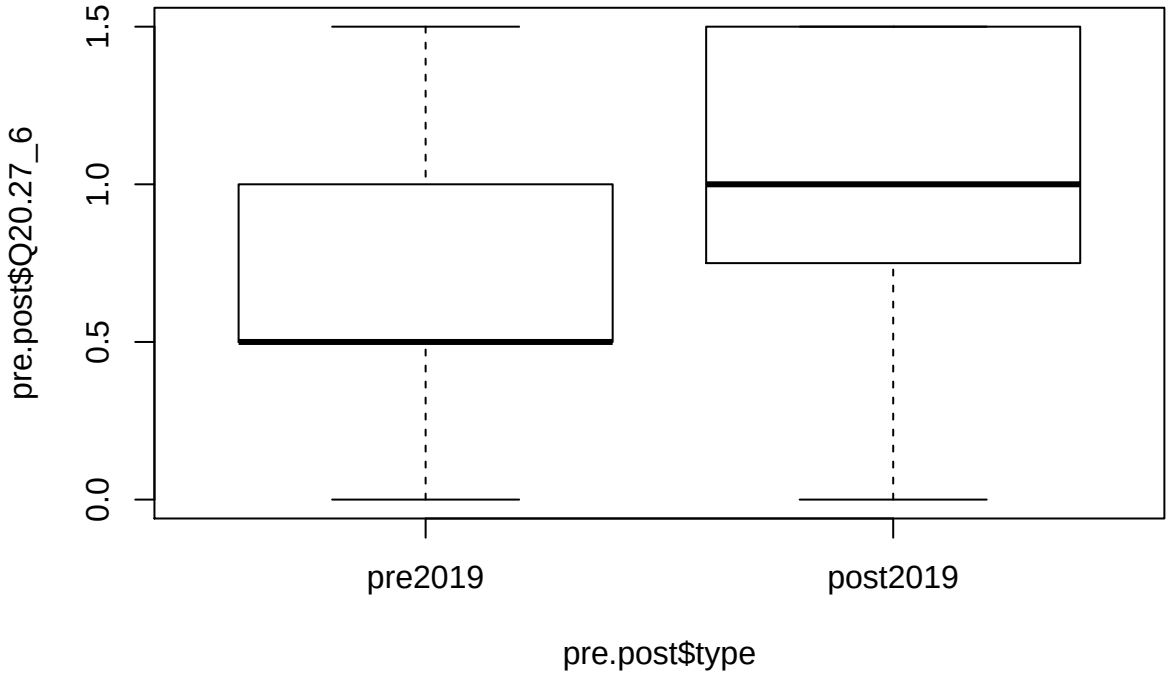
```
boxplot(pre.post$Q20.27_5 ~ pre.post$type)
```




```
# Q25. Write documents in discipline-appropriate style and format
# Q25 _ not sig
t.test(pre.post$Q20.27_6 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_6 by pre.post$type
## t = -1.2845, df = 21.656, p-value = 0.2125
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.7043073  0.1658457
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.7307692              1.0000000
```

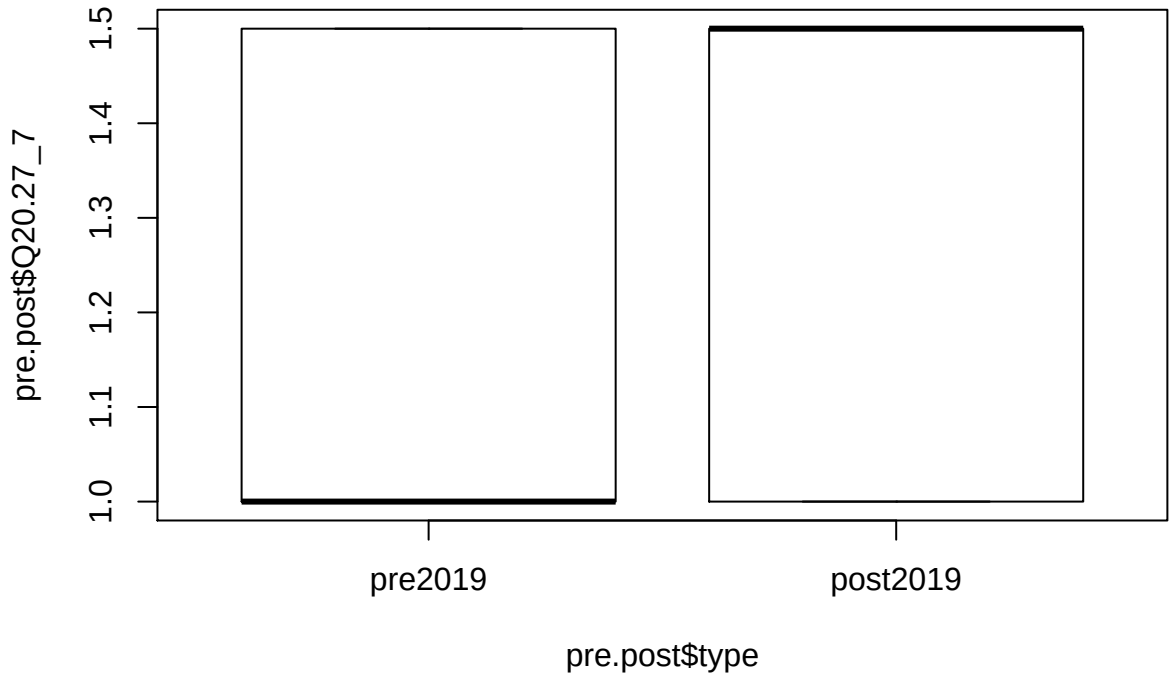
```
boxplot(pre.post$Q20.27_6 ~ pre.post$type)
```




```
# Q26. Work effectively with others
# Q26 _ not sig
t.test(pre.post$Q20.27_7 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_7 by pre.post$type
## t = -0.39339, df = 21.299, p-value = 0.6979
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2635753  0.1796592
## sample estimates:
##  mean in group pre2019 mean in group post2019
##               1.230769               1.272727
```

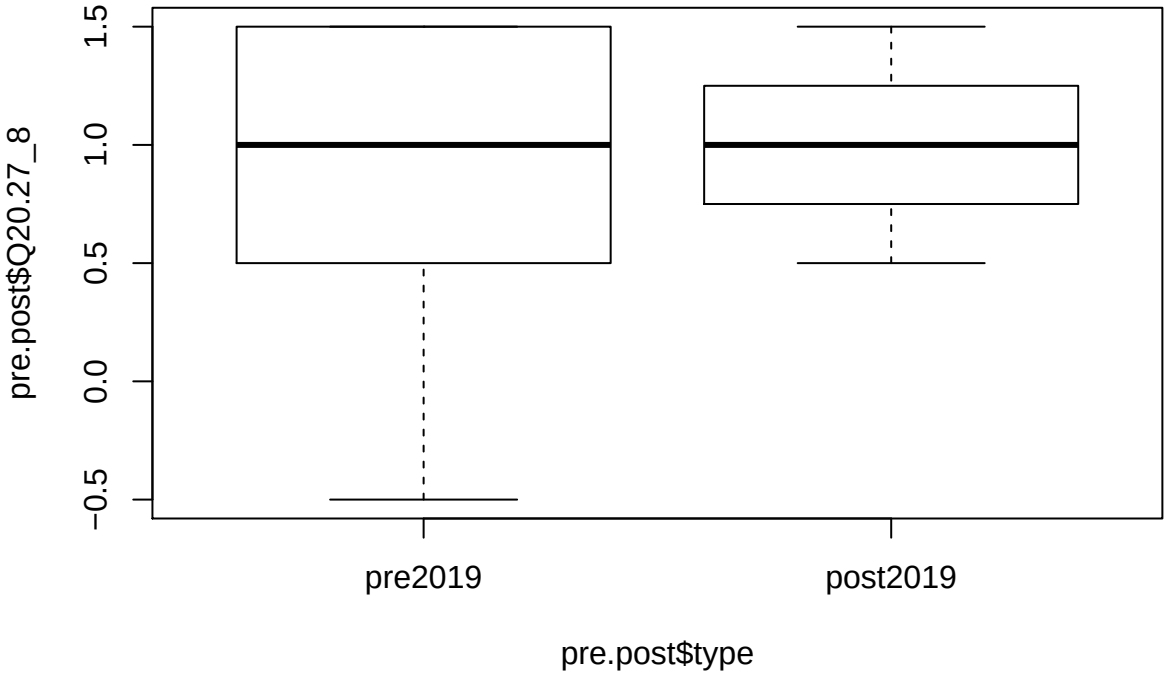
```
boxplot(pre.post$Q20.27_7 ~ pre.post$type)
```




```
# Q27. Prepare and give oral presentations
# Q27 _ not sig
t.test(pre.post$Q20.27_8 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q20.27_8 by pre.post$type
## t = -0.37539, df = 20.6, p-value = 0.7112
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5035673  0.3497212
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.9230769              1.0000000
```

```
boxplot(pre.post$Q20.27_8 ~ pre.post$type)
```

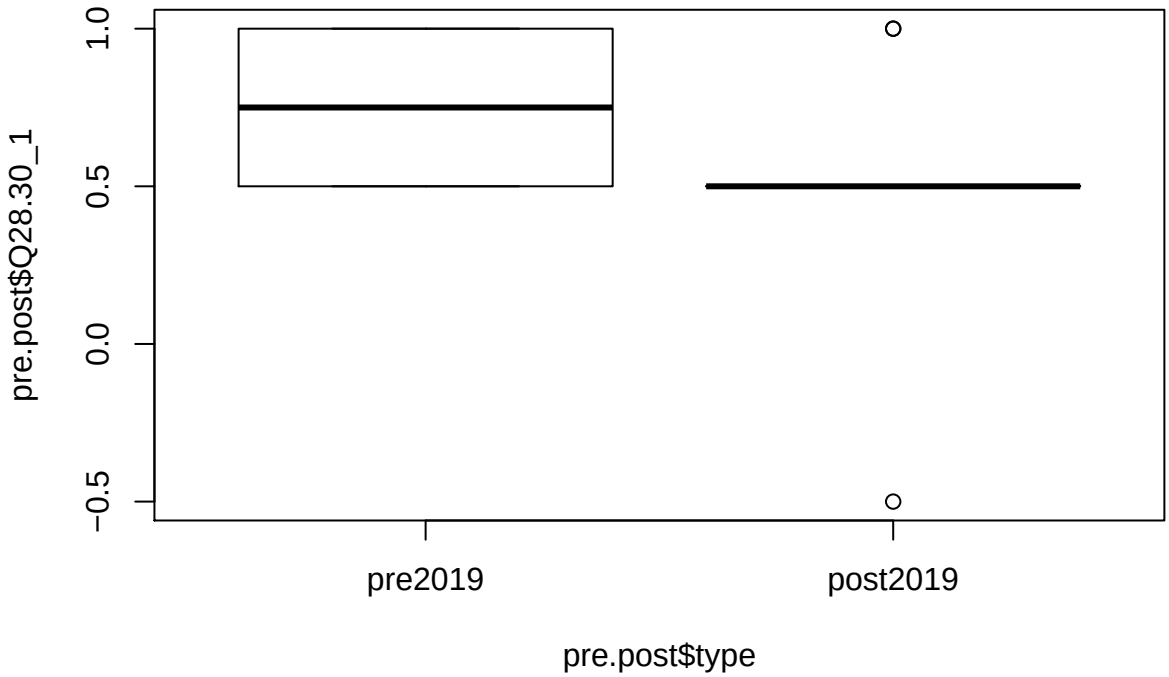


(SALG) Presently I Understand... Scale Response Category 1 = I gained nothing/not at all 2 = I gained a little 3 = I gained somewhat 4 = I gained a lot 5 = I gained a great deal [different scale than Pre-Assessment] Q28. How ideas we will explore in this class relate to ideas I have encountered in other classes within this subject area Q29. How ideas we will explore in this class relate to ideas I have encountered in classes outside of this subject area Q30. How studying this subject helps people address real world issues

```
# Q28. How ideas we will explore in this class relate to ideas I have encountered in other classes with
# Q28 _ not sig
t.test(pre.post$Q28.30_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q28.30_1 by pre.post$type
## t = 1.7987, df = 17.334, p-value = 0.0895
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.04281353  0.54281353
## sample estimates:
##  mean in group pre2019 mean in group post2019
##                   0.75                   0.50
```

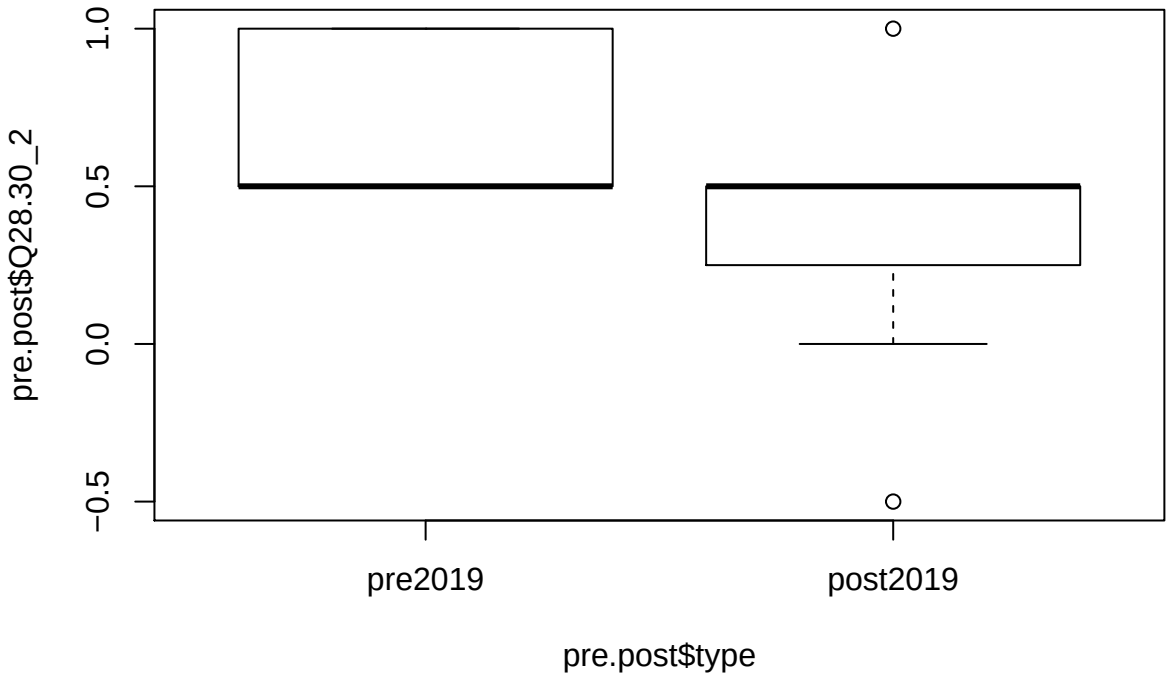
```
boxplot(pre.post$Q28.30_1 ~ pre.post$type)
```




```
# Q29. How ideas we will explore in this class relate to ideas I have encountered in classes outside of
# Q29 _ significant- but the reverse as expected
t.test(pre.post$Q28.30_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q28.30_2 by pre.post$type
## t = 2.5555, df = 17.386, p-value = 0.02023
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.06392654 0.66334619
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.7272727              0.3636364
```

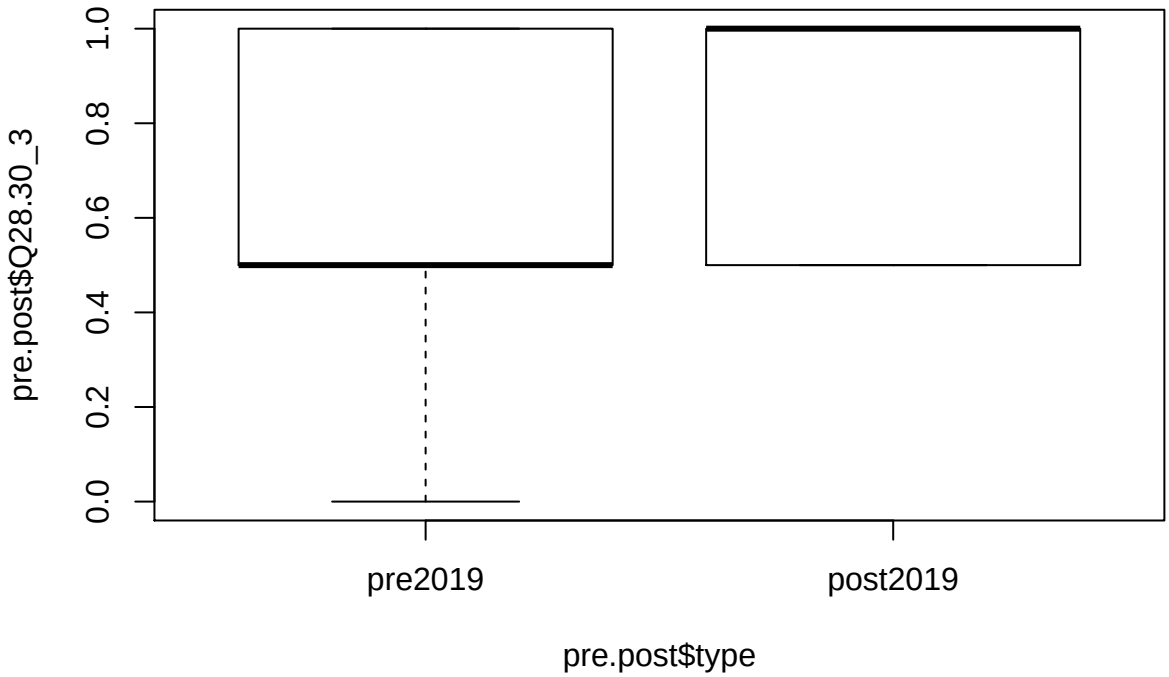
```
boxplot(pre.post$Q28.30_2 ~ pre.post$type)
```




```
# Q30. How studying this subject helps people address real world issues
# Q30 _ not sig - but could be without single outlier??
t.test(pre.post$Q28.30_3 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q28.30_3 by pre.post$type
## t = -1.2742, df = 21.033, p-value = 0.2165
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4325174  0.1038461
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.6538462              0.8181818
```

```
boxplot(pre.post$Q28.30_3 ~ pre.post$type)
```

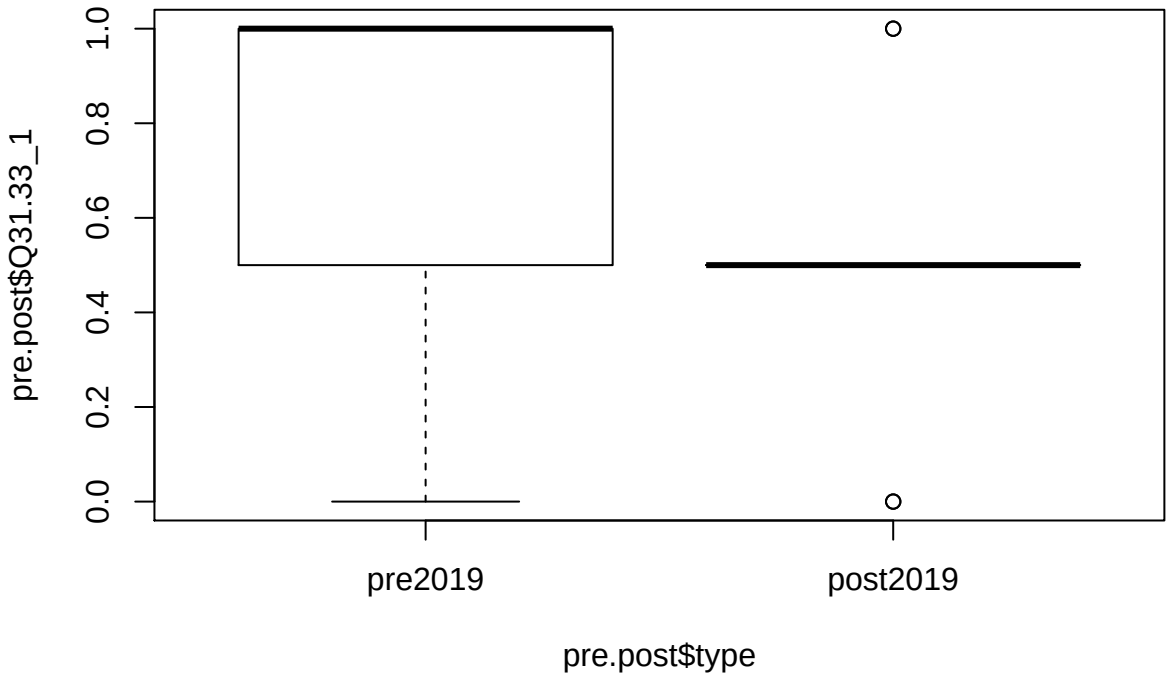


(SALG) Presently I Am... Scale Response Category 1 = I gained nothing/not at all 2 = I gained a little 3 = I gained somewhat 4 = I gained a lot 5 = I gained a great deal [different scale than Pre-Assessment] Q31. Enthusiastic about this subject Q32. Interested in discussing this subject area with friends or family Q33. Interested in taking or planning to take additional classes in this subject

```
# Q31. Enthusiastic about this subject
# Q31 _ not sig - but a lot less post test variation
t.test(pre.post$Q31.33_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q31.33_1 by pre.post$type
## t = 1.2508, df = 21.574, p-value = 0.2244
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1269033  0.5115187
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.6923077              0.5000000
```

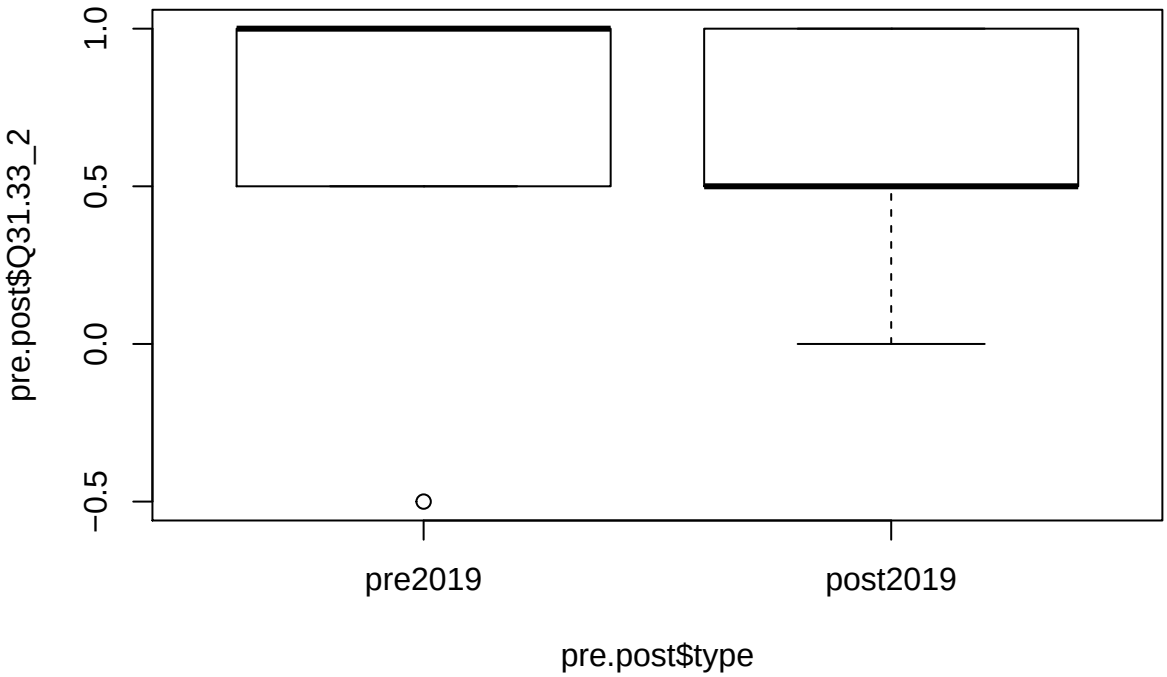
```
boxplot(pre.post$Q31.33_1 ~ pre.post$type)
```




```
# Q32.  Interested in discussing this subject area with friends or family
# Q32 _ not sig
t.test(pre.post$Q31.33_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q31.33_2 by pre.post$type
## t = 0.36074, df = 21.692, p-value = 0.7218
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2659420  0.3778301
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.6923077              0.6363636
```

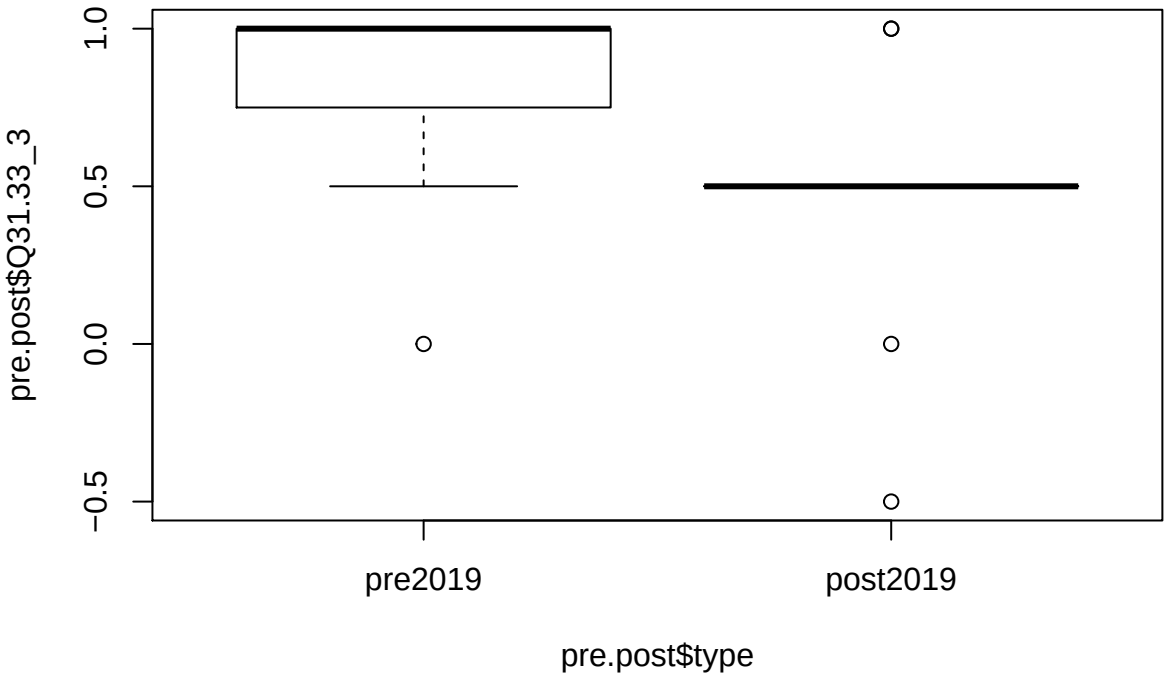
```
boxplot(pre.post$Q31.33_2 ~ pre.post$type)
```




```
# Q33. Interested in taking or planning to take additional classes in this subject
# Q33 _ significant - but the reverse as expected
t.test(pre.post$Q31.33_3 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q31.33_3 by pre.post$type
## t = 2.2537, df = 19.183, p-value = 0.0361
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.02615002 0.70112271
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.8181818              0.4545455
```

```
boxplot(pre.post$Q31.33_3 ~ pre.post$type)
```



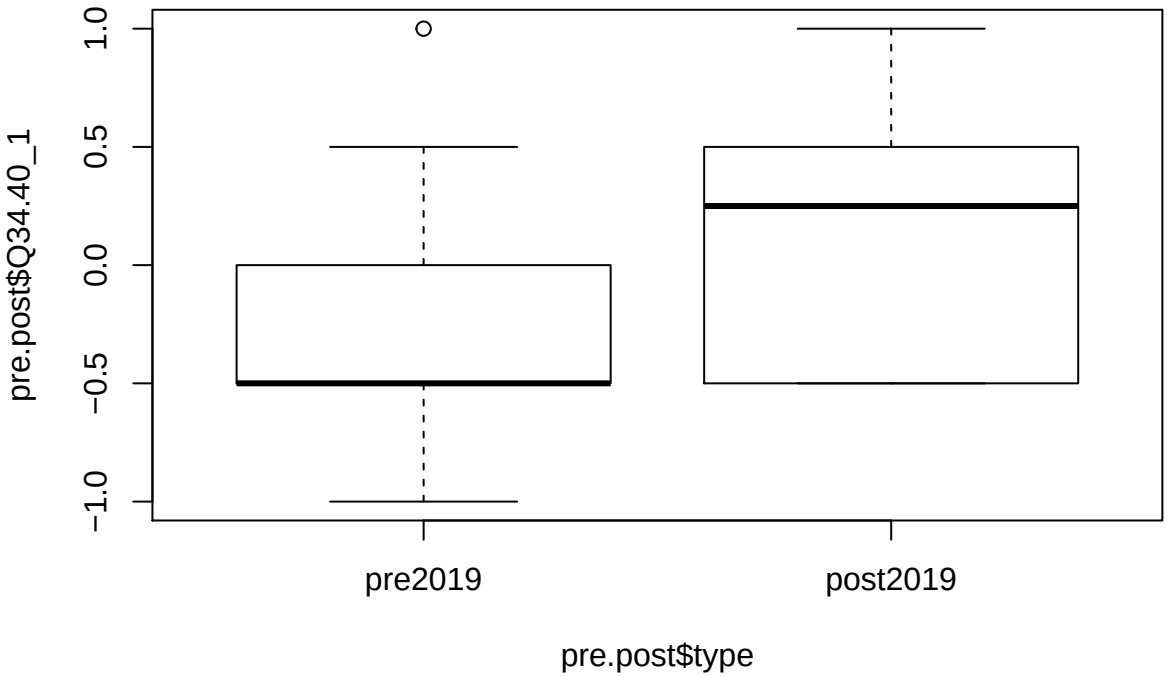
Community Engagement Rankings: Strongly agree, Agree, Neither agree nor disagree, disagree, strongly disagree, don't know, prefer not to respond Q34. I know what kinds of foods are grown agriculturally in my community Q35. I know of areas where food can be foraged in or near the city I live Q36. I know what kinds of tree species are found in my community Q37. I know what kinds of diseases local foresters and agriculturalists manage in Boulder Q38. I have met people who work in urban agriculture systems Q39. I could tell a story about the environment at a place in or near the city I live Q40. I could tell a story about the history of a place in or near the city I live

```
calcSE <- function(x){sd(x)/sqrt(length(x))}

# Q34. I know what kinds of foods are grown agriculturally in my community
#Q34 - 0.07- not signficant
t.test(pre.post$Q34.40_1 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_1 by pre.post$type
## t = -1.8836, df = 19.713, p-value = 0.07446
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.98935985  0.05089831
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             -0.2692308              0.2000000
```

```
boxplot(pre.post$Q34.40_1 ~ pre.post$type)
```




```
# Let's look at our group means and st errors
Q34.m <- aggregate(Q34.40_1~type, data=pre.post, mean)
Q34.m
```

```
##       type   Q34.40_1
## 1  pre2019 -0.2692308
## 2 post2019  0.2000000
```

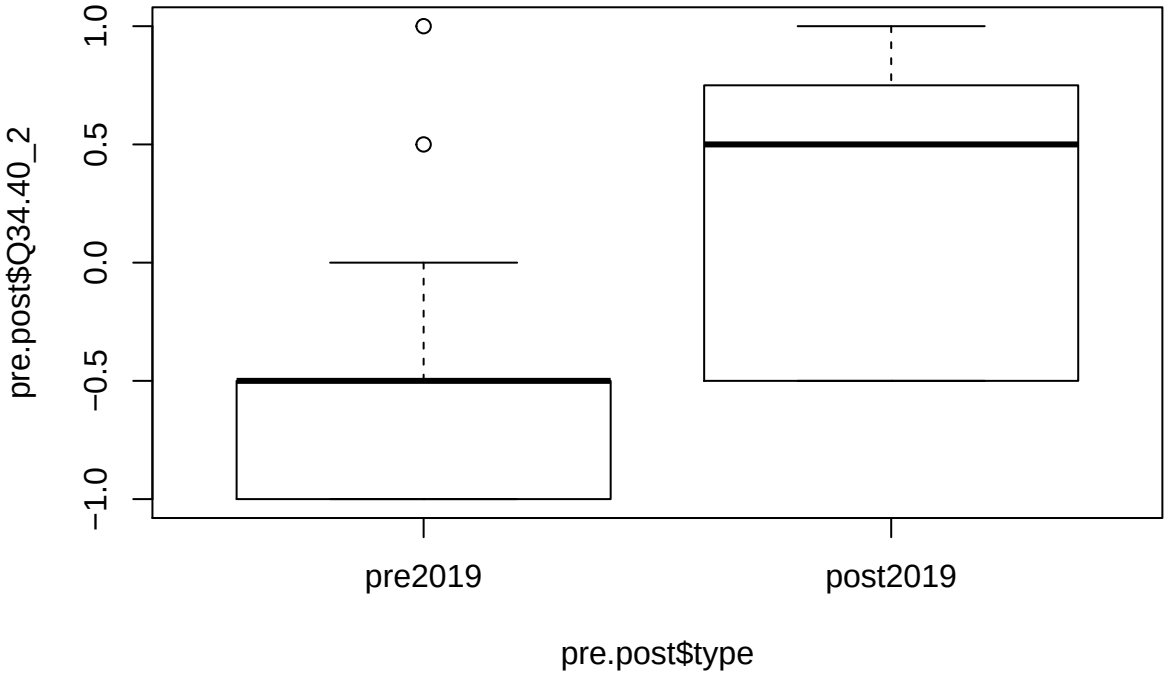
```
Q34.sd <- aggregate(Q34.40_1~type, data=pre.post, calcSE)
Q34.sd
```

```
##       type  Q34.40_1
## 1  pre2019 0.1661728
## 2 post2019 0.1855921
```

```
# Q35. I know of areas where food can be foraged in or near the city I live
#Q35 - significant
t.test(pre.post$Q34.40_2 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_2 by pre.post$type
## t = -2.7009, df = 20.825, p-value = 0.01345
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.2318341 -0.1597743
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             -0.4230769              0.2727273
```

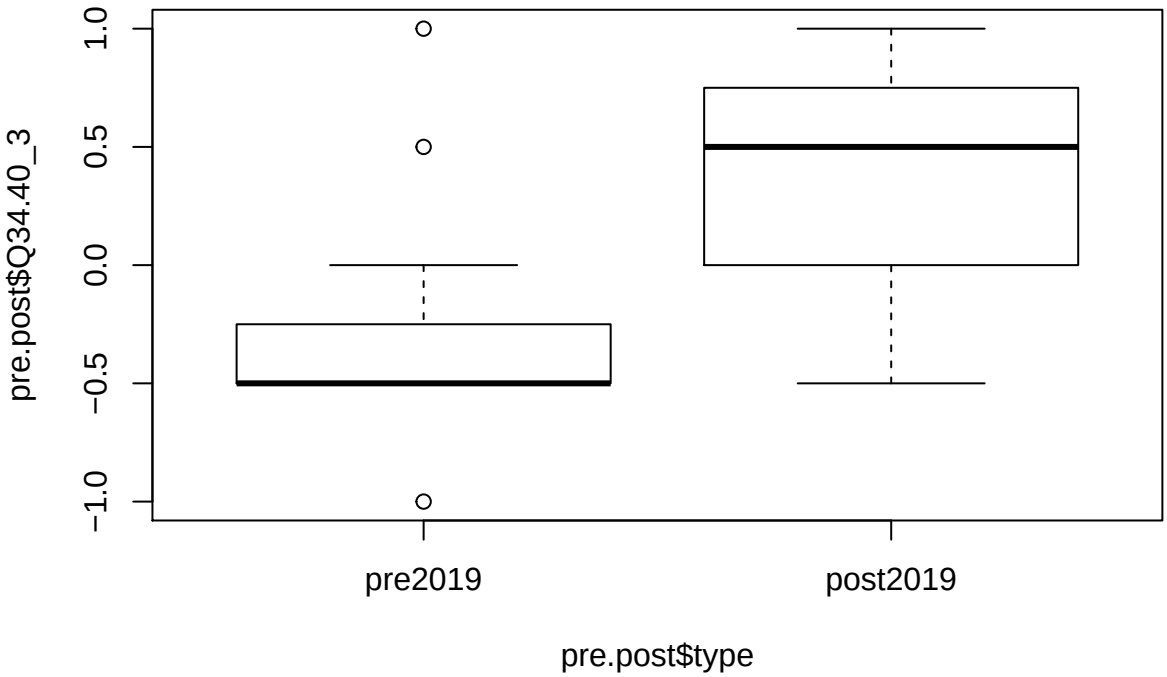
```r
boxplot(pre.post$Q34.40_2 ~ pre.post$type)
```




```r
# Q36. I know what kinds of tree species are found in my community
#Q36 - significant
t.test(pre.post$Q34.40_3 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_3 by pre.post$type
## t = -2.8696, df = 20.751, p-value = 0.009246
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.1305556 -0.1800505
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             -0.2916667              0.3636364
```

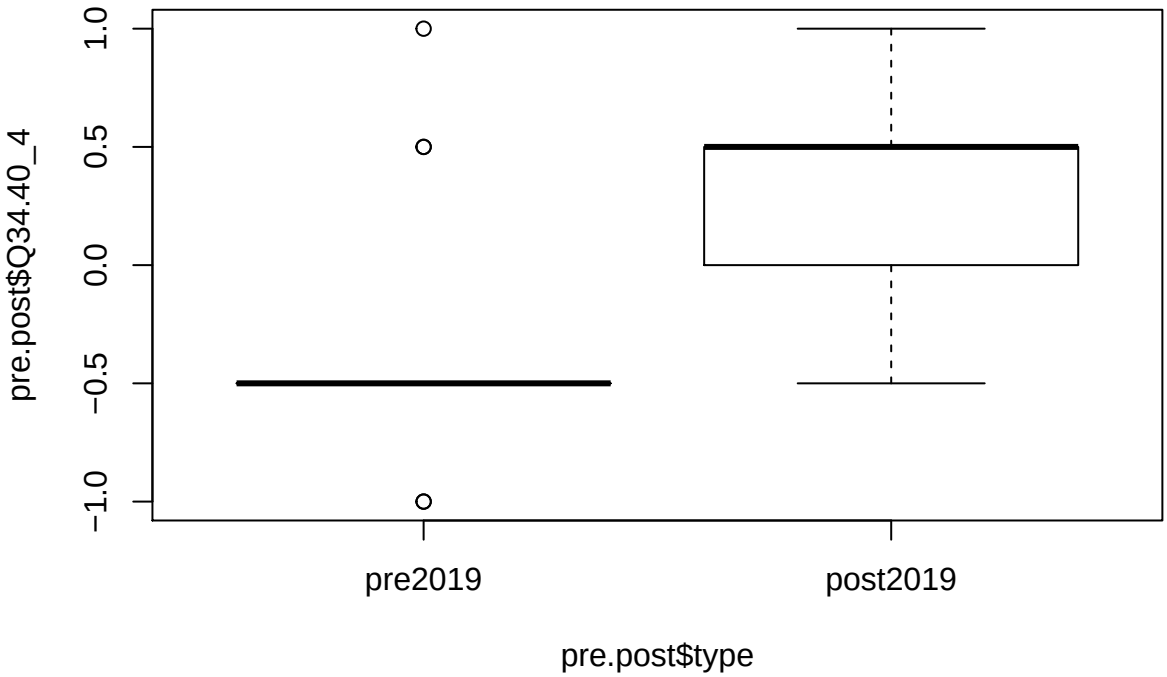
```r
boxplot(pre.post$Q34.40_3 ~ pre.post$type)
```




```
# Q37. I know what kinds of diseases local foresters and agriculturalists manage in Boulder
#Q37 - significant
t.test(pre.post$Q34.40_4 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_4 by pre.post$type
## t = -2.6477, df = 21.728, p-value = 0.0148
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.1164687 -0.1352796
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             -0.3076923              0.3181818
```

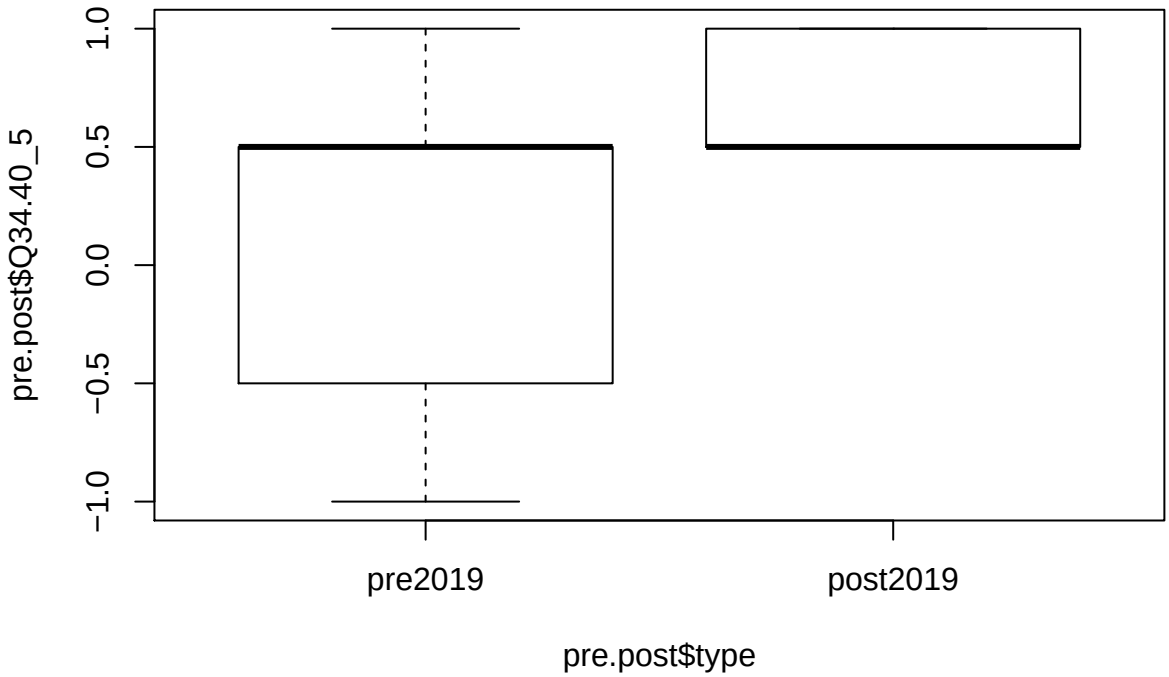
```
boxplot(pre.post$Q34.40_4 ~ pre.post$type)
```




```
# Q38. I have met people who work in urban agriculture systems
#Q38 - significant
t.test(pre.post$Q34.40_5 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_5 by pre.post$type
## t = -3.6042, df = 16.576, p-value = 0.002265
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.0928097 -0.2848127
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             0.03846154              0.72727273
```

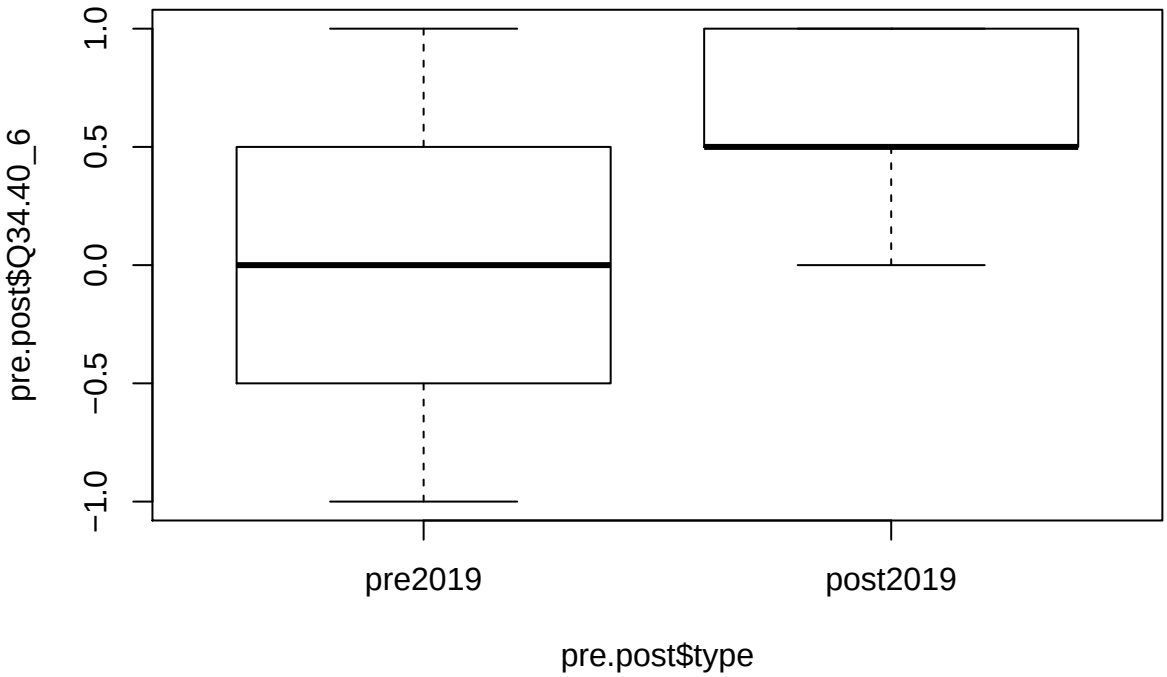
```
boxplot(pre.post$Q34.40_5 ~ pre.post$type)
```




```
# Q39. I could tell a story about the environment at a place in or near the city I live
#Q39 - significant
t.test(pre.post$Q34.40_6 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_6 by pre.post$type
## t = -2.5011, df = 20.581, p-value = 0.02091
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.95469977 -0.08725827
## sample estimates:
##  mean in group pre2019 mean in group post2019
##              0.1153846              0.6363636
```

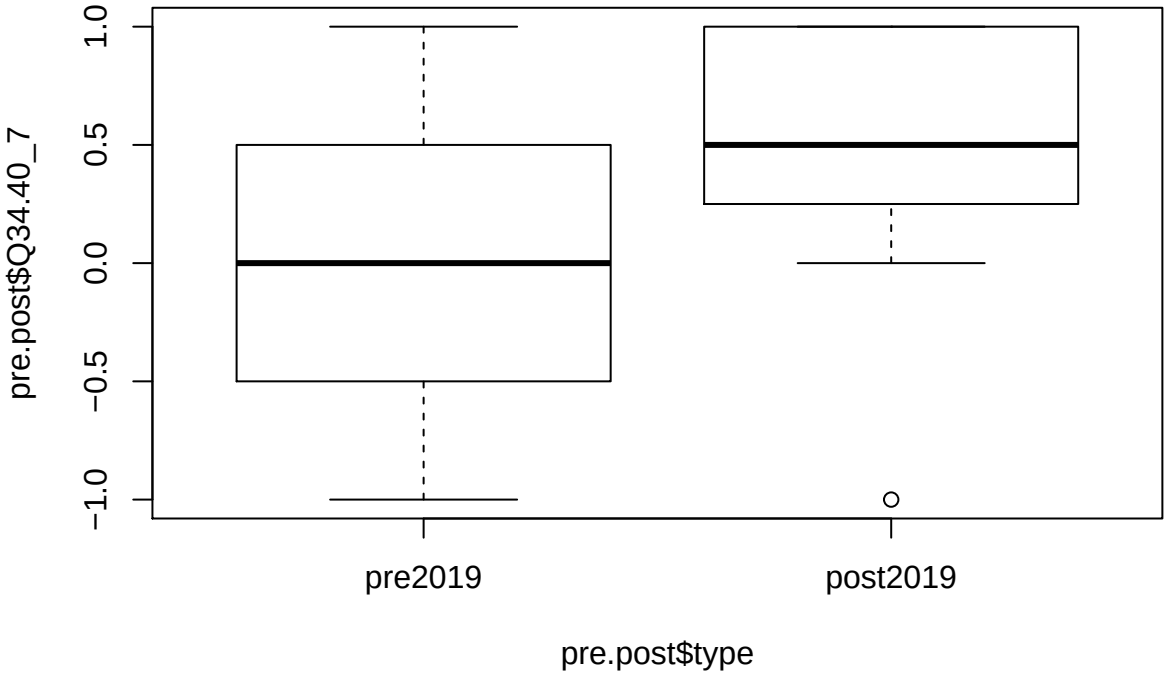
```
boxplot(pre.post$Q34.40_6 ~ pre.post$type)
```




```
# Q40. I could tell a story about the history of a place in or near the city I live
#Q40 - not significant
t.test(pre.post$Q34.40_7 ~ pre.post$type)
```

```
##
##  Welch Two Sample t-test
##
## data:  pre.post$Q34.40_7 by pre.post$type
## t = -1.4761, df = 21.651, p-value = 0.1543
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.9086514  0.1534066
## sample estimates:
##  mean in group pre2019 mean in group post2019
##             0.07692308              0.45454545
```

```
boxplot(pre.post$Q34.40_7 ~ pre.post$type)
```


pre.post$Q34.40_7
1.0
0.5
0.0
−0.5
−1.0
pre2019
post2019
pre.post$type