

# Phase 3 Political Analysis

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## Introduction

### Setup and Preliminaries

```
load("~/Desktop/Dissertation Analysis/Dissertation Analysis/Data/Processed/lms_cluster.rda")

# Load necessary libraries
library(pacman)
p_load(dplyr, ggplot2, FSA, dunn.test, rstatix, rcompanion, effsize, knitr,
       resample, boot, effectsize, pheatmap, forcats, dunn.test, tidyr)

# Set seed for reproducibility
set.seed(2500)
```

### Kruskal-Wallis & Dunn's Test

```
# Dependent Variables
dv_names <- c("VOTE_PREF", "IDEOLOGY", "FEELPART", "PARTYID", "SAYSO", "GOVTRUST", "INCSUPP", "DREAMACT")

# Initialize a list to store test results
kruskal_results <- list()
dunn_results <- list()

for (dv in dv_names) {
  # Perform Kruskal-Wallis Test
  kruskal_results[[dv]] <- kruskal.test(as.formula(paste(dv, "~ clusters")), data = lms_subset)

  # Extract cluster assignments and the DV
  data_for_test <- select(lms_subset, clusters, !!sym(dv))

  # Perform Dunn's Test for post-hoc comparisons if Kruskal-Wallis is significant
  if (kruskal_results[[dv]]$p.value < 0.05) {
    # Convert clusters to factor if not already
    data_for_test$clusters <- as.factor(data_for_test$clusters)

    # Remove NA values for Dunn's test
    data_for_test <- na.omit(data_for_test)

    # Perform Dunn's test
    dunn_results[[dv]] <- dunnTest(as.formula(paste(dv, "~ clusters")), data = data_for_test)
  } else {
```

```

    dunn_results[[dv]] <- NA
  }
}

# Print Kruskal-Wallis results
print("Kruskal-Wallis Test Results:")

## [1] "Kruskal-Wallis Test Results:"
print(kruskal_results)

## $VOTE_PREF
##
##   Kruskal-Wallis rank sum test
##
## data:  VOTE_PREF by clusters
## Kruskal-Wallis chi-squared = 23.965, df = 3, p-value = 2.54e-05
##
##
## $IDEOLOGY
##
##   Kruskal-Wallis rank sum test
##
## data:  IDEOLOGY by clusters
## Kruskal-Wallis chi-squared = 31.29, df = 3, p-value = 7.385e-07
##
##
## $FEELPART
##
##   Kruskal-Wallis rank sum test
##
## data:  FEELPART by clusters
## Kruskal-Wallis chi-squared = 15.241, df = 3, p-value = 0.001622
##
##
## $PARTYID
##
##   Kruskal-Wallis rank sum test
##
## data:  PARTYID by clusters
## Kruskal-Wallis chi-squared = 38.691, df = 3, p-value = 2.018e-08
##
##
## $SAYSO
##
##   Kruskal-Wallis rank sum test
##
## data:  SAYSO by clusters
## Kruskal-Wallis chi-squared = 14.234, df = 3, p-value = 0.002604
##
##
## $GOVTRUST
##
##   Kruskal-Wallis rank sum test

```

```

##
## data:  GOVTRUST by clusters
## Kruskal-Wallis chi-squared = 17.899, df = 3, p-value = 0.0004615
##
##
## $INCSUPP
##
## Kruskal-Wallis rank sum test
##
## data:  INCSUPP by clusters
## Kruskal-Wallis chi-squared = 67.598, df = 3, p-value = 1.394e-14
##
##
## $DREAMACT
##
## Kruskal-Wallis rank sum test
##
## data:  DREAMACT by clusters
## Kruskal-Wallis chi-squared = 100.64, df = 3, p-value < 2.2e-16
##
##
## $IMMVIEW
##
## Kruskal-Wallis rank sum test
##
## data:  IMMVIEW by clusters
## Kruskal-Wallis chi-squared = 142.18, df = 3, p-value < 2.2e-16
##
##
## $IMMPOLICY
##
## Kruskal-Wallis rank sum test
##
## data:  IMMPOLICY by clusters
## Kruskal-Wallis chi-squared = 98.615, df = 3, p-value < 2.2e-16
##
## Print Dunn's Test results
print("Dunn's Test Results (for significant Kruskal-Wallis tests):")

## [1] "Dunn's Test Results (for significant Kruskal-Wallis tests):"
print(dunn_results)

## $VOTE_PREF
## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.
##
## Comparison      Z      P.unadj      P.adj
## 1 Assimilationist - Bicultural -3.1487120 1.639917e-03 6.559669e-03
## 2 Assimilationist - Culture Affirming -4.8683070 1.125584e-06 6.753503e-06
## 3 Bicultural - Culture Affirming -3.2555534 1.131716e-03 5.658581e-03
## 4 Assimilationist - Demicultural -1.9465740 5.158583e-02 1.031717e-01
## 5 Bicultural - Demicultural 0.1225672 9.024498e-01 9.024498e-01
## 6 Culture Affirming - Demicultural 2.4598123 1.390097e-02 4.170291e-02
##

```

```

## $IDEOLOGY

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

## Comparison Z P.unadj P.adj
## 1 Assimilationist - Bicultural -0.8808132 3.784189e-01 3.784189e-01
## 2 Assimilationist - Culture Affirming -4.5084340 6.530789e-06 3.265395e-05
## 3 Bicultural - Culture Affirming -4.6673906 3.050491e-06 1.830295e-05
## 4 Assimilationist - Demicultural -3.0808900 2.063829e-03 8.255315e-03
## 5 Bicultural - Demicultural -2.9419684 3.261332e-03 9.783996e-03
## 6 Culture Affirming - Demicultural 1.1203875 2.625487e-01 5.250974e-01
##

## $FEELPART

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

## Comparison Z P.unadj P.adj
## 1 Assimilationist - Bicultural -2.6904680 0.0071351888 0.028540755
## 2 Assimilationist - Culture Affirming -3.4373544 0.0005874265 0.003524559
## 3 Bicultural - Culture Affirming -1.9192322 0.0549549530 0.164864859
## 4 Assimilationist - Demicultural -2.9708119 0.0029701360 0.014850680
## 5 Bicultural - Demicultural -1.4295730 0.1528396168 0.305679234
## 6 Culture Affirming - Demicultural 0.2910393 0.7710212381 0.771021238
##

## $PARTYID

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

## Comparison Z P.unadj P.adj
## 1 Assimilationist - Bicultural -5.734010 9.808349e-09 5.885010e-08
## 2 Assimilationist - Culture Affirming -5.103297 3.337868e-07 1.668934e-06
## 3 Bicultural - Culture Affirming -1.436897 1.507472e-01 3.014945e-01
## 4 Assimilationist - Demicultural -2.608705 9.088552e-03 3.635421e-02
## 5 Bicultural - Demicultural 1.321695 1.862698e-01 1.862698e-01
## 6 Culture Affirming - Demicultural 2.063990 3.901867e-02 1.170560e-01
##

## $SAYSO

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

## Comparison Z P.unadj P.adj
## 1 Assimilationist - Bicultural 3.6315192 0.0002817577 0.001690546
## 2 Assimilationist - Culture Affirming 2.1440268 0.0320307430 0.160153715
## 3 Bicultural - Culture Affirming -0.3889784 0.6972920905 0.697292090
## 4 Assimilationist - Demicultural 1.1043606 0.2694367538 0.808310261
## 5 Bicultural - Demicultural -1.4798884 0.1389030245 0.555612098
## 6 Culture Affirming - Demicultural -0.8595497 0.3900373334 0.780074667
##

## $GOVTRUST

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

## Comparison Z P.unadj P.adj
## 1 Assimilationist - Bicultural 1.5829122 0.1134414859 0.3403244578

```

```

## 2 Assimilationist - Culture Affirming 3.8648911 0.0001111388 0.0006668328
## 3      Bicultural - Culture Affirming 3.3289785 0.0008716514 0.0034866058
## 4      Assimilationist - Demicultural -0.1935186 0.8465528319 0.8465528319
## 5      Bicultural - Demicultural -1.4369948 0.1507194707 0.3014389414
## 6      Culture Affirming - Demicultural -3.5276068 0.0004193345 0.0020966727
##
## $INCSUPP

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

##           Comparison          Z      P.unadj      P.adj
## 1      Assimilationist - Bicultural -8.1050597 5.271961e-16 3.163176e-15
## 2 Assimilationist - Culture Affirming -3.4001560 6.734741e-04 2.693896e-03
## 3      Bicultural - Culture Affirming  2.5217167 1.167837e-02 3.503512e-02
## 4      Assimilationist - Demicultural -4.0816741 4.471247e-05 2.235623e-04
## 5      Bicultural - Demicultural  1.4055939 1.598447e-01 3.196895e-01
## 6      Culture Affirming - Demicultural -0.7472616 4.549057e-01 4.549057e-01
##
## $DREAMACT

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

##           Comparison          Z      P.unadj      P.adj
## 1      Assimilationist - Bicultural -8.979484 2.720398e-19 1.632239e-18
## 2 Assimilationist - Culture Affirming -4.794703 1.629156e-06 6.516625e-06
## 3      Bicultural - Culture Affirming  1.566789 1.171640e-01 2.343279e-01
## 4      Assimilationist - Demicultural -1.036814 2.998223e-01 2.998223e-01
## 5      Bicultural - Demicultural  5.646914 1.633530e-08 8.167651e-08
## 6      Culture Affirming - Demicultural  3.219880 1.282444e-03 3.847331e-03
##
## $IMMVIEW

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

##           Comparison          Z      P.unadj      P.adj
## 1      Assimilationist - Bicultural -10.539432 5.684128e-26 3.410477e-25
## 2 Assimilationist - Culture Affirming -8.145871 3.765613e-16 1.882807e-15
## 3      Bicultural - Culture Affirming -1.167504 2.430068e-01 2.430068e-01
## 4      Assimilationist - Demicultural -1.763102 7.788326e-02 1.557665e-01
## 5      Bicultural - Demicultural  5.987023 2.137167e-09 8.548667e-09
## 6      Culture Affirming - Demicultural  5.468882 4.528842e-08 1.358652e-07
##
## $IMMPOLICY

## Dunn (1964) Kruskal-Wallis multiple comparison
## p-values adjusted with the Holm method.

##           Comparison          Z      P.unadj      P.adj
## 1      Assimilationist - Bicultural -9.420223 4.501311e-21 2.700787e-20
## 2 Assimilationist - Culture Affirming -4.950070 7.418669e-07 3.709334e-06
## 3      Bicultural - Culture Affirming  1.739169 8.200507e-02 8.200507e-02
## 4      Assimilationist - Demicultural -2.395657 1.659059e-02 4.977177e-02
## 5      Bicultural - Demicultural  4.389283 1.137251e-05 4.549004e-05
## 6      Culture Affirming - Demicultural  2.124027 3.366789e-02 6.733578e-02

```

## Mann-Whitney U and Clifford's Delta

```
# Function to calculate Clifford's Delta
cliffords_delta <- function(x, y) {
  nx <- length(x)
  ny <- length(y)
  U <- wilcox.test(x, y, exact = FALSE)$statistic
  delta <- (2 * U - nx * ny) / (nx * ny)
  return(delta)
}

# Iterate through each DV, perform Mann-Whitney U test between cluster pairs, and calculate Clifford's Delta
for (dv in dv_names) {
  if (!is.null(kruskal_results[[dv]]) && kruskal_results[[dv]]$p.value < 0.05) {
    print(paste("Processing", dv))

    # Extract the clusters and DV, excluding NA values
    data_filtered <- na.omit(select(lns_subset, clusters, !!sym(dv)))

    # Get unique pairs of clusters
    cluster_pairs <- combn(unique(data_filtered$clusters), 2, simplify = FALSE)

    for (pair in cluster_pairs) {
      group1 <- filter(data_filtered, clusters == pair[1]][[dv]]
      group2 <- filter(data_filtered, clusters == pair[2]][[dv]]

      # Perform Mann-Whitney U test
      mw_test <- wilcox.test(group1, group2, exact = FALSE)

      # Calculate Clifford's Delta
      delta <- cliffords_delta(group1, group2)

      # Print results
      cat("Comparison between", pair[1], "and", pair[2], "\n")
      print(mw_test)
      cat("Clifford's Delta:", delta, "\n\n")
    }
  }
}
```

```
## [1] "Processing VOTE_PREF"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 646954, p-value = 0.001115
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.08588483
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
```

```

##
## data: group1 and group2
## W = 619961, p-value = 0.9026
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.003431304
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1230058, p-value = 0.001668
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.06746028
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 89136, p-value = 0.01327
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.08918949
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 176104, p-value = 1.121e-06
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1537746
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 141761, p-value = 0.05297
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.06391234
##
## [1] "Processing IDEOLOGY"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 623082, p-value = 2.37e-06

```

```

## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.1196155
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 568506, p-value = 0.003128
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.07985064
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1173876, p-value = 0.3681
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.01870397
##
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 84926, p-value = 0.2708
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.03775187
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 173271, p-value = 1.036e-05
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1352169
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 146059, p-value = 0.002975
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.09616871
##

```



```

## [1] "Processing FEELPART"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 672028, p-value = 0.05023
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.05045649
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 593310, p-value = 0.1472
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.0397052
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1218306, p-value = 0.006677
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.05726175
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 82565, p-value = 0.8044
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.008895732
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 168670, p-value = 0.0009664
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1050694
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction

```

```

##
## data: group1 and group2
## W = 145828, p-value = 0.004628
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.09443506
##
## [1] "Processing PARTYID"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 679854, p-value = 0.1435
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.03939944
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 641310, p-value = 0.1854
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.0379855
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1298188, p-value = 9.317e-09
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1265844
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 88080, p-value = 0.04012
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.07627968
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 177612, p-value = 5.878e-07

```

```

## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1636578
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 144876, p-value = 0.01117
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.08729033
##
## [1] "Processing SAYSO"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 699482, p-value = 0.6823
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.01166603
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 589982, p-value = 0.1365
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.04509089
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1055928, p-value = 0.0003034
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.0836528
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 78959, p-value = 0.3714
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.03516747

```

```

##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 141199, p-value = 0.02818
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.07490869
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 127749, p-value = 0.2472
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.04124733
##
## [1] "Processing GOVTRUST"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 770938, p-value = 0.001022
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.08929781
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 592556, p-value = 0.1569
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.04092558
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1112559, p-value = 0.1175
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.03450727
##
## Comparison between 1 and 3
##

```

```

## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 70964, p-value = 0.0003574
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.1328678
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 132900, p-value = 5.471e-05
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.1292844
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 134326, p-value = 0.809
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.008109122
##
## [1] "Processing INCSUPP"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 756977, p-value = 0.01012
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.0695716
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 643373, p-value = 0.1502
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.04132455
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2

```

```

## W = 1357762, p-value = 7.361e-16
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1782834
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 79512, p-value = 0.4478
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.02841624
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 170180, p-value = 0.0004819
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1149624
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 152084, p-value = 4.006e-05
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1413824
##
## [1] "Processing DREAMACT"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 738586, p-value = 0.09413
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.04358601
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 717294, p-value = 7.293e-09
## alternative hypothesis: true location shift is not equal to 0
##

```

```

## Clifford's Delta: 0.1609694
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1373056, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1915549
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 91834, p-value = 0.001112
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1221636
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 176870, p-value = 1.312e-06
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1587965
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 139200, p-value = 0.1976
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.04469586
##
## [1] "Processing IMMVIEW"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 693306, p-value = 0.1905
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: -0.02039242
##
## Comparison between 4 and 3

```

```

##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 686476, p-value = 2.118e-10
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1110885
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1324568, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1494764
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 92597, p-value = 1.325e-07
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1314809
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 178560, p-value = 1.453e-12
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1698688
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 138360, p-value = 0.1599
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.03838793
##
## [1] "Processing IMPOLICY"
## Comparison between 4 and 1
##
## Wilcoxon rank sum test with continuity correction
##

```



```

## data: group1 and group2
## W = 743119, p-value = 0.07521
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.04999092
##
## Comparison between 4 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 698662, p-value = 1.227e-05
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.130812
##
## Comparison between 4 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 1400737, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.2155772
##
## Comparison between 1 and 3
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 88756, p-value = 0.02916
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.08455222
##
## Comparison between 1 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 178566, p-value = 4.493e-07
## alternative hypothesis: true location shift is not equal to 0
##
## Clifford's Delta: 0.1699114
##
## Comparison between 3 and 2
##
## Wilcoxon rank sum test with continuity correction
##
## data: group1 and group2
## W = 144198, p-value = 0.02007
## alternative hypothesis: true location shift is not equal to 0
##

```

```
## Clifford's Delta: 0.08219821
```

## Bootstrapping effect size

### Cross-Validation

```
# Define Clifford's Delta function
cliffords_delta <- function(x, y) {
  nx <- length(x)
  ny <- length(y)
  U <- wilcox.test(x, y, exact = FALSE)$statistic
  delta <- (2 * U - nx * ny) / (nx * ny)
  return(delta)
}

# Function for bootstrapping Clifford's Delta
bootstrap_clifford_delta <- function(data, indices, dv, cluster1, cluster2) {
  sample_data <- data[indices, ]
  group1_data <- sample_data[sample_data$clusters == cluster1, dv]
  group2_data <- sample_data[sample_data$clusters == cluster2, dv]
  delta <- cliffords_delta(group1_data, group2_data)
  return(delta)
}

# Perform k-fold bootstrap analysis
perform_k_fold_bootstrap <- function(data, dv_names, cluster_pairs, k = 5) {
  set.seed(2500) # For reproducibility

  # Add fold assignment
  data$folds <- sample(rep(1:k, length.out = nrow(data)))

  results <- list()

  for (dv in dv_names) {
    for (pair in cluster_pairs) {
      deltas <- numeric(k)

      for (fold in 1:k) {
        fold_data <- data[data$folds != fold, ]

        bootstrap_res <- boot(fold_data, statistic = bootstrap_clifford_delta, R = 250,
                              dv = dv, cluster1 = pair[1], cluster2 = pair[2])

        deltas[fold] <- mean(bootstrap_res$t)
      }

      mean_delta <- mean(deltas)
      ci_delta <- quantile(deltas, probs = c(0.025, 0.975))
      results[[paste(dv, pair[1], "vs", pair[2])]] <- list(MeanDelta = mean_delta, CI = ci_delta)
    }
  }

  return(results)
}
```

```

# Dependent variables and cluster pairs of interest
dv_names <- c("VOTE_PREF", "IDEOLOGY", "FEELPART", "PARTYID", "SAYSO", "GOVTRUST", "INCSUPP", "DREAMACT")
cluster_pairs <- list(c("Culture Affirming", "Assimilationist"), c("Culture Affirming", "Demicultural"),
                     c("Culture Affirming", "Bicultural"), c("Assimilationist", "Demicultural"),
                     c("Assimilationist", "Bicultural"), c("Demicultural", "Bicultural"))

# Perform analysis
results <- perform_k_fold_bootstrap(lns_subset, dv_names, cluster_pairs, k = 5)

# Print results
for (name in names(results)) {
  cat(name, "\nMean Delta:", results[[name]]$MeanDelta,
      "\n95% CI:", paste("[", results[[name]]$CI[1], ",", results[[name]]$CI[2], "]", "\n\n"))
}

## VOTE_PREF Culture Affirming vs Assimilationist
## Mean Delta: 0.1522628
## 95% CI: [ 0.130128943943 , 0.169022594354353 ]
##
## VOTE_PREF Culture Affirming vs Demicultural
## Mean Delta: 0.0875386
## 95% CI: [ 0.0717483294657721 , 0.107868684631051 ]
##
## VOTE_PREF Culture Affirming vs Bicultural
## Mean Delta: 0.08570739
## 95% CI: [ 0.0723049012557827 , 0.105170924502111 ]
##
## VOTE_PREF Assimilationist vs Demicultural
## Mean Delta: -0.06361792
## 95% CI: [ -0.0969558406300156 , -0.0253256530515555 ]
##
## VOTE_PREF Assimilationist vs Bicultural
## Mean Delta: -0.06701918
## 95% CI: [ -0.093800972724502 , -0.0486655895526628 ]
##
## VOTE_PREF Demicultural vs Bicultural
## Mean Delta: -0.00402309
## 95% CI: [ -0.0276034332572761 , 0.0122556286174212 ]
##
## IDEOLOGY Culture Affirming vs Assimilationist
## Mean Delta: 0.1338462
## 95% CI: [ 0.122217761014675 , 0.143511788633191 ]
##
## IDEOLOGY Culture Affirming vs Demicultural
## Mean Delta: 0.03958294
## 95% CI: [ 0.00600752600993104 , 0.0764925394712122 ]
##
## IDEOLOGY Culture Affirming vs Bicultural
## Mean Delta: 0.118475
## 95% CI: [ 0.10485598488429 , 0.138202352437313 ]
##
## IDEOLOGY Assimilationist vs Demicultural
## Mean Delta: -0.09658038

```

```

## 95% CI: [ -0.122123039853913 , -0.0678777384456977 ]
##
## IDEOLOGY Assimilationist vs Bicultural
## Mean Delta: -0.01999715
## 95% CI: [ -0.02586630723426 , -0.0143682245032338 ]
##
## IDEOLOGY Demicultural vs Bicultural
## Mean Delta: 0.07916615
## 95% CI: [ 0.0566523899869999 , 0.101166733737727 ]
##
## FEELPART Culture Affirming vs Assimilationist
## Mean Delta: 0.1041029
## 95% CI: [ 0.0934850727947648 , 0.110573020871108 ]
##
## FEELPART Culture Affirming vs Demicultural
## Mean Delta: 0.008548947
## 95% CI: [ -0.00973808836662584 , 0.0205663826436056 ]
##
## FEELPART Culture Affirming vs Bicultural
## Mean Delta: 0.04874599
## 95% CI: [ 0.0387503261591634 , 0.0541639036333985 ]
##
## FEELPART Assimilationist vs Demicultural
## Mean Delta: -0.09544286
## 95% CI: [ -0.119384561138232 , -0.0789474913144462 ]
##
## FEELPART Assimilationist vs Bicultural
## Mean Delta: -0.05714352
## 95% CI: [ -0.0655238273711269 , -0.0394559455523719 ]
##
## FEELPART Demicultural vs Bicultural
## Mean Delta: 0.04058822
## 95% CI: [ 0.0185043228675481 , 0.0557437149323298 ]
##
## PARTYID Culture Affirming vs Assimilationist
## Mean Delta: 0.1653804
## 95% CI: [ 0.151052595885346 , 0.186509894549845 ]
##
## PARTYID Culture Affirming vs Demicultural
## Mean Delta: 0.07616921
## 95% CI: [ 0.0502914966391725 , 0.0930750134631313 ]
##
## PARTYID Culture Affirming vs Bicultural
## Mean Delta: 0.03996815
## 95% CI: [ 0.0149011001523568 , 0.051477730672395 ]
##
## PARTYID Assimilationist vs Demicultural
## Mean Delta: -0.08470047
## 95% CI: [ -0.104388186499001 , -0.0642579003707616 ]
##
## PARTYID Assimilationist vs Bicultural
## Mean Delta: -0.1272385
## 95% CI: [ -0.140591497659623 , -0.104367986434461 ]
##

```

```

## PARTYID Demicultural vs Bicultural
## Mean Delta: -0.03815062
## 95% CI: [ -0.0511762173909224 , -0.0272166206100908 ]
##
## SAYSO Culture Affirming vs Assimilationist
## Mean Delta: -0.07626103
## 95% CI: [ -0.0895727466405932 , -0.053091150564891 ]
##
## SAYSO Culture Affirming vs Demicultural
## Mean Delta: -0.03315828
## 95% CI: [ -0.0451995036359395 , -0.00580013325644504 ]
##
## SAYSO Culture Affirming vs Bicultural
## Mean Delta: 0.01168904
## 95% CI: [ 0.0031762589304662 , 0.0276346977469974 ]
##
## SAYSO Assimilationist vs Demicultural
## Mean Delta: 0.0415912
## 95% CI: [ 0.014071983841181 , 0.0744370022062634 ]
##
## SAYSO Assimilationist vs Bicultural
## Mean Delta: 0.08370782
## 95% CI: [ 0.0629403385256499 , 0.102997352729217 ]
##
## SAYSO Demicultural vs Bicultural
## Mean Delta: 0.04537742
## 95% CI: [ 0.0333522179603168 , 0.0610333348441352 ]
##
## GOVTRUST Culture Affirming vs Assimilationist
## Mean Delta: -0.1303572
## 95% CI: [ -0.140511988801675 , -0.107631637153459 ]
##
## GOVTRUST Culture Affirming vs Demicultural
## Mean Delta: -0.1331414
## 95% CI: [ -0.161827156627481 , -0.0885841467507251 ]
##
## GOVTRUST Culture Affirming vs Bicultural
## Mean Delta: -0.08974831
## 95% CI: [ -0.0993310203863677 , -0.06636965956204 ]
##
## GOVTRUST Assimilationist vs Demicultural
## Mean Delta: -0.008357642
## 95% CI: [ -0.032435320907168 , 0.0139121977100695 ]
##
## GOVTRUST Assimilationist vs Bicultural
## Mean Delta: 0.03453712
## 95% CI: [ 0.0294466844001757 , 0.0402634453085242 ]
##
## GOVTRUST Demicultural vs Bicultural
## Mean Delta: 0.04187988
## 95% CI: [ 0.0185706495649762 , 0.0639854042126851 ]
##
## INCSUPP Culture Affirming vs Assimilationist
## Mean Delta: 0.1158216

```

```

## 95% CI: [ 0.102268984029795 , 0.151032299504933 ]
##
## INCSUPP Culture Affirming vs Demicultural
## Mean Delta: -0.02770209
## 95% CI: [ -0.0522876721837981 , 0.00105422578100668 ]
##
## INCSUPP Culture Affirming vs Bicultural
## Mean Delta: -0.07046899
## 95% CI: [ -0.083116919981103 , -0.0469009472627862 ]
##
## INCSUPP Assimilationist vs Demicultural
## Mean Delta: -0.1411432
## 95% CI: [ -0.157893500340461 , -0.129940537823994 ]
##
## INCSUPP Assimilationist vs Bicultural
## Mean Delta: -0.1784644
## 95% CI: [ -0.194473479806239 , -0.168946770749898 ]
##
## INCSUPP Demicultural vs Bicultural
## Mean Delta: -0.04203155
## 95% CI: [ -0.0533232932269851 , -0.0197930962915225 ]
##
## DREAMACT Culture Affirming vs Assimilationist
## Mean Delta: 0.1595782
## 95% CI: [ 0.138901190435209 , 0.179477880950427 ]
##
## DREAMACT Culture Affirming vs Demicultural
## Mean Delta: 0.1250622
## 95% CI: [ 0.101281790112247 , 0.147314433662652 ]
##
## DREAMACT Culture Affirming vs Bicultural
## Mean Delta: -0.04323724
## 95% CI: [ -0.0559923977852668 , -0.0322979943369228 ]
##
## DREAMACT Assimilationist vs Demicultural
## Mean Delta: -0.04553745
## 95% CI: [ -0.0657792458090927 , -0.0299627412012342 ]
##
## DREAMACT Assimilationist vs Bicultural
## Mean Delta: -0.192623
## 95% CI: [ -0.21011753353543 , -0.173394846196507 ]
##
## DREAMACT Demicultural vs Bicultural
## Mean Delta: -0.1606181
## 95% CI: [ -0.17529169905158 , -0.138586817022907 ]
##
## IMMVIEW Culture Affirming vs Assimilationist
## Mean Delta: 0.1705966
## 95% CI: [ 0.156649175396692 , 0.179364314220978 ]
##
## IMMVIEW Culture Affirming vs Demicultural
## Mean Delta: 0.1304279
## 95% CI: [ 0.119957806819763 , 0.138849224763367 ]
##

```

```
## IMMVIEW Culture Affirming vs Bicultural
## Mean Delta: 0.02061668
## 95% CI: [ 0.0179049997317773 , 0.0251247966159773 ]
##
## IMMVIEW Assimilationist vs Demicultural
## Mean Delta: -0.03861035
## 95% CI: [ -0.057151389724867 , -0.0181979827129695 ]
##
## IMMVIEW Assimilationist vs Bicultural
## Mean Delta: -0.1496703
## 95% CI: [ -0.157130296440743 , -0.137460891543901 ]
##
## IMMVIEW Demicultural vs Bicultural
## Mean Delta: -0.1098059
## 95% CI: [ -0.118386619552849 , -0.101409812371786 ]
##
## IMPPOLICY Culture Affirming vs Assimilationist
## Mean Delta: 0.1710856
## 95% CI: [ 0.157945461655969 , 0.188322888807411 ]
##
## IMPPOLICY Culture Affirming vs Demicultural
## Mean Delta: 0.08557837
## 95% CI: [ 0.070721946564693 , 0.0948735995704945 ]
##
## IMPPOLICY Culture Affirming vs Bicultural
## Mean Delta: -0.04891075
## 95% CI: [ -0.0597424943735289 , -0.0349252160175106 ]
##
## IMPPOLICY Assimilationist vs Demicultural
## Mean Delta: -0.08406789
## 95% CI: [ -0.0963363643979881 , -0.0694948237683752 ]
##
## IMPPOLICY Assimilationist vs Bicultural
## Mean Delta: -0.2149555
## 95% CI: [ -0.234063898890684 , -0.194035423483319 ]
##
## IMPPOLICY Demicultural vs Bicultural
## Mean Delta: -0.1297093
## 95% CI: [ -0.138827939275777 , -0.122312135683101 ]
```

## Visualizations

### Heatmap of P-Values (Kruskal Wallis and Dunn's Text)

First, create and check dataframe.

```
# Initialize an empty list to store the p-values along with their respective DV names
all_p_values_list <- list()

# Iterate through dunn_results to extract p-values
for (dv in names(dunn_results)) {
  dv_result <- dunn_results[[dv]]
  if (!is.null(dv_result)) {
    # Extract adjusted p-values and comparisons
    p_values_df <- dv_result$res[, c("Comparison", "P.adj")]
  }
}
```

```

    p_values_df$DV <- dv # Add DV name to each row
    all_p_values_list[[dv]] <- p_values_df
  }
}

# Combine all entries into a single dataframe
all_p_values <- do.call(rbind, all_p_values_list)

# Check the structure and contents of all_p_values
str(all_p_values)

## 'data.frame':    60 obs. of  3 variables:
## $ Comparison: chr  "Assimilationist - Bicultural" "Assimilationist - Culture Affirming" "Bicultural
## $ P.adj      : num  6.56e-03 6.75e-06 5.66e-03 1.03e-01 9.02e-01 ...
## $ DV         : chr  "VOTE_PREF" "VOTE_PREF" "VOTE_PREF" "VOTE_PREF" ...

head(all_p_values)

##              Comparison      P.adj      DV
## VOTE_PREF.1  Assimilationist - Bicultural 6.559669e-03 VOTE_PREF
## VOTE_PREF.2  Assimilationist - Culture Affirming 6.753503e-06 VOTE_PREF
## VOTE_PREF.3  Bicultural - Culture Affirming 5.658581e-03 VOTE_PREF
## VOTE_PREF.4  Assimilationist - Demicultural 1.031717e-01 VOTE_PREF
## VOTE_PREF.5  Bicultural - Demicultural 9.024498e-01 VOTE_PREF
## VOTE_PREF.6  Culture Affirming - Demicultural 4.170291e-02 VOTE_PREF

Generate p-value heatmap

# Assuming all_p_values is correctly generated and available
# Check the structure and contents of all_p_values
str(all_p_values)

## 'data.frame':    60 obs. of  3 variables:
## $ Comparison: chr  "Assimilationist - Bicultural" "Assimilationist - Culture Affirming" "Bicultural
## $ P.adj      : num  6.56e-03 6.75e-06 5.66e-03 1.03e-01 9.02e-01 ...
## $ DV         : chr  "VOTE_PREF" "VOTE_PREF" "VOTE_PREF" "VOTE_PREF" ...

head(all_p_values)

##              Comparison      P.adj      DV
## VOTE_PREF.1  Assimilationist - Bicultural 6.559669e-03 VOTE_PREF
## VOTE_PREF.2  Assimilationist - Culture Affirming 6.753503e-06 VOTE_PREF
## VOTE_PREF.3  Bicultural - Culture Affirming 5.658581e-03 VOTE_PREF
## VOTE_PREF.4  Assimilationist - Demicultural 1.031717e-01 VOTE_PREF
## VOTE_PREF.5  Bicultural - Demicultural 9.024498e-01 VOTE_PREF
## VOTE_PREF.6  Culture Affirming - Demicultural 4.170291e-02 VOTE_PREF

# Reshape data for matrix format
wide_p_values <- pivot_wider(all_p_values, names_from = Comparison, values_from = P.adj)

# Ensure all values are numeric for heatmap
wide_p_values[] <- lapply(wide_p_values, function(x) as.numeric(as.character(x)))

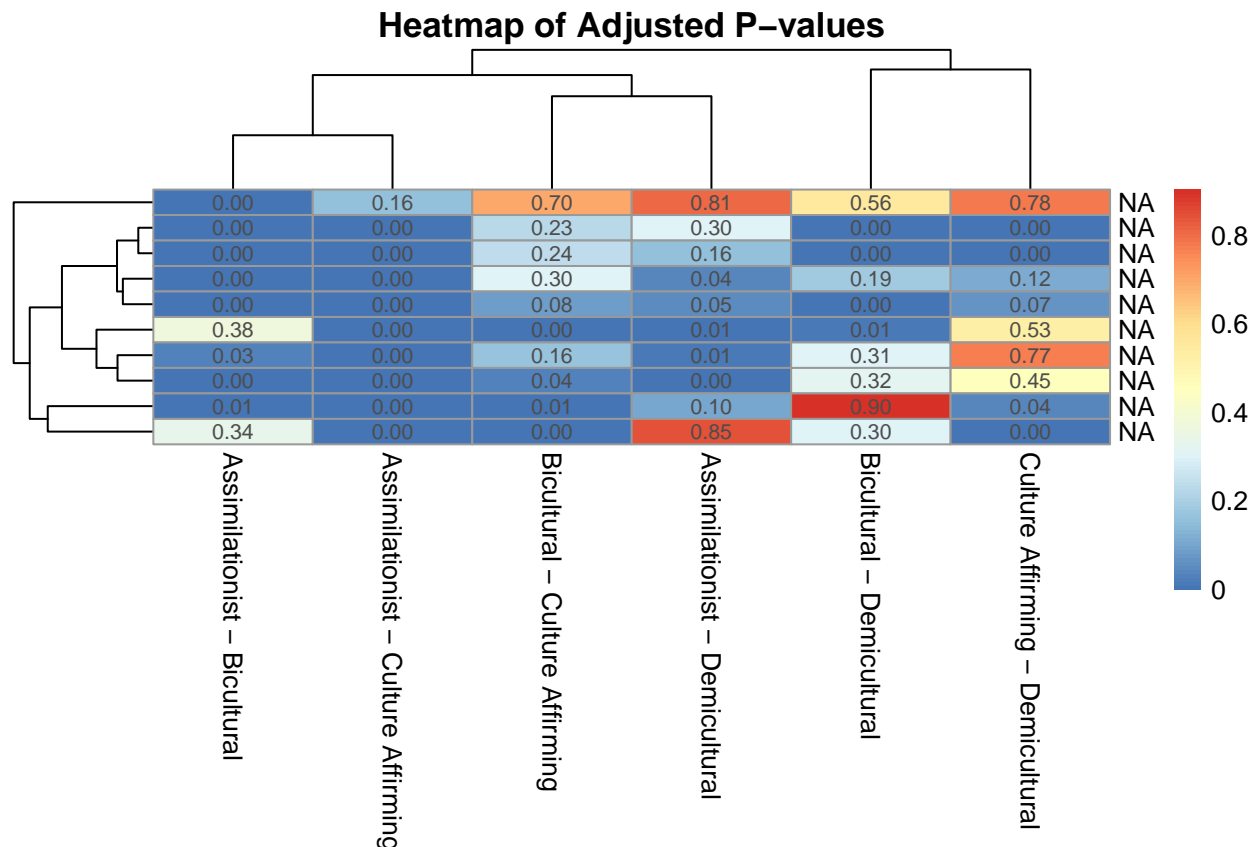
## Warning in FUN(X[[i]], ...): NAs introduced by coercion

# Generate adjusted p-value matrix visual
p_value_matrix <- as.matrix(wide_p_values[, -1])
rownames(p_value_matrix) <- wide_p_values$DV

```



```
# Generate heatmap, ensuring numerical accuracy to two decimal places
pheatmap(p_value_matrix,
  clustering_distance_rows = "euclidean",
  clustering_distance_cols = "euclidean",
  cluster_rows = TRUE,
  cluster_cols = TRUE,
  annotation_legend = TRUE,
  display_numbers = TRUE, # Display the p-values in the cells
  number_format = "%.2f", # Adjust number format to two decimal places for better readability
  main = "Heatmap of Adjusted P-values")
```



Horizontal bar charts that reflect the effect size (Clifford's Delta) for each DV

```
# Data frame containing the mean effect sizes for each group comparison within each DV
effect_sizes_data <- data.frame(
  DV = rep(c("VOTE_PREF", "IDEOLOGY", "FEELPART", "PARTYID", "SAYSO",
    "GOVTRUST", "INCSUPP", "DREAMACT", "IMMVIEW", "IMMPOLICY"), each = 6),
  GroupComparison = rep(c("Bicultural vs Culture Affirming", "Bicultural vs Assimilationist", "Bicultural vs Demicultural",
    "Culture Affirming vs Assimilationist", "Culture Affirming vs Demicultural", "Assimilationist vs Demicultural"), each = 6),
  CliffordDelta = c(-0.08588483, 0.003431304, 0.06746028, 0.08918949, 0.1537746, 0.06391234,
    -0.1196155, -0.07985064, 0.01870397, 0.03775187, 0.1352169, 0.09616871,
    -0.05045649, -0.0397052, 0.05726175, 0.008895732, 0.1050694, 0.09443506,
    -0.03939944, 0.0379855, 0.1265844, 0.07627968, 0.1636578, 0.08729033,
    -0.01166603, -0.04509089, -0.0836528, -0.03516747, -0.07490869, -0.04124733,
    0.08929781, -0.04092558, -0.03450727, -0.1328678, -0.1292844, 0.008109122,
    0.0695716, 0.04132455, 0.1782834, -0.02841624, 0.1149624, 0.1413824,
```

```

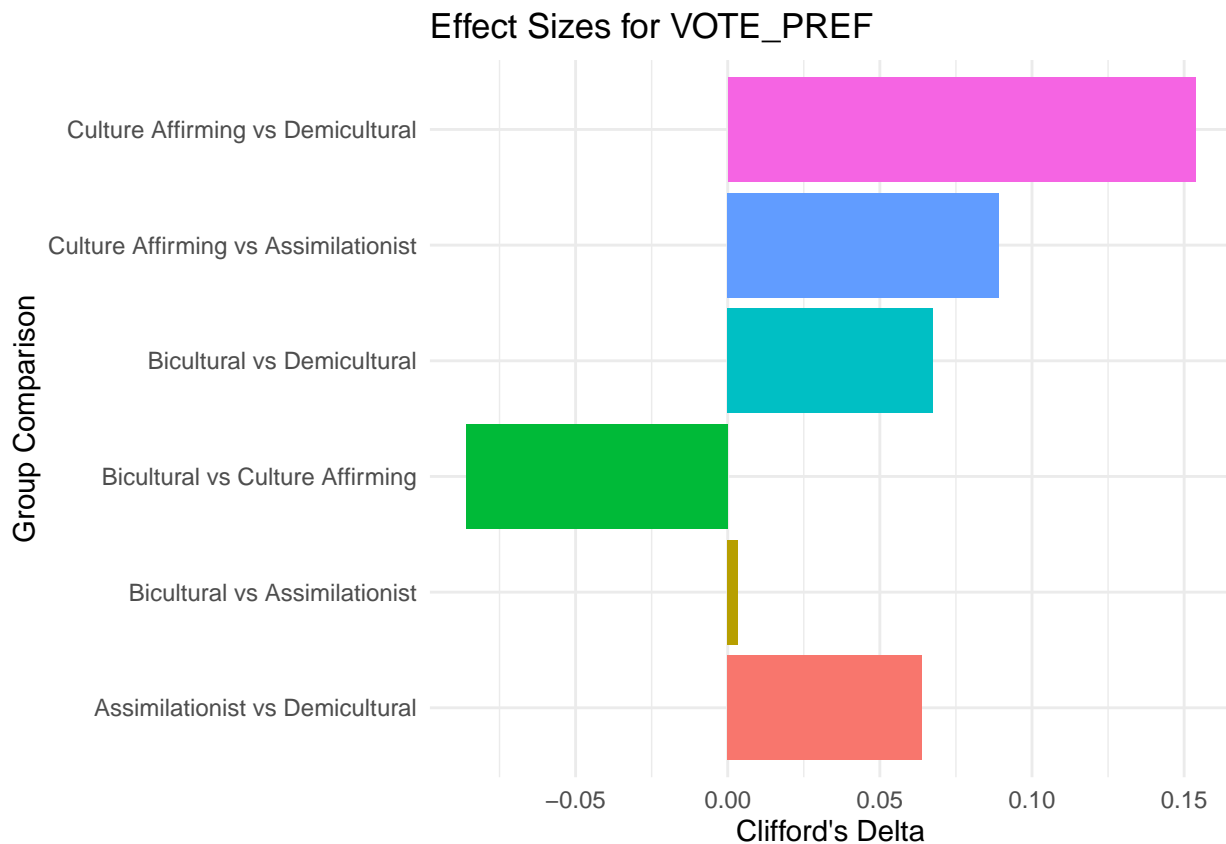
0.04358601, 0.1609694, 0.1915549, 0.1221636, 0.1587965, 0.04469586,
-0.02039242, 0.1110885, 0.1494764, 0.1314809, 0.1698688, 0.03838793,
0.04999092, 0.130812, 0.2155772, 0.08455222, 0.1699114, 0.08219821)
)

# Create the plot for each DV
plot_list <- lapply(unique(effect_sizes_data$DV), function(dv) {
  dv_data <- effect_sizes_data[effect_sizes_data$DV == dv, ]
  p <- ggplot(dv_data, aes(x = GroupComparison, y = CliffordDelta, fill = GroupComparison)) +
    geom_bar(stat = "identity") +
    coord_flip() +
    labs(title = paste("Effect Sizes for", dv),
         x = "Group Comparison",
         y = "Clifford's Delta") +
    theme_minimal() +
    theme(legend.position = "none")
  return(p)
})

# Output plots to a list (in an interactive R session, you would print these)
plot_list

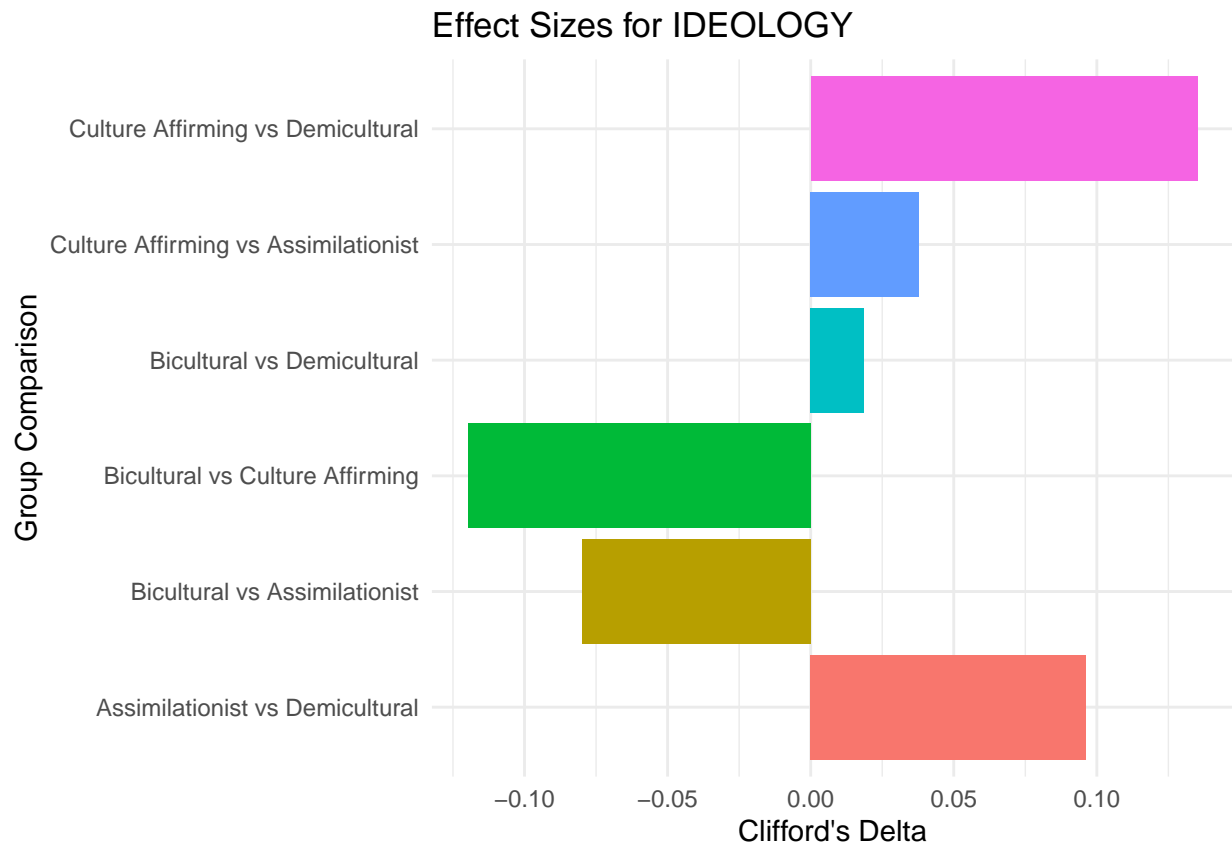
```

```
## [[1]]
```

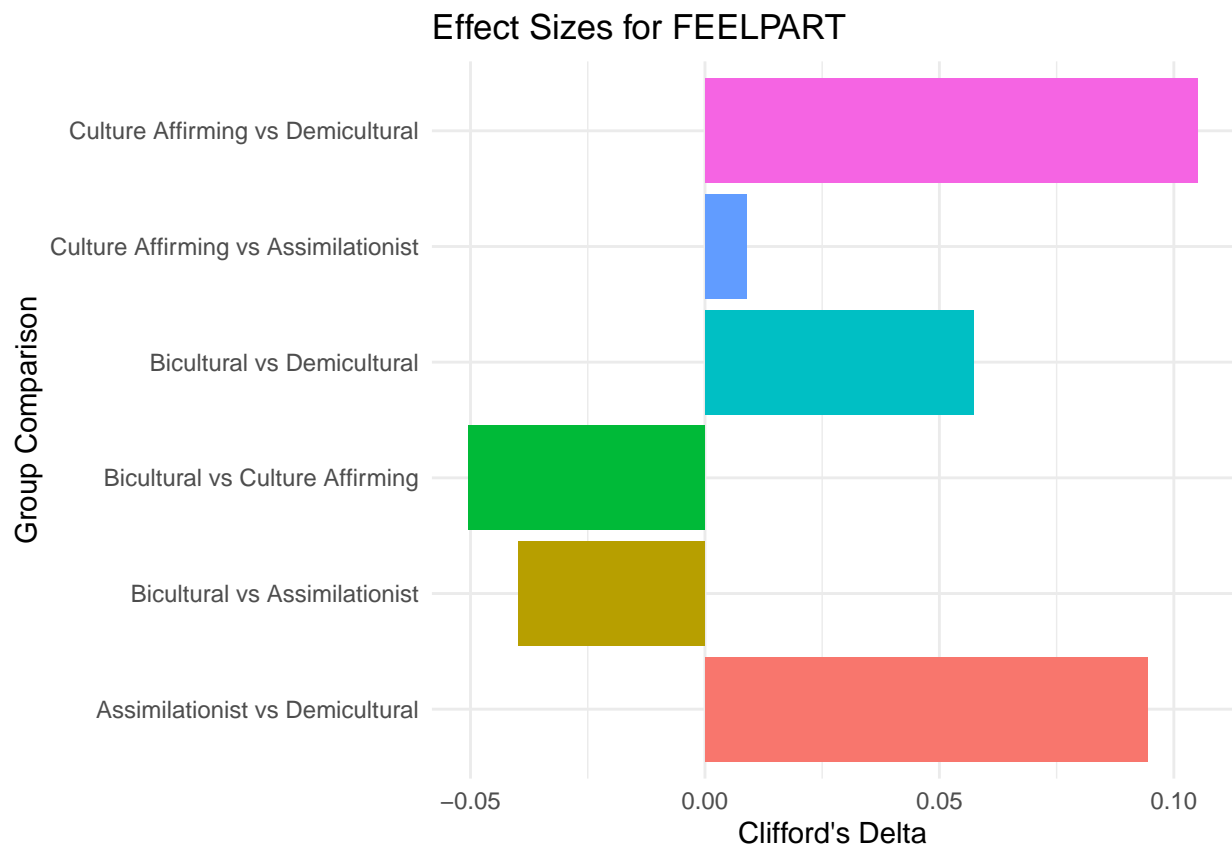


```
##
```

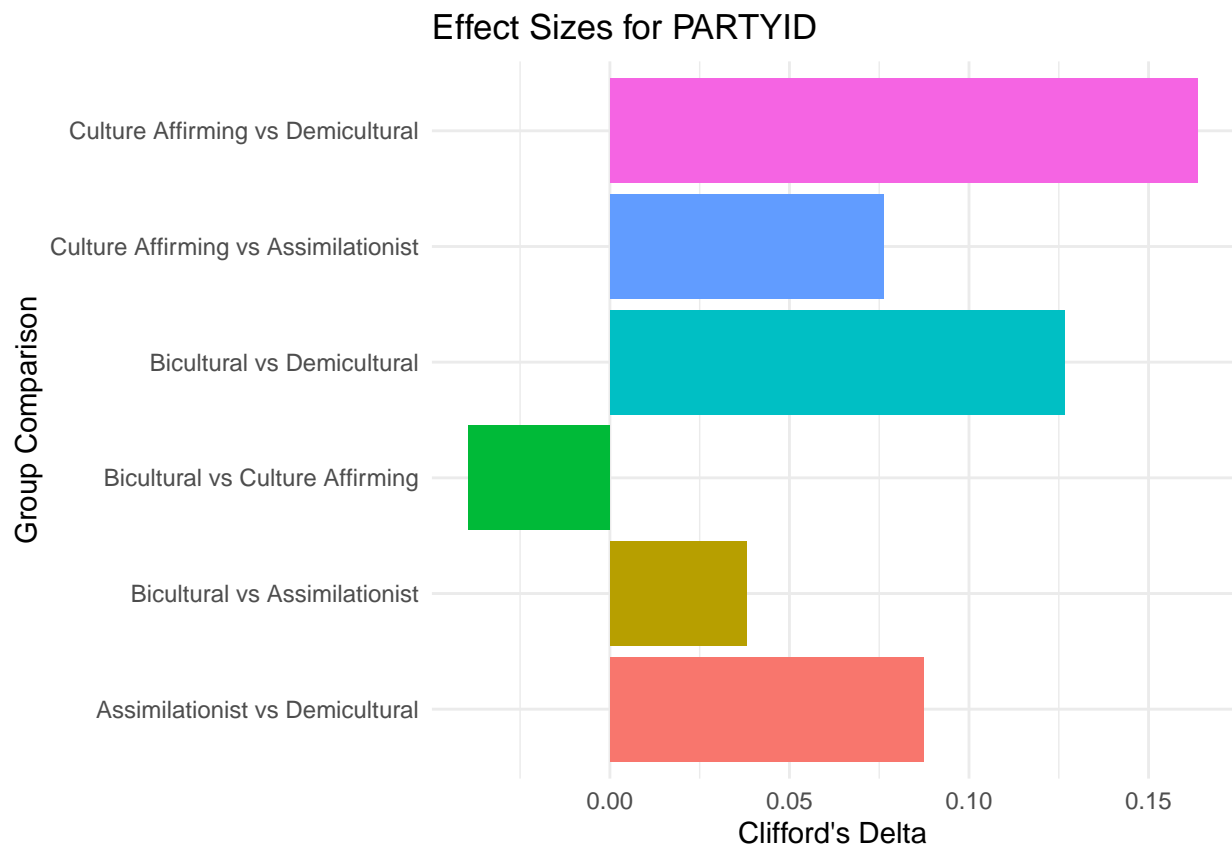
```
## [[2]]
```



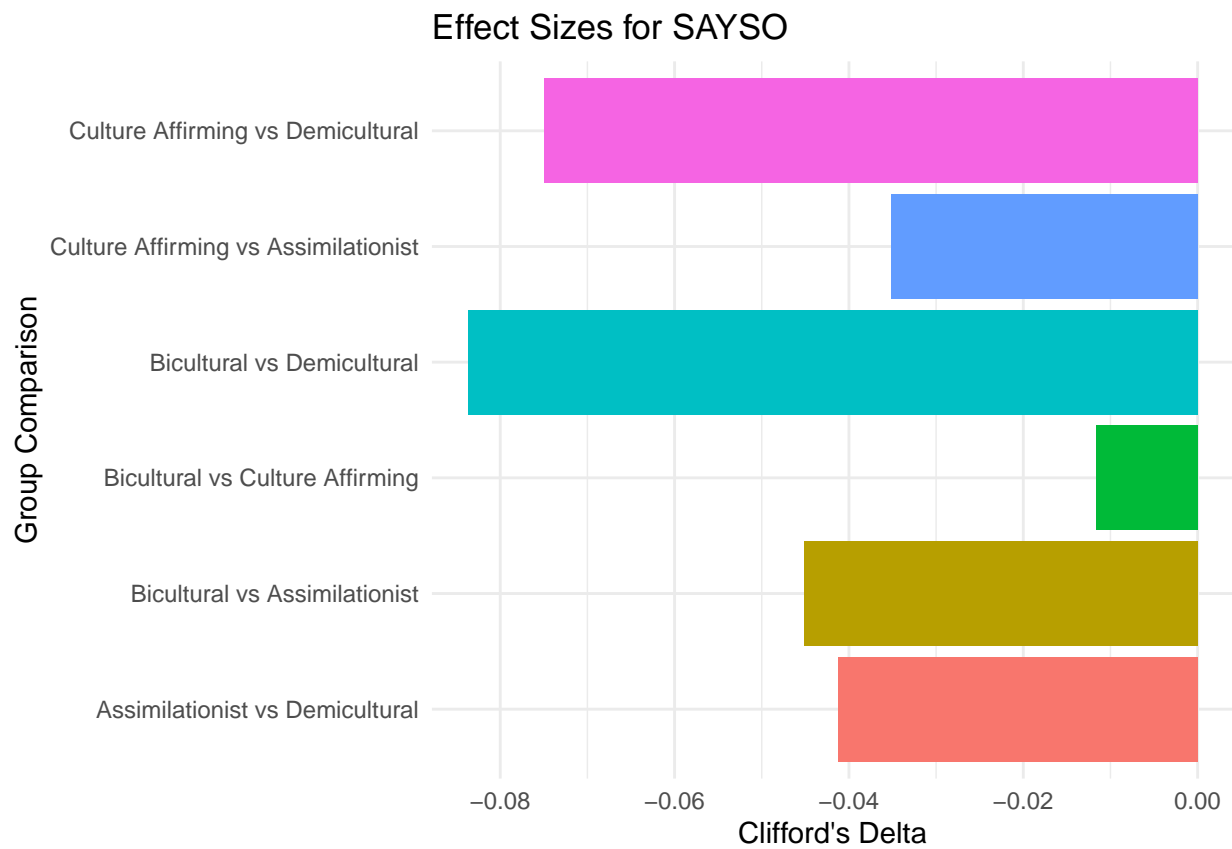
##  
## [[3]]



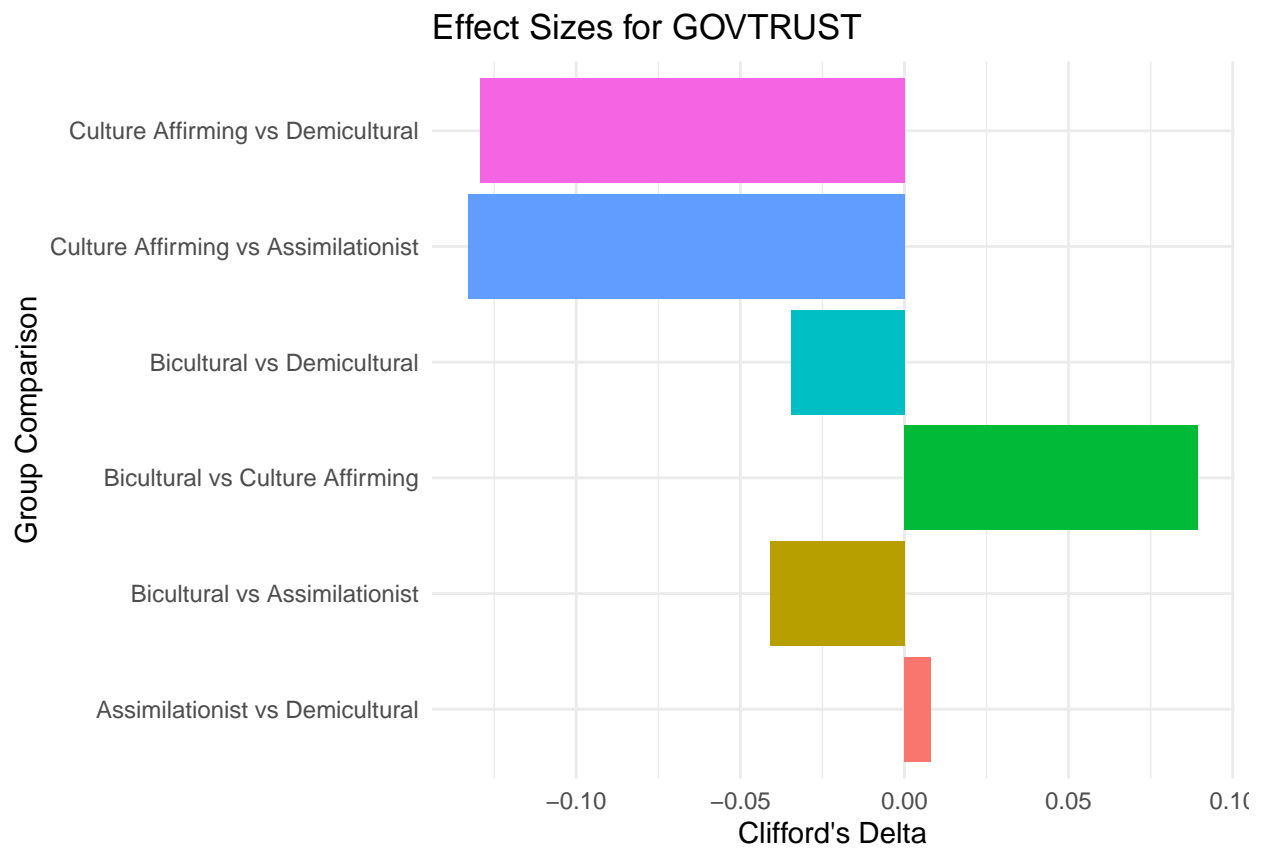
##  
## [[4]]



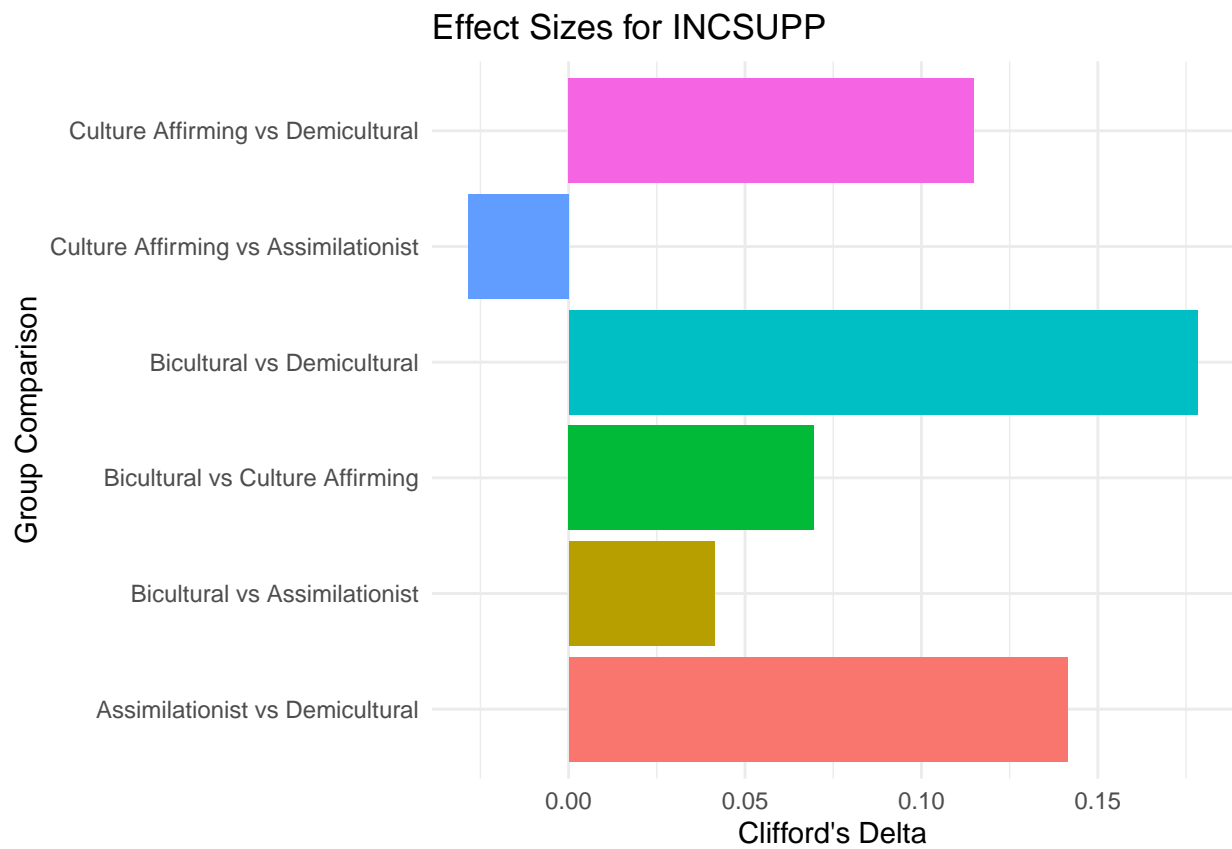
##  
## [[5]]



##  
## [[6]]

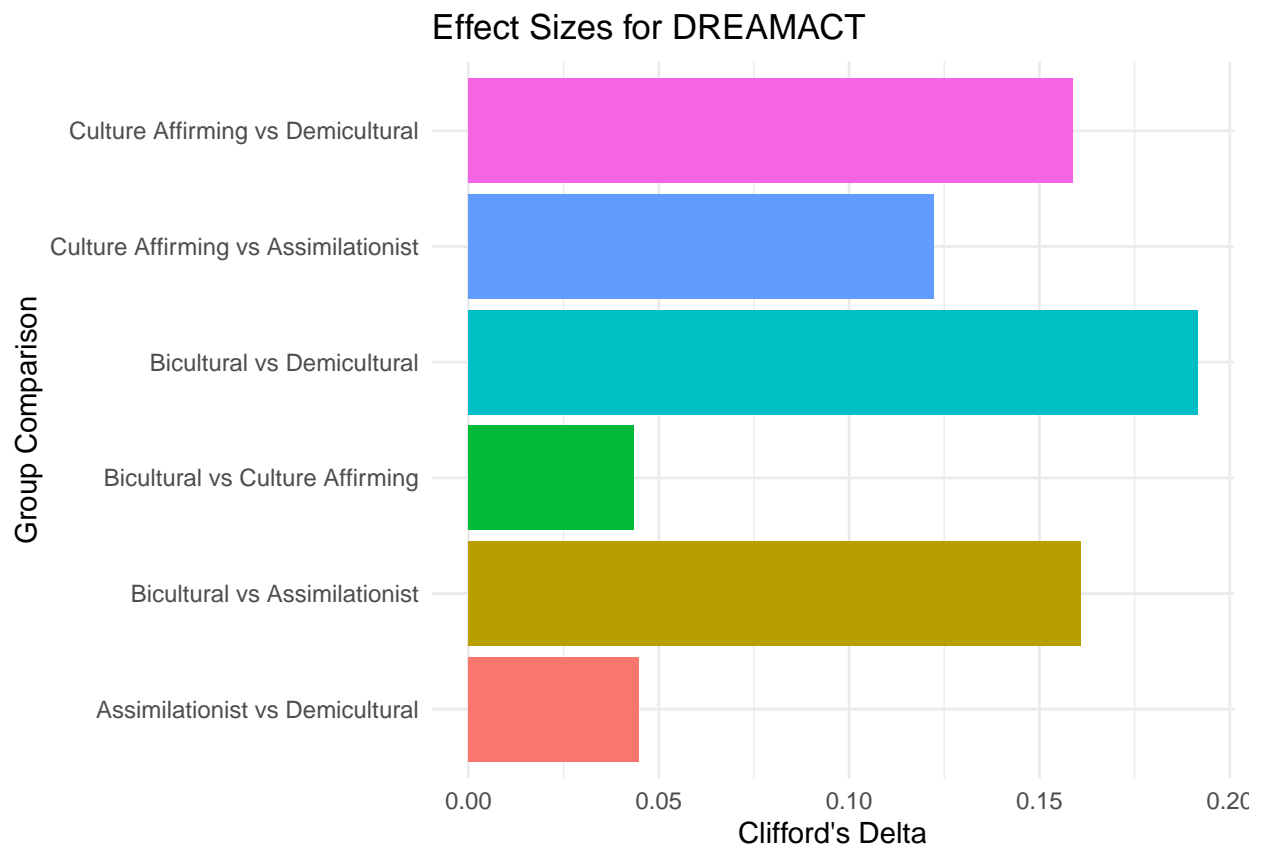


##  
## [[7]]

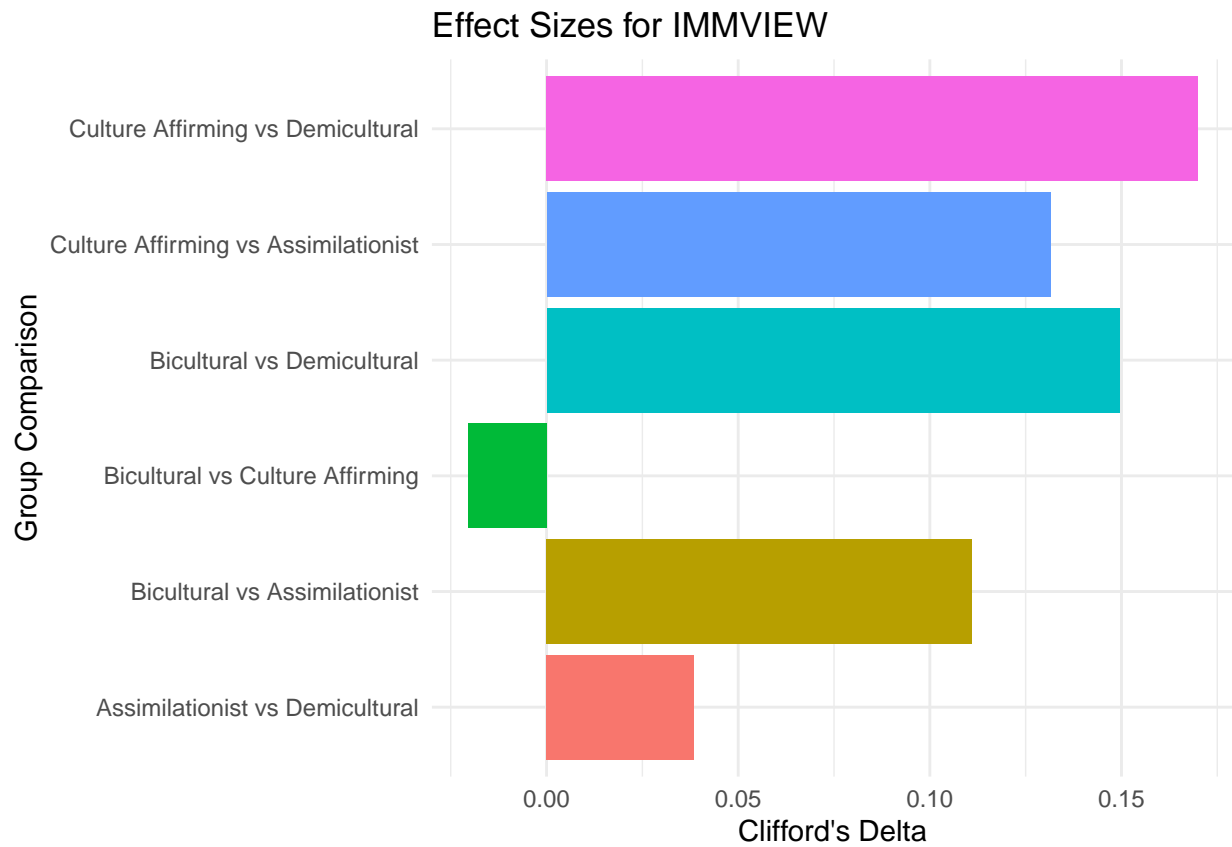


##  
## [[8]]

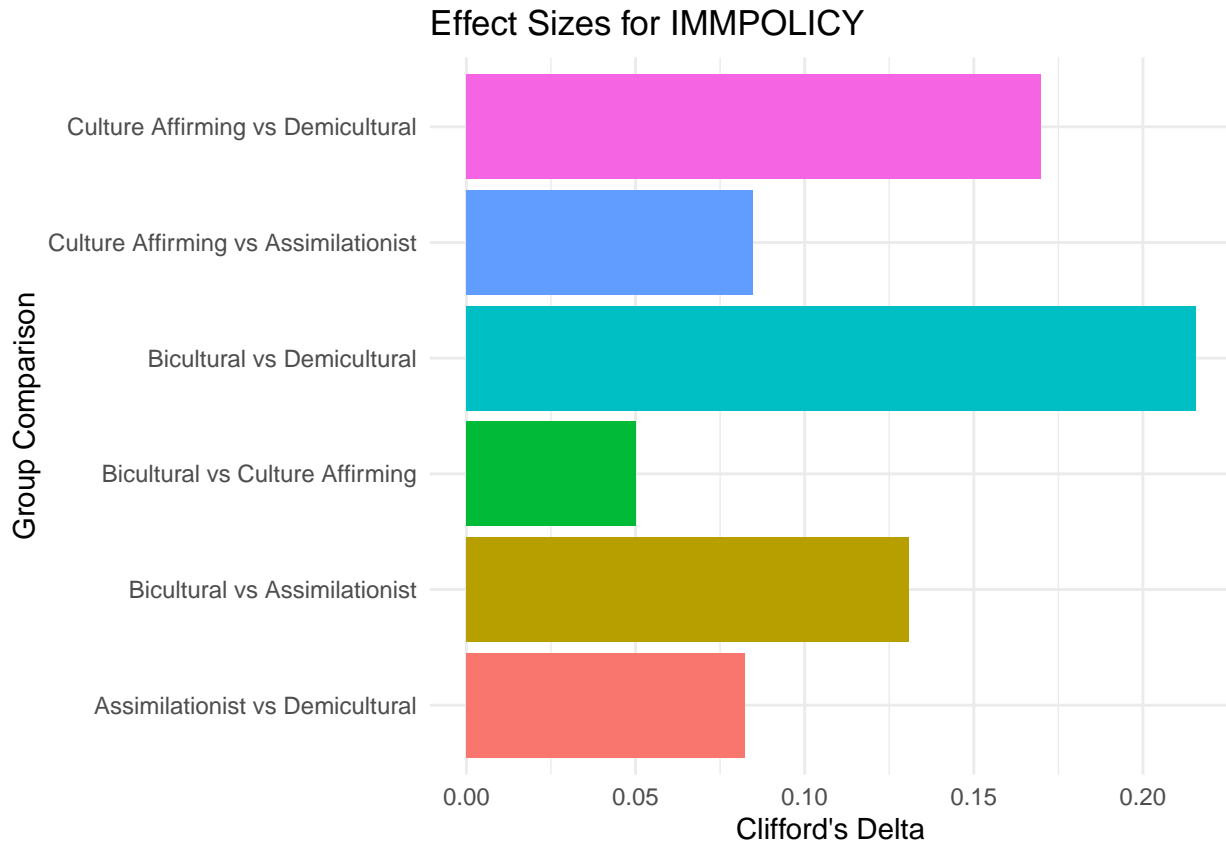




##  
## [[9]]



##  
## [[10]]



### Bootstrapping visual

*# Create a data frame for the effect sizes and confidence intervals*

```
results_long <- data.frame(
  DV = rep(c("VOTE_PREF", "IDEOLOGY", "FEELPART", "PARTYID", "SAYSO",
    "GOVTRUST", "INCSUPP", "DREAMACT", "IMMVIEW", "IMMPOLICY"), each = 6),
  Comparison = rep(c("Culture Affirming vs Assimilationist", "Culture Affirming vs Demicultural",
    "Culture Affirming vs Bicultural", "Assimilationist vs Demicultural",
    "Assimilationist vs Bicultural", "Demicultural vs Bicultural"), times = 10),
  MeanDelta = c(0.1547059, 0.09233548, 0.08587643, -0.06264687, -0.06608069, -0.006134255,
    0.1367659, 0.03911232, 0.1200444, -0.09633336, -0.01669249, 0.08036858,
    0.1069555, 0.003783072, 0.05044485, -0.09289184, -0.05827897, 0.03861188,
    0.1620583, 0.07119604, 0.04167913, -0.08662531, -0.1246331, -0.0360445,
    -0.07368748, -0.0340521, 0.01249216, 0.04379062, 0.0817566, 0.04365741,
    -0.1286762, -0.1337622, -0.08875619, -0.008314092, 0.03293426, 0.04349508,
    0.1158073, -0.03090745, -0.07054483, -0.1405438, -0.1802514, -0.04258738,
    0.1560401, 0.1213302, -0.04464698, -0.04240695, -0.1915187, -0.1638945,
    0.1691563, 0.1314193, 0.02147545, -0.03825933, -0.1497571, -0.1109044,
    0.1690053, 0.08566547, -0.04648618, -0.08234473, -0.2156806, -0.1323361),
  CI_Lower = c(0.100139, 0.01316083, 0.0394979, -0.1270689, -0.1057078, -0.05673681,
    0.08279524, -0.01981126, 0.0785398, -0.1658921, -0.06448284, 0.0341695,
    0.03860215, -0.05486829, 0.003594739, -0.1569954, -0.09388322, -0.007729793,
    0.1037622, -0.003161096, -0.006409413, -0.1436435, -0.1663727, -0.0920855,
    -0.1411585, -0.1252424, -0.04049107, -0.03601247, 0.03616807, -0.01013817,
    -0.1946839, -0.209907, -0.1396847, -0.07174956, -0.008550909, -0.007372629,
    0.05177603, -0.10013, -0.1193646, -0.2004205, -0.2244747, -0.09228738,
    0.09578143, 0.04842683, -0.09533265, -0.1087501, -0.2363106, -0.2181062,
    0.1335738, 0.07554411, -0.0080828, -0.09003991, -0.1835351, -0.1563921,
```

```

        0.1120777, 0.01589623, -0.0982657, -0.1547979, -0.2608261, -0.1890401),
CI_Upper = c(0.2216734, 0.1660327, 0.1248837, -0.004169638, -0.02677431, 0.04865304,
        0.1942003, 0.1011144, 0.1633805, -0.03367586, 0.01872499, 0.1269286,
        0.1713541, 0.07721421, 0.09952362, -0.02512299, -0.01716343, 0.09155562,
        0.2159224, 0.1479783, 0.09103454, -0.02976594, -0.07771892, 0.01630768,
        -0.01645865, 0.04137275, 0.06368909, 0.1214286, 0.1259482, 0.08947585,
        -0.06421705, -0.06180097, -0.03486763, 0.05435566, 0.07388191, 0.090388,
        0.1745826, 0.03527199, -0.02247421, -0.08377259, -0.1370686, 0.005727803,
        0.2139798, 0.183446, 0.004827116, 0.02497783, -0.1539272, -0.1070527,
        0.2077687, 0.1802424, 0.04820862, 0.01018288, -0.1172836, -0.06734113,
        0.2275679, 0.1557504, 0.01381613, -0.006938767, -0.1768027, -0.07939256)
)

# Create a factor that orders the DVs by the magnitude of the effect sizes
results_long$DV <- factor(results_long$DV, levels = unique(results_long$DV))

# Color code the comparisons based on whether their CIs cross zero
results_long$Significant <- ifelse(results_long$CI_Lower * results_long$CI_Upper > 0, "significant", "not significant")

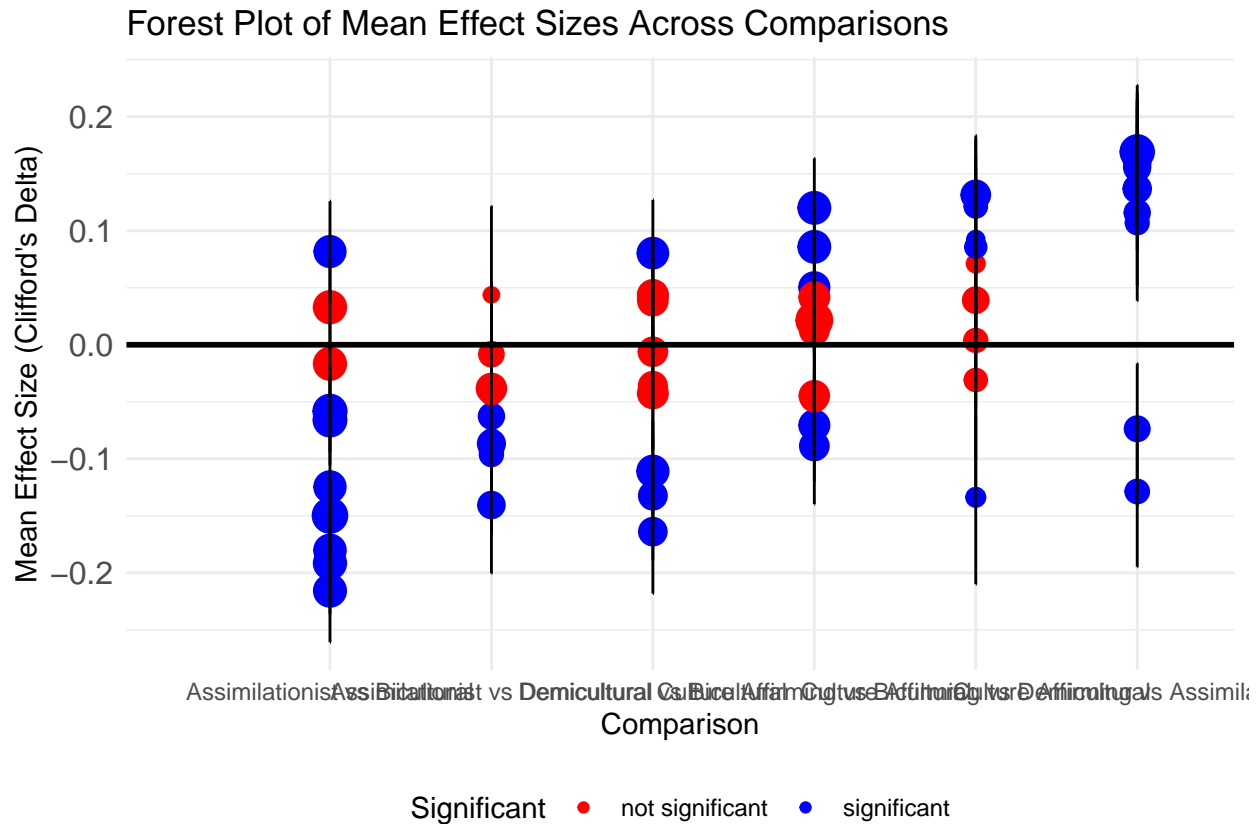
# Generate the forest plot with the enhancements
forest_plot <- ggplot(results_long, aes(x = MeanDelta, ymin = CI_Lower, ymax = CI_Upper, y = fct_reorder(DV, -abs(CI_Upper - CI_Lower)))) + # Color code and size by CI
  geom_point(aes(color = Significant, size = -abs(CI_Upper - CI_Lower))) + # Color code and size by CI
  geom_errorbarh(aes(xmin = CI_Lower, xmax = CI_Upper, height = 0)) + # Horizontal error bars for CIs
  geom_vline(xintercept = 0, linetype = "solid", color = "black", size = 1) + # Emphasize the zero line
  coord_flip() + # Flip the axes
  scale_color_manual(values = c("significant" = "blue", "not significant" = "red")) + # Define the colors
  labs(
    title = "Forest Plot of Mean Effect Sizes Across Comparisons",
    x = "Mean Effect Size (Clifford's Delta)",
    y = "Comparison"
  ) +
  theme_minimal() + # Use a minimal theme
  theme(
    legend.position = "bottom",
    axis.text.y = element_text(size = 12)
  ) +
  guides(size = FALSE) # Do not show the size guide

## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.

## Warning: The `<scale>` argument of `guides()` cannot be `FALSE`. Use "none" instead as
## of ggplot2 3.3.4.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.

# Display the plot
forest_plot

```



#### Cross-validation visual

```
cross_val_results <- data.frame(
  DV = rep(c("VOTE_PREF", "IDEOLOGY", "FEELPART", "PARTYID", "SAYSO",
    "GOVTRUST", "INCSUPP", "DREAMACT", "IMMVIEW", "IMMPOLICY"), each = 6),
  Comparison = rep(c("Culture Affirming vs Assimilationist", "Culture Affirming vs Demiculturalist",
    "Culture Affirming vs Biculturalist", "Assimilationist vs Demiculturalist",
    "Assimilationist vs Biculturalist", "Demiculturalist vs Biculturalist"), times = 10),
  MeanDelta = round(c(0.1523, 0.0875, 0.0857, -0.0636, -0.0670, -0.0040,
    0.1338, 0.0396, 0.1185, -0.0966, -0.0200, 0.0792,
    0.1041, 0.0085, 0.0487, -0.0954, -0.0571, 0.0406,
    0.1654, 0.0762, 0.0400, -0.0847, -0.1272, -0.0382,
    -0.0763, -0.0332, 0.0117, 0.0416, 0.0837, 0.0454,
    -0.1304, -0.1331, -0.0897, -0.0084, 0.0345, 0.0419,
    0.1158, -0.0277, -0.0705, -0.1411, -0.1785, -0.0420,
    0.1596, 0.1251, -0.0432, -0.0455, -0.1926, -0.1606,
    0.1706, 0.1304, 0.0206, -0.0386, -0.1497, -0.1098,
    0.1711, 0.0856, -0.0489, -0.0841, -0.2150, -0.1297), 4),
  CI_Lower = round(c(0.1301, 0.0717, 0.0723, -0.0970, -0.0938, -0.0276,
    0.1222, 0.0060, 0.1049, -0.1221, -0.0259, 0.0567,
    0.0935, -0.0097, 0.0388, -0.1194, -0.0655, 0.0185,
    0.1511, -0.0032, 0.0149, -0.1044, -0.1406, -0.0512,
    -0.0896, -0.0452, -0.0405, 0.0141, 0.0629, 0.0334,
    -0.1405, -0.1618, -0.0993, -0.0324, 0.0294, 0.0186,
    0.1023, -0.0523, -0.0831, -0.1579, -0.1945, -0.0533,
    0.1389, 0.1013, -0.0560, -0.0658, -0.2101, -0.1753,
    0.1566, 0.1200, 0.0179, -0.0572, -0.1571, -0.1184,
```

```

        0.1579, 0.0707, -0.0597, -0.0963, -0.2341, -0.1388), 4),
CI_Upper = round(c(0.1690, 0.1079, 0.1052, -0.0253, -0.0487, 0.0123,
        0.1435, 0.0765, 0.1382, -0.0679, 0.0187, 0.1012,
        0.1106, 0.0206, 0.0542, -0.0789, -0.0395, 0.0557,
        0.1865, 0.0931, 0.0515, -0.0643, -0.1044, 0.0163,
        -0.0531, -0.0058, 0.0276, 0.0744, 0.1030, 0.0610,
        -0.0642, -0.0618, -0.0349, 0.0544, 0.0739, 0.0904,
        0.1746, 0.0353, -0.0225, -0.0838, -0.1371, 0.0057,
        0.2140, 0.1834, 0.0048, 0.0250, -0.1539, -0.1071,
        0.2078, 0.1802, 0.0482, 0.0102, -0.1173, -0.0673,
        0.2276, 0.1558, 0.0138, -0.0069, -0.1768, -0.0794), 4)
)

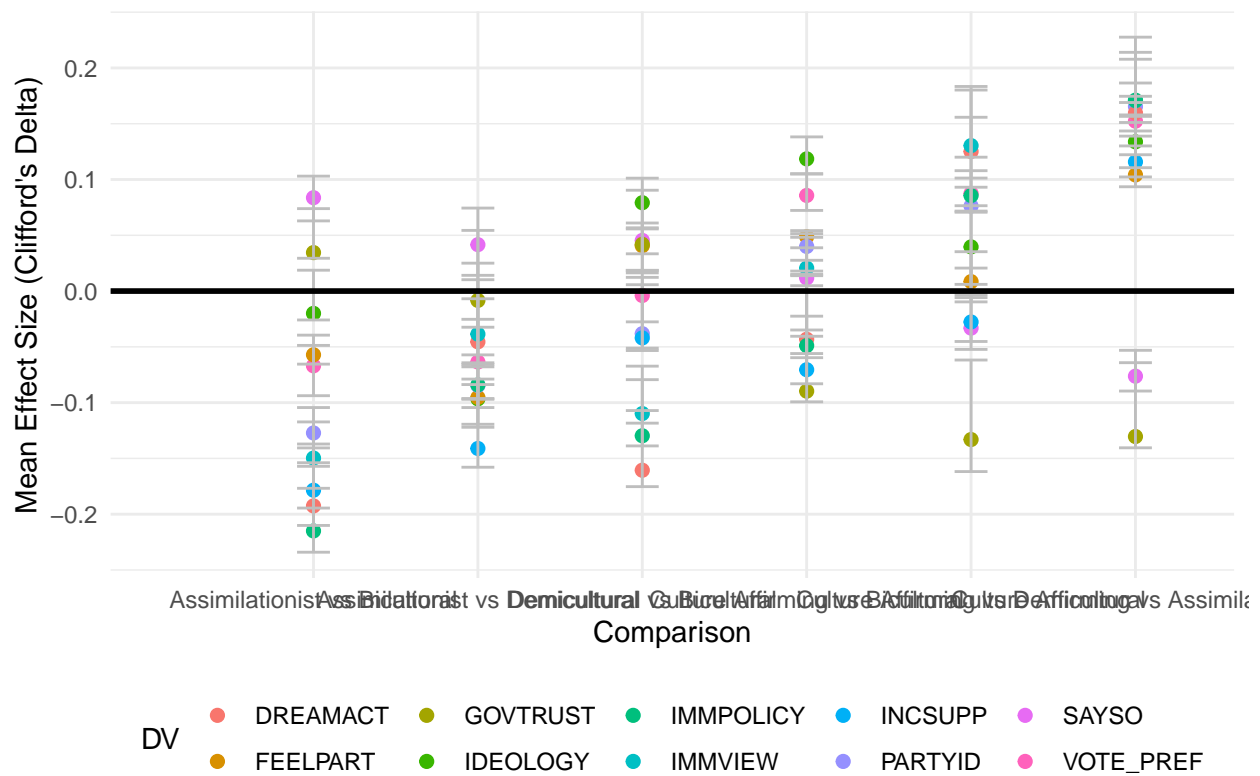
# Reorder comparisons based on the effect size magnitude for better visualization
cross_val_results <- cross_val_results %>%
  mutate(Comparison = reorder(Comparison, MeanDelta))

# Generate the forest plot
forest_plot <- ggplot(cross_val_results, aes(x = MeanDelta, ymin = CI_Lower, ymax = CI_Upper, y = Comparison)) +
  geom_point(size = 2, aes(color = DV)) + # Points for mean delta with color coding for DV
  geom_errorbarh(aes(xmin = CI_Lower, xmax = CI_Upper), height = 0.2, color = "gray") + # Error bars for CI
  geom_vline(xintercept = 0, linetype = "solid", color = "black", size = 1) + # Zero line
  coord_flip() + # Flip coordinates for horizontal layout
  labs(title = "Cross-Validation Results of Mean Effect Sizes",
        x = "Mean Effect Size (Clifford's Delta)",
        y = "Comparison") +
  theme_minimal() + # Minimal theme for plot
  theme(legend.position = "bottom") # Legend at the bottom

# Print the plot
forest_plot

```

## Cross-Validation Results of Mean Effect Sizes



Save

```
# Save the dataset with the new cluster labels
save(lms_subset, file = "~/Desktop/Dissertation Analysis/Dissertation Analysis/Data/Processed/lms_final")
```

End of Script