NormEvidenceInterventions

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Data Processing

```
library(readxl)
```

```
## Warning: package 'readxl' was built under R version 4.3.1
```

```
file_path <- "D:\\Princeton\\BSPL\\Norm Interventions\\nabnexus\\allwaves.xlsx"

dataframe <- read_excel(file_path)
```

```
## New names:
## * `attention1_t3` -> `attention1_t3...184`
## * `` -> `...218`
## * `` -> `...219`
## * `` -> `...220`
## * `attention1_t3` -> `attention1_t3...229`
```

```
dataframe <- dataframe[-nrow(dataframe), ]
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
new_df <- select(dataframe, prolific, control, treatment, b_frq_topic_t1,
                 b_frq_t1, importance_t1_1, importance_t1_2, importance_t1_3,
                 importance_t1_4, importance_t1_5, importance_t1_6,
                 b_frq_topic_t2, b_frq_t2, importance_t2_1, importance_t2_2,
                 importance_t2_3, importance_t2_4, importance_t2_5,
                 importance_t2_6, b_frq_topic_t3, b_frq_t3, importance_t3_1,
                 importance_t3_2, importance_t3_3, importance_t3_4,
                 importance_t3_5, importance_t3_6)
```

```
library(stringr)
```

```
## Warning: package 'stringr' was built under R version 4.3.1
```

```
new_df$frq_t1_character_count <- nchar(new_df$b_frq_t1)

new_df$frq_t1_word_count <- str_count(new_df$b_frq_t1, "\\S+")

new_df$frq_t2_character_count <- nchar(new_df$b_frq_t2)

new_df$frq_t2_word_count <- str_count(new_df$b_frq_t2, "\\S+")

new_df$frq_t3_character_count <- nchar(new_df$b_frq_t3)

new_df$frq_t3_word_count <- str_count(new_df$b_frq_t3, "\\S+")
```

```
new_df <- select(new_df, prolific, control, treatment, b_frq_topic_t1,
                 b_frq_t1, frq_t1_character_count, frq_t1_word_count,
                 importance_t1_1, importance_t1_2, importance_t1_3,
                 importance_t1_4, importance_t1_5, importance_t1_6,
                 b_frq_topic_t2, b_frq_t2, frq_t2_character_count,
                 frq_t2_word_count, importance_t2_1, importance_t2_2,
                 importance_t2_3, importance_t2_4, importance_t2_5,
                 importance_t2_6, b_frq_topic_t3, b_frq_t3,
                 frq_t3_character_count, frq_t3_word_count, importance_t3_1,
                 importance_t3_2, importance_t3_3, importance_t3_4,
                 importance_t3_5, importance_t3_6)
```

```
new_df <- rename(new_df, frq_topic_t1 = b_frq_topic_t1, frq_t1 = b_frq_t1,
                 frq_topic_t2 = b_frq_topic_t2, frq_t2 = b_frq_t2,
                 frq_topic_t3 = b_frq_topic_t3, frq_t3 = b_frq_t3)
```

Regressing Chosen Topic ~ Topic Importance

This includes regressions for each time period as well as one for everything combined.

```
library(nnet)

# Multinomial Logistic Regression
model <- multinom(frq_topic_t1 ~ importance_t1_1 + importance_t1_2 +
                            importance_t1_3 + importance_t1_4 + importance_t1_5 +
                            importance_t1_6, data = new_df)
```

```
## # weights:  48 (35 variable)
## initial  value 1103.723833
## iter  10 value 700.142697
## iter  20 value 566.461845
```

```
## iter  30 value 552.479144
## iter  40 value 545.546978
## iter  50 value 545.508348
## final  value 545.508328
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic_t1 ~ importance_t1_1 + importance_t1_2 +
##     importance_t1_3 + importance_t1_4 + importance_t1_5 + importance_t1_6,
##     data = new_df)
##
## Coefficients:
##   (Intercept) importance_t1_1 importance_t1_2 importance_t1_3 importance_t1_4
## 2   1.6704149       -2.396855      1.82796595       0.4543214      -0.3942682
## 3   0.9875819       -2.691338      0.03337441       2.9561947      -1.0102729
## 4   1.2051630       -2.552056     -0.02453433       0.5793683       1.6016663
## 5   3.0729680       -2.979939      0.21463992       0.9038051      -0.6228404
## 6   0.5853175       -2.800065      0.16302515       0.3687954      -0.6387186
##   importance_t1_5 importance_t1_6
## 2     -0.20163377       0.7867650
## 3      0.17687832       0.8221322
## 4      0.07819049       0.7513181
## 5      1.40923493       0.8994371
## 6      0.27723221       3.2579136
##
## Std. Errors:
##   (Intercept) importance_t1_1 importance_t1_2 importance_t1_3 importance_t1_4
## 2    1.947735       0.6347064       0.5784011       0.4045447       0.5025082
## 3    1.955159       0.6368256       0.5599509       0.4401754       0.5086731
## 4    1.885352       0.6218578       0.5403916       0.3744116       0.4871758
## 5    1.905269       0.6470620       0.5686016       0.4085546       0.5187830
## 6    1.951112       0.6372526       0.5585893       0.3911341       0.5144662
##   importance_t1_5 importance_t1_6
## 2       0.3053301       0.4054788
## 3       0.3095447       0.3919927
## 4       0.2903766       0.3784387
## 5       0.3317209       0.4093856
## 6       0.3116572       0.4364765
##
## Residual Deviance: 1091.017
## AIC: 1161.017
```

```
# Multinomial Logistic Regression
model <- multinom(frq_topic_t2 ~ importance_t2_1 + importance_t2_2 +
                          importance_t2_3 + importance_t2_4 + importance_t2_5 +
                          importance_t2_6, data = new_df)
```

```
## # weights:  48 (35 variable)
## initial  value 1103.723833
## iter  10 value 729.018084
## iter  20 value 612.506927
```

```
## iter  30 value 599.959048
## iter  40 value 596.577863
## iter  50 value 596.507145
## iter  50 value 596.507144
## iter  50 value 596.507144
## final  value 596.507144
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic_t2 ~ importance_t2_1 + importance_t2_2 +
##     importance_t2_3 + importance_t2_4 + importance_t2_5 + importance_t2_6,
##     data = new_df)
##
## Coefficients:
##   (Intercept) importance_t2_1 importance_t2_2 importance_t2_3 importance_t2_4
## 2  1.39794680       -2.399068       2.3797421     -0.32385152     -0.07506242
## 3  0.45131556       -2.414156       0.1861877      2.08587568     -0.27029733
## 4 -0.03747306       -2.445792       0.2658589      0.15829316      2.08031741
## 5  3.58768671       -2.729023       0.5630386      0.10691453     -0.34267342
## 6  1.80014301       -2.809275       0.2647734     -0.08275658      0.02939821
##   importance_t2_5 importance_t2_6
## 2      0.06677710       0.3323820
## 3      0.14230051       0.5892401
## 4      0.05664415       0.3587760
## 5      1.45575816       0.5404649
## 6      0.36755384       2.3356974
##
## Std. Errors:
##   (Intercept) importance_t2_1 importance_t2_2 importance_t2_3 importance_t2_4
## 2    1.730770       0.5178973       0.4307386       0.3947724       0.4723919
## 3    1.672053       0.5168472       0.3724387       0.4129313       0.4504894
## 4    1.627417       0.5105331       0.3650980       0.3813176       0.4666382
## 5    1.619866       0.5321524       0.3967282       0.3955290       0.4647789
## 6    1.640003       0.5212022       0.3825890       0.3891335       0.4626933
##   importance_t2_5 importance_t2_6
## 2       0.3483933       0.3438224
## 3       0.3376411       0.3310813
## 4       0.3278116       0.3211589
## 5       0.3601245       0.3475592
## 6       0.3419028       0.3560957
##
## Residual Deviance: 1193.014
## AIC: 1263.014
```

```
# Multinomial Logistic Regression
model <- multinom(frq_topic_t3 ~ importance_t3_1 + importance_t3_2 +
                          importance_t3_3 + importance_t3_4 + importance_t3_5 +
                          importance_t3_6, data = new_df)
```

```
## # weights:  48 (35 variable)
## initial  value 1103.723833
```

```
## iter  10 value 700.506611
## iter  20 value 607.146624
## iter  30 value 592.500063
## iter  40 value 589.481478
## final  value 589.442707
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic_t3 ~ importance_t3_1 + importance_t3_2 +
##     importance_t3_3 + importance_t3_4 + importance_t3_5 + importance_t3_6,
##     data = new_df)
##
## Coefficients:
##   (Intercept) importance_t3_1 importance_t3_2 importance_t3_3 importance_t3_4
## 2  -1.4039731       -2.249162       1.9053194       0.7415456      0.08283648
## 3  -1.5272731       -2.029255      -0.2798000       2.1417691      0.39710964
## 4  -1.1908225       -2.091314      -0.1300959       0.2352728      2.58959502
## 5   0.6670503       -2.361271      -0.1471918       0.4325130      0.64733889
## 6  -1.0060429       -2.095929      -0.1405035       0.3412858      0.62291837
##   importance_t3_5 importance_t3_6
## 2      0.06074394      0.06844187
## 3      0.43263989      0.07522061
## 4      0.27287106     -0.13941730
## 5      1.84138126     -0.25999320
## 6      0.33524040      1.65887068
##
## Std. Errors:
##   (Intercept) importance_t3_1 importance_t3_2 importance_t3_3 importance_t3_4
## 2    1.379596       0.4730195       0.4526605       0.3303305       0.3864780
## 3    1.292604       0.4668953       0.4240763       0.3493757       0.3762685
## 4    1.218764       0.4577609       0.4108006       0.3160601       0.3985369
## 5    1.234475       0.4858461       0.4390946       0.3342801       0.3981793
## 6    1.275006       0.4731276       0.4268530       0.3198698       0.3908953
##   importance_t3_5 importance_t3_6
## 2       0.3020366       0.3003018
## 3       0.3064474       0.3069300
## 4       0.2952809       0.2982866
## 5       0.3352394       0.3235532
## 6       0.3068842       0.3229246
##
## Residual Deviance: 1178.885
## AIC: 1248.885
```

```
frq_topic <- c(new_df$frq_topic_t1, new_df$frq_topic_t2, new_df$frq_topic_t3)

importance_1 <- c(new_df$importance_t1_1, new_df$importance_t2_1,
                  new_df$importance_t3_1)

importance_2 <- c(new_df$importance_t1_2, new_df$importance_t2_2,
                  new_df$importance_t3_2)
```

```r
importance_3 <- c(new_df$importance_t1_3, new_df$importance_t2_3,
                  new_df$importance_t3_3)

importance_4 <- c(new_df$importance_t1_4, new_df$importance_t2_4,
                  new_df$importance_t3_4)

importance_5 <- c(new_df$importance_t1_5, new_df$importance_t2_5,
                  new_df$importance_t3_5)

importance_6 <- c(new_df$importance_t1_6, new_df$importance_t2_6,
                  new_df$importance_t3_6)

stacked_df <- data.frame(frq_topic, importance_1, importance_2, importance_3,
                         importance_4, importance_5, importance_6)
```

```r
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ importance_1 + importance_2 +
                           importance_3 + importance_4 + importance_5 +
                           importance_6, data = stacked_df)
```

```
## # weights:  48 (35 variable)
## initial  value 3311.171499
## iter  10 value 2063.659801
## iter  20 value 1946.145711
## iter  30 value 1812.364720
## iter  40 value 1768.780775
## final  value 1768.319644
## converged
```

```r
summary(model)
```

```
## Call:
## multinom(formula = frq_topic ~ importance_1 + importance_2 +
##     importance_3 + importance_4 + importance_5 + importance_6,
##     data = stacked_df)
##
## Coefficients:
##   (Intercept) importance_1 importance_2 importance_3 importance_4 importance_5
## 2   0.2630213    -2.352499  2.041337827    0.3089545 -0.041551110  -0.04493559
## 3  -0.3177995    -2.336862  0.003160596    2.3320246 -0.166119622   0.21338097
## 4  -0.2940061    -2.347985  0.081272831    0.3274964  2.139870633   0.10735991
## 5   2.0993509    -2.647285  0.237682002    0.4632709 -0.008027427   1.50192554
## 6   0.1412418    -2.549937  0.135568598    0.2237973  0.149468770   0.28488205
##   importance_6
## 2    0.3498043
## 3    0.4279939
## 4    0.2641568
## 5    0.3506977
## 6    2.2712977
##
## Std. Errors:
##   (Intercept) importance_1 importance_2 importance_3 importance_4 importance_5
```

```
## 2   0.9034553    0.3033490    0.2691568    0.2082936    0.2594560    0.1799184
## 3   0.8798753    0.3004030    0.2479186    0.2214869    0.2506359    0.1791810
## 4   0.8433819    0.2958831    0.2415258    0.1980195    0.2557091    0.1720205
## 5   0.8454827    0.3096964    0.2576906    0.2096783    0.2592058    0.1919235
## 6   0.8674712    0.3031157    0.2508284    0.2026730    0.2566345    0.1807319
##   importance_6
## 2    0.1993800
## 3    0.1953343
## 4    0.1896458
## 5    0.2037767
## 6    0.2101403
##
## Residual Deviance: 3536.639
## AIC: 3606.639
```

The interpretation of all of these regressions is that the higher the respondent ranks the importance of a topic, the more likely they are to choose it, which makes sense.

Regressing Chosen Topic ~ Time

Data Processing

```
time1 <- c(1)
num_repetitions <- 616
time1 <- rep(time1, times = num_repetitions)

time2 <- c(2)
time2 <- rep(time2, times = num_repetitions)

time3 <- c(3)
time3 <- rep(time3, times = num_repetitions)

time <- c(time1, time2, time3)

stacked_df$time <- time
```

```
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ time, data = stacked_df)
```

```
## # weights:  18 (10 variable)
## initial  value 3311.171499
## iter  10 value 2849.674275
## final  value 2830.582510
## converged
```

```
summary(model)
```

```
## Call:
```

```
## multinom(formula = frq_topic ~ time, data = stacked_df)
##
## Coefficients:
##   (Intercept)        time
## 2    1.269340 -0.03252416
## 3    2.273602 -0.13973028
## 4    3.071985 -0.12687171
## 5    1.694157 -0.06251098
## 6    2.445325 -0.24117933
##
## Std. Errors:
##   (Intercept)      time
## 2   0.4622268 0.2068042
## 3   0.4310777 0.1933461
## 4   0.4174309 0.1867455
## 5   0.4452281 0.1993731
## 6   0.4304993 0.1937626
##
## Residual Deviance: 5661.165
## AIC: 5681.165
```

Time does not seem to have a relationship with chosen topic.

Regressing Topic Importance ~ Time

```
model <- lm(importance_1 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_1 ~ time, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.7979 -0.7979  0.2021  1.2021  2.2622
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.82792    0.07815   36.19   <2e-16 ***
## time        -0.03003    0.03618   -0.83    0.407
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.27 on 1846 degrees of freedom
## Multiple R-squared:  0.0003732,  Adjusted R-squared:  -0.0001683
## F-statistic: 0.6892 on 1 and 1846 DF,  p-value: 0.4065
```

```
model <- lm(importance_2 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_2 ~ time, data = stacked_df)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -2.135 -1.112 -0.112  0.888  1.911
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.15747    0.07769  40.644   <2e-16 ***
## time        -0.02273    0.03596  -0.632    0.527
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.262 on 1846 degrees of freedom
## Multiple R-squared:  0.0002163,  Adjusted R-squared:  -0.0003253
## F-statistic: 0.3994 on 1 and 1846 DF,  p-value: 0.5275
```

```
model <- lm(importance_3 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_3 ~ time, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8057 -0.8009  0.1991  1.1943  1.2040
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.81061    0.06829  55.801   <2e-16 ***
## time        -0.00487    0.03161  -0.154    0.878
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.11 on 1846 degrees of freedom
## Multiple R-squared:  1.286e-05,  Adjusted R-squared:  -0.0005288
## F-statistic: 0.02373 on 1 and 1846 DF,  p-value: 0.8776
```

```
model <- lm(importance_4 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_4 ~ time, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.1172 -0.1172 -0.1155  0.8837  0.8845
```

```
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 4.1147186  0.0633527  64.949   <2e-16 ***
## time        0.0008117  0.0293266   0.028    0.978
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.029 on 1846 degrees of freedom
## Multiple R-squared:  4.15e-07,   Adjusted R-squared:  -0.0005413
## F-statistic: 0.000766 on 1 and 1846 DF,  p-value: 0.9779
```

```
model <- lm(importance_5 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_5 ~ time, data = stacked_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.10254 -1.07413 -0.07413  0.95427  1.95427
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.13095    0.08113  38.591   <2e-16 ***
## time        -0.02841    0.03756  -0.756    0.449
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.318 on 1846 degrees of freedom
## Multiple R-squared:  0.0003099,  Adjusted R-squared:  -0.0002317
## F-statistic: 0.5722 on 1 and 1846 DF,  p-value: 0.4495
```

```
model <- lm(importance_6 ~ time, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_6 ~ time, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.2243 -1.2097 -0.2097  0.7903  1.7903
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.231602   0.078563  41.134   <2e-16 ***
## time        -0.007305   0.036367  -0.201    0.841
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 1.276 on 1846 degrees of freedom
## Multiple R-squared:  2.186e-05,  Adjusted R-squared:  -0.0005198
## F-statistic: 0.04035 on 1 and 1846 DF,  p-value: 0.8408
```

Time does not seem to effect the importance of each topic.

Regressing Chosen Topic on Treatment

Data Processing

```
control <- new_df$control
num_repititions <- 3
control <- rep(control, times = num_repititions)

treatment <- new_df$treatment
treatment <- rep(treatment, times = num_repititions)

stacked_df$control <- control
stacked_df$treatment <- treatment
```

```
stacked_df$climatenorm <- ifelse(stacked_df$control != "climate" &
                                 stacked_df$treatment == "norm", 1, 0)

stacked_df$climateevidence <- ifelse(stacked_df$control != "climate" &
                                 stacked_df$treatment == "evidence", 1, 0)

stacked_df$climatenormevidence <- ifelse(stacked_df$control != "climate" &
                                 stacked_df$treatment == "normevidence", 1, 0)

stacked_df$healthnorm <- ifelse(stacked_df$control != "health" &
                                 stacked_df$treatment == "norm", 1, 0)

stacked_df$healthevidence <- ifelse(stacked_df$control != "health" &
                                 stacked_df$treatment == "evidence", 1, 0)

stacked_df$healthnormevidence <- ifelse(stacked_df$control != "health" &
                                 stacked_df$treatment == "normevidence", 1, 0)

stacked_df$politicsnorm <- ifelse(stacked_df$control != "politics" &
                                 stacked_df$treatment == "norm", 1, 0)

stacked_df$politicsevidence <- ifelse(stacked_df$control != "politics" &
                                 stacked_df$treatment == "evidence", 1, 0)

stacked_df$politicsnormevidence <- ifelse(stacked_df$control != "politics" &
                                 stacked_df$treatment == "normevidence", 1, 0)
```

1-2: Climate, 3-4: Health, 5-6: Politics

```
model <- lm(importance_1 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_1 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.0049 -0.8284  0.1282  1.1716  2.4949
##
## Coefficients: (1 not defined because of singularities)
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            2.69013    0.15538  17.313   <2e-16 ***
## climatenorm           -0.12647    0.10908  -1.159   0.2464
## climateevidence       -0.00319    0.10821  -0.029   0.9765
## climatenormevidence    0.13311    0.12672   1.050   0.2937
## healthnorm             0.19691    0.10908   1.805   0.0712 .
## healthevidence        -0.05631    0.10821  -0.520   0.6029
## healthnormevidence     0.18167    0.12623   1.439   0.1503
## politicsnorm          -0.05860    0.10908  -0.537   0.5912
## politicsevidence       0.08918    0.10821   0.824   0.4099
## politicsnormevidence       NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.265 on 1839 degrees of freedom
## Multiple R-squared:  0.01116,    Adjusted R-squared:  0.006861
## F-statistic: 2.595 on 8 and 1839 DF,  p-value: 0.008059
```

```
model <- lm(importance_2 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_2 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.2745 -1.1268 -0.1268  0.8732  2.1869
```

```
##
## Coefficients: (1 not defined because of singularities)
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            3.12293    0.15439  20.228   <2e-16 ***
## climatenorm           -0.21407    0.10838  -1.975   0.0484 *
## climateevidence        0.02784    0.10752   0.259   0.7957
## climatenormevidence    0.04374    0.12591   0.347   0.7283
## healthnorm             0.21790    0.10838   2.010   0.0445 *
## healthevidence        -0.01112    0.10752  -0.103   0.9176
## healthnormevidence     0.10784    0.12542   0.860   0.3900
## politicsnorm          -0.09573    0.10838  -0.883   0.3772
## politicsevidence      -0.12589    0.10752  -1.171   0.2418
## politicsnormevidence        NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.257 on 1839 degrees of freedom
## Multiple R-squared:  0.01195,    Adjusted R-squared:  0.007653
## F-statistic:  2.78 on 8 and 1839 DF,  p-value: 0.004652
```

```
model <- lm(importance_3 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_3 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.1179 -0.7879  0.2121  1.1549  1.3434
##
## Coefficients: (1 not defined because of singularities)
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            4.05393    0.13567  29.880  < 2e-16 ***
## climatenorm           -0.11980    0.09524  -1.258 0.208606
## climateevidence       -0.21244    0.09448  -2.248 0.024669 *
## climatenormevidence   -0.39736    0.11065  -3.591 0.000338 ***
## healthnorm            -0.08905    0.09524  -0.935 0.349907
## healthevidence        -0.10726    0.09448  -1.135 0.256442
## healthnormevidence     0.06402    0.11022   0.581 0.561394
## politicsnorm          -0.14625    0.09524  -1.535 0.124837
## politicsevidence      -0.12507    0.09448  -1.324 0.185747
## politicsnormevidence        NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.105 on 1839 degrees of freedom
## Multiple R-squared:  0.01235,    Adjusted R-squared:  0.008053
## F-statistic: 2.874 on 8 and 1839 DF,  p-value: 0.003508
```

```r
model <- lm(importance_4 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_4 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.2817 -0.2817  0.0704  0.8378  1.0704
##
## Coefficients: (1 not defined because of singularities)
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           4.059025   0.126009  32.212   <2e-16 ***
## climatenorm           0.085783   0.088459   0.970   0.3323
## climateevidence       0.084292   0.087753   0.961   0.3369
## climatenormevidence  -0.003469   0.102765  -0.034   0.9731
## healthnorm            0.136882   0.088459   1.547   0.1219
## healthevidence        0.018845   0.087753   0.215   0.8300
## healthnormevidence    0.130719   0.102366   1.277   0.2018
## politicsnorm         -0.048848   0.088459  -0.552   0.5809
## politicsevidence     -0.148292   0.087753  -1.690   0.0912 .
## politicsnormevidence        NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.026 on 1839 degrees of freedom
## Multiple R-squared:  0.01009,    Adjusted R-squared:  0.005782
## F-statistic: 2.343 on 8 and 1839 DF,  p-value: 0.01669
```

```r
model <- lm(importance_5 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_5 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.2500 -1.0631 -0.0101  0.9899  2.0497
##
## Coefficients: (1 not defined because of singularities)
```

```
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)             2.862665   0.161718  17.702   <2e-16 ***
## climatenorm             0.097445   0.113527   0.858   0.3908
## climateevidence         0.080018   0.112621   0.711   0.4775
## climatenormevidence     0.147436   0.131887   1.118   0.2638
## healthnorm              0.260547   0.113527   2.295   0.0218 *
## healthevidence          0.120380   0.112621   1.069   0.2853
## healthnormevidence      0.239899   0.131375   1.826   0.0680 .
## politicsnorm           -0.005565   0.113527  -0.049   0.9609
## politicsevidence        0.007565   0.112621   0.067   0.9464
## politicsnormevidence         NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.317 on 1839 degrees of freedom
## Multiple R-squared:  0.006129,   Adjusted R-squared:  0.001806
## F-statistic: 1.418 on 8 and 1839 DF,  p-value: 0.184
```

```
model <- lm(importance_6 ~ climatenorm + climateevidence + climatenormevidence +
              healthnorm + healthevidence + healthnormevidence + politicsnorm +
              politicsevidence + politicsnormevidence, data = stacked_df)

summary(model)
```

```
##
## Call:
## lm(formula = importance_6 ~ climatenorm + climateevidence + climatenormevidence +
##     healthnorm + healthevidence + healthnormevidence + politicsnorm +
##     politicsevidence + politicsnormevidence, data = stacked_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.51515 -1.11261 -0.09314  0.88739  2.14141
##
## Coefficients: (1 not defined because of singularities)
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)             3.452934   0.155661  22.182  < 2e-16 ***
## climatenorm            -0.231067   0.109275  -2.115 0.034604 *
## climateevidence        -0.161752   0.108403  -1.492 0.135834
## climatenormevidence     0.062217   0.126947   0.490 0.624120
## healthnorm              0.003485   0.109275   0.032 0.974565
## healthevidence         -0.178570   0.108403  -1.647 0.099672 .
## healthnormevidence     -0.196524   0.126455  -1.554 0.120331
## politicsnorm           -0.363282   0.109275  -3.324 0.000903 ***
## politicsevidence        0.007325   0.108403   0.068 0.946131
## politicsnormevidence         NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.268 on 1839 degrees of freedom
## Multiple R-squared:  0.0177, Adjusted R-squared:  0.01343
## F-statistic: 4.142 on 8 and 1839 DF,  p-value: 6.44e-05
```

For importance_1, we expect climatenorm, climateevidence, and climatenormevidence to increase importance_1 and so on for the other topics. However, we do not see this relationship.

```
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ climatenorm + climateevidence +
                    climatenormevidence + healthnorm + healthevidence +
                    healthnormevidence + politicsnorm + politicsevidence +
                    politicsnormevidence, data = stacked_df)
```

```
## # weights:  66 (50 variable)
## initial  value 3311.171499
## iter  10 value 2827.302312
## iter  20 value 2798.024440
## iter  30 value 2794.193509
## iter  40 value 2793.378654
## iter  50 value 2793.073570
## iter  60 value 2793.008329
## final  value 2793.008248
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic ~ climatenorm + climateevidence +
##     climatenormevidence + healthnorm + healthevidence + healthnormevidence +
##     politicsnorm + politicsevidence + politicsnormevidence, data = stacked_df)
##
## Coefficients:
##   (Intercept) climatenorm climateevidence climatenormevidence healthnorm
## 2    1.779469    5.066072       0.4085393          -0.9991931  -6.845543
## 3    2.337411    5.561395       0.2762796          -0.7437028  -6.713200
## 4    2.912120    5.861036       1.0229597          -0.3369469  -6.565889
## 5    2.048781    5.431462       0.6415451          -0.3291226  -6.700086
## 6    2.317735    5.459366       0.5721151          -0.2421455  -6.741032
##   healthevidence healthnormevidence politicsnorm politicsevidence
## 2      0.6448178        -0.42364259     6.409822        -1.425700
## 3      0.8824611        -0.10563634     6.221615        -1.158348
## 4      0.7467086        -0.02130248     6.231465        -1.414989
## 5      0.6415174        -0.44672179     6.260711        -1.591608
## 6      0.6651858        -0.30796588     5.963780        -1.122101
##   politicsnormevidence
## 2            0.7237646
## 3            0.4539595
## 4            0.3011969
## 5            0.1898652
## 6            0.3882682
##
## Std. Errors:
##   (Intercept) climatenorm climateevidence climatenormevidence healthnorm
## 2   0.1372001   0.3223426       0.5729814           0.4783516  0.2474657
```

```
## 3   0.1300646   0.2814887       0.5521006           0.4512601  0.2010740
## 4   0.1268263   0.2633155       0.5428345           0.4387615  0.1789934
## 5   0.1329166   0.2933984       0.5636155           0.4646995  0.2153873
## 6   0.1301809   0.2902428       0.5511195           0.4492736  0.2120413
##   healthevidence healthnormevidence politicsnorm politicsevidence
## 2      0.5739274          0.4725579    0.3525110        0.6296251
## 3      0.5531608          0.4447352    0.3149377        0.6110593
## 4      0.5425741          0.4312287    0.2987443        0.6015437
## 5      0.5636155          0.4559938    0.3257201        0.6199863
## 6      0.5512716          0.4410956    0.3227180        0.6098071
##   politicsnormevidence
## 2            0.4672142
## 3            0.4351214
## 4            0.4210340
## 5            0.4468790
## 6            0.4316799
##
## Residual Deviance: 5586.016
## AIC: 5676.016
```

Baseline is Climate Control, Evidence Control

```
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ control + control:treatment, data = stacked_df)
```

```
## # weights:  60 (45 variable)
## initial  value 3311.171499
## iter  10 value 2830.739062
## iter  20 value 2800.266309
## iter  30 value 2794.968641
## iter  40 value 2793.272748
## iter  50 value 2793.099144
## iter  60 value 2793.009165
## final  value 2793.008249
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic ~ control + control:treatment, data = stacked_df)
##
## Coefficients:
##   (Intercept) controlhealth controlpolitics controlclimate:treatmentnorm
## 2    0.998726 -0.2372998999        1.833960                    0.3448968
## 3    2.061615 -0.6069054742        1.434398                   -0.2158966
## 4    2.243947  0.2754275204        2.437664                    0.3336229
## 5    1.098815 -0.0008831696        2.232838                    0.5105048
## 6    1.860991 -0.0939741955        1.693838                   -0.3206758
##   controlhealth:treatmentnorm controlpolitics:treatmentnorm
## 2                    12.54090                     -2.832673
## 3                    12.71259                     -2.310367
```

```
## 4                    12.53213                    -2.474327
## 5                    12.68989                    -2.551506
## 6                    12.02081                    -2.518721
##   controlclimate:treatmentnormevidence controlhealth:treatmentnormevidence
## 2                            1.0803194                            0.7430662
## 3                            0.6235842                            0.5933933
## 4                            0.9475112                            0.3574075
## 5                            0.6925633                            0.8120188
## 6                            0.5365069                            0.6972466
##   controlpolitics:treatmentnormevidence
## 2                            -2.476168
## 3                            -2.008093
## 4                            -2.127862
## 5                            -2.058819
## 6                            -1.787328
##
## Std. Errors:
##   (Intercept) controlhealth controlpolitics controlclimate:treatmentnorm
## 2   0.4421737     0.6363648        1.119743                     0.6369015
## 3   0.4013325     0.5806627        1.091262                     0.5950052
## 4   0.3975390     0.5588389        1.080175                     0.5808126
## 5   0.4364685     0.6171679        1.107114                     0.6248887
## 6   0.4063338     0.5764264        1.092319                     0.6061928
##   controlhealth:treatmentnorm controlpolitics:treatmentnorm
## 2                   0.3031635                     1.113609
## 3                   0.2240395                     1.071668
## 4                   0.1668032                     1.053400
## 5                   0.2570115                     1.080636
## 6                   0.2282897                     1.072950
##   controlclimate:treatmentnormevidence controlhealth:treatmentnormevidence
## 2                            0.7552423                            0.7177023
## 3                            0.7190278                            0.6770956
## 4                            0.7105928                            0.6468752
## 5                            0.7610954                            0.6910336
## 6                            0.7270603                            0.6622205
##   controlpolitics:treatmentnormevidence
## 2                              1.140677
## 3                              1.097670
## 4                              1.078280
## 5                              1.103645
## 6                              1.093289
##
## Residual Deviance: 5586.016
## AIC: 5676.016
```

Data Processing

```
stacked_df$importance <- ifelse(stacked_df$frq_topic == "1", stacked_df$importance_1,
                        ifelse(stacked_df$frq_topic == "2", stacked_df$importance_2,
                               ifelse(stacked_df$frq_topic == "3", stacked_df$importance_3,
                                      ifelse(stacked_df$frq_topic == "4", stacked_df$importance_4,
                                             ifelse(stacked_df$frq_topic == "5", stacked_df$importance_
```

```
                                                    ifelse(stacked_df$frq_topic == "6", stacked_df$impo
```

Regressing Topic Chosen on Topic Importance

```
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ importance, data = stacked_df)
```

```
## # weights:  18 (10 variable)
## initial  value 3311.171499
## iter  10 value 2849.630373
## final  value 2787.501788
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic ~ importance, data = stacked_df)
##
## Coefficients:
##   (Intercept)  importance
## 2   1.1211456  0.01881995
## 3   0.5996492  0.31476113
## 4   0.7319561  0.46626120
## 5   2.6479742 -0.26149196
## 6   1.5049432  0.10539926
##
## Std. Errors:
##   (Intercept) importance
## 2   0.7590043  0.1726461
## 3   0.7387397  0.1668115
## 4   0.7089397  0.1603191
## 5   0.7060258  0.1618668
## 6   0.7171258  0.1628486
##
## Residual Deviance: 5575.004
## AIC: 5595.004
```

```
stacked_df$t1_treated <- ifelse(stacked_df$control == "climate", 0, 1)
stacked_df$t2_treated <- ifelse(stacked_df$control == "climate", 0, 1)

stacked_df$t3_treated <- ifelse(stacked_df$control == "health", 0, 1)
stacked_df$t4_treated <- ifelse(stacked_df$control == "health", 0, 1)

stacked_df$t5_treated <- ifelse(stacked_df$control == "politics", 0, 1)
stacked_df$t6_treated <- ifelse(stacked_df$control == "politics", 0, 1)
```

```
# Multinomial Logistic Regression
model <- multinom(frq_topic ~ t1_treated + t2_treated + t3_treated +
                    t4_treated + t5_treated + t6_treated, data = stacked_df)
```

```
## # weights:  48 (35 variable)
## initial  value 3311.171499
## iter  10 value 2883.791204
## iter  20 value 2818.565466
## final  value 2818.005012
## converged
```

```
summary(model)
```

```
## Call:
## multinom(formula = frq_topic ~ t1_treated + t2_treated + t3_treated +
##     t4_treated + t5_treated + t6_treated, data = stacked_df)
##
## Coefficients:
##   (Intercept) t1_treated t2_treated t3_treated t4_treated t5_treated t6_treated
## 2   0.3276535  0.1105582  0.1105582 0.07217425 0.07217425  0.4725745  0.4725745
## 3   0.5459381  0.2911120  0.2911120 0.26623625 0.26623625  0.5345280  0.5345280
## 4   0.7716432  0.6231248  0.6231248 0.36733837 0.36733837  0.5528232  0.5528232
## 5   0.4333618  0.3526206  0.3526206 0.13033553 0.13033553  0.3837675  0.3837675
## 6   0.5415903  0.4085206  0.4085206 0.18483951 0.18483951  0.4898206  0.4898206
##
## Std. Errors:
##   (Intercept) t1_treated t2_treated t3_treated t4_treated t5_treated t6_treated
## 2  0.04705472  0.1249132  0.1249132  0.1279387  0.1279387  0.1250302  0.1250302
## 3  0.04392316  0.1168084  0.1168084  0.1198057  0.1198057  0.1161083  0.1161083
## 4  0.04244405  0.1130671  0.1130671  0.1158289  0.1158289  0.1119451  0.1119451
## 5  0.04518393  0.1204568  0.1204568  0.1230167  0.1230167  0.1193782  0.1193782
## 6  0.04393742  0.1170494  0.1170494  0.1197123  0.1197123  0.1160779  0.1160779
##
## Residual Deviance: 5636.01
## AIC: 5666.01
```

For this regression, we expect to see t2_treated to significantly predict topic 1 and 2 treated and so on. However, we do not see this relationship.

```
# file_path <- "D:\\Princeton\\BSPL\\norms.csv"

# write.csv(new_df, file = file_path, row.names = FALSE)
```