Feasibility Study Analysis

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0.1 Setup

```
source("loadDataFiltered.R")
```

```
[1] "'filtered_data' object created."
```

```
# system_fonts <- system_fonts()
# View(system_fonts)
```

```
#View(data)
```

```
# codebook <- look_for(filtered_data)
# View(codebook)
```

0.2 Data Cleaning

0.2.1 filtered_data

```
# Ensure 'condition' is a factor
filtered_data$condition <- as.factor(filtered_data$condition)

filtered_data <- filtered_data %>%
  mutate(
    condition_rev = case_when(
      condition == "group-proself" ~ "MTS-Proself",
      condition == "group-prosocial" ~ "MTS-Prosocial",
      condition == "individual-proself" ~ "Group-Proself",
      condition == "individual-prosocial" ~ "Group-Prosocial",
      TRUE ~ condition  # fallback
    )
  )
```

```
# Step 2: Now recode using the cleaned version
filtered_data <- filtered_data %>%
  mutate(
    structure_rev = dplyr::recode(as.character(structure),
                           "individual" = "group",
                           "group" = "MTS")
  )
```

```r
freq(as.ordered(filtered_data$structure_rev), plot=0)
```

```
as.ordered(filtered_data$structure_rev)
      Frequency Percent Cum Percent
group        55   50.46       50.46
MTS          54   49.54      100.00
Total       109  100.00
```

```r
freq(as.ordered(filtered_data$structure), plot=0)
```

```
as.ordered(filtered_data$structure)
           Frequency Percent Cum Percent
group             54   49.54       49.54
individual        55   50.46      100.00
Total            109  100.00
```

```r
# Reasons for Choices

filtered_data <- filtered_data %>%
  mutate(across(Q7.2_1:Q7.6_5, ~ ifelse(is.na(.), 0, .)))

# View(reasons_df)


# Create summary variables to combined individual phrasing and group phrasing
filtered_data <- filtered_data %>%
    mutate(
      REASONS_1 = coalesce(Q7.2_1, Q7.5_1),
      REASONS_2 = coalesce(Q7.2_2, Q7.5_2),
      REASONS_3 = coalesce(Q7.2_3, Q7.5_3),
      REASONS_4 = coalesce(Q7.3_1, Q7.6_1),
      REASONS_5 = coalesce(Q7.3_2, Q7.6_2),
      REASONS_6 = coalesce(Q7.3_3, Q7.6_3),
      REASONS_7 = coalesce(Q7.3_4, Q7.6_4),
      REASONS_8 = coalesce(Q7.3_5, Q7.6_5)
      )

# Update labels for clarity
var_label(filtered_data$REASONS_1) <- "I would have trusted the other groups to also share in
var_label(filtered_data$REASONS_2) <- "I would have shared information because the commitment
var_label(filtered_data$REASONS_3) <- "I would have wanted to solve the problem regardless of
var_label(filtered_data$REASONS_4) <- "We would not have want to lose"
var_label(filtered_data$REASONS_5) <- "We would have thought the other groups would share inf
var_label(filtered_data$REASONS_6) <- "We would not trust other groups to share information w
var_label(filtered_data$REASONS_7) <- "We would not want to be exploited by the other groups'
var_label(filtered_data$REASONS_8) <- "We would not want the other groups to do better than u

# View(filtered_data)
```

0.2.1.1 competition/cooperation scale for manipulation check

```r
# Calculate the means for competition / cooperation items, using recoded competition questio
filtered_data <- filtered_data %>%
  rowwise() %>%
  mutate(competition_score = mean(c_across(RQ16.1_1:Q16.1_8), na.rm = TRUE)) %>%
  ungroup()
```

0.2.1.2 reasons for choices

```r
# Reverse coded item for the Reasons scale
filtered_data <- filtered_data %>%
  mutate(REASONS_3_rev = ifelse(REASONS_3 == 1, 0,
                         ifelse(REASONS_3 == 0, 1, NA)))
```

```r
# Split cooperation and competition items for two subscales
filtered_data <- filtered_data %>%
  mutate(
    reasons_coop_mean   = rowMeans(
      select(., REASONS_1, REASONS_2, REASONS_3), na.rm = TRUE),
    reasons_comp_mean   = rowMeans(
      select(., REASONS_4, REASONS_5, REASONS_6, REASONS_7, REASONS_8), na.rm = TRUE)
  )
```

```r
filtered_data <- filtered_data %>%
  mutate(reasons_combined_mean = reasons_comp_mean - reasons_coop_mean)
```

0.2.1.3 labeling

```r
filtered_data$motivation <- as.factor(filtered_data$motivation)
```

```r
freq(as.ordered(filtered_data$condition), plot = FALSE)
```

```
as.ordered(filtered_data$condition)
                     Frequency Percent Cum Percent
group-proself               26   23.85       23.85
group-prosocial             28   25.69       49.54
individual-proself          26   23.85       73.39
individual-prosocial        29   26.61      100.00
Total                      109  100.00
```

```r
str(filtered_data$condition)
```

```
 Factor w/ 4 levels "group-proself",..: 3 3 3 3 3 3 3 3 3 3 ...
```

```r
filtered_data <- filtered_data %>%
    mutate(
    condition_rev = dplyr::recode(as.character(condition),
                    "group-proself"   = "MTS-Proself",
                    "group-prosocial" = "MTS-Prosocial",
                    "individual-proself"   = "Group-Proself",
                    "individual-prosocial" = "Group-Prosocial"
                     ))

filtered_data$condition_rev <- factor(
  filtered_data$condition_rev,
  levels = c(
    "Group-Prosocial",
    "Group-Proself",
    "MTS-Prosocial",
    "MTS-Proself"
    ))

freq(as.ordered(filtered_data$condition_rev), plot = FALSE)
```

```
as.ordered(filtered_data$condition_rev)
                Frequency Percent Cum Percent
Group-Prosocial        29   26.61       26.61
Group-Proself          26   23.85       50.46
```

```
MTS-Prosocial          28   25.69       76.15
MTS-Proself            26   23.85      100.00
Total                 109  100.00
```

```r
freq(as.ordered(filtered_data$condition), plot = FALSE)
```

```
as.ordered(filtered_data$condition)
                     Frequency Percent Cum Percent
group-proself               26   23.85       23.85
group-prosocial             28   25.69       49.54
individual-proself          26   23.85       73.39
individual-prosocial        29   26.61      100.00
Total                      109  100.00
```

```r
str(filtered_data$condition)
```

```
 Factor w/ 4 levels "group-proself",..: 3 3 3 3 3 3 3 3 3 3 ...
```

```r
filtered_data <- filtered_data %>%
    mutate(
    condition_rev = dplyr::recode(as.character(condition),
                    "group-proself"   = "MTS-Proself",
                    "group-prosocial" = "MTS-Prosocial",
                    "individual-proself"   = "Group-Proself",
                    "individual-prosocial" = "Group-Prosocial"
                     ))

freq(as.ordered(filtered_data$condition), plot = FALSE)
```

```
as.ordered(filtered_data$condition)
                     Frequency Percent Cum Percent
group-proself               26   23.85       23.85
group-prosocial             28   25.69       49.54
individual-proself          26   23.85       73.39
individual-prosocial        29   26.61      100.00
Total                      109  100.00
```

0.2.2 combined_data

```r
combined_data <- filtered_data %>%
  select(condition_rev,
         public_more_withheld, public_more_shared, public_more_distort,
         public_less_withheld, public_less_shared, public_less_distort,
         private_more_withheld, private_more_shared, private_more_distort,
         private_less_withheld, private_less_shared, private_less_distort) %>%
  pivot_longer(
    cols = -condition_rev,  # All columns except 'condition_rev'
    names_to = c("Data_Type", "Importance", "Action"),
    names_sep = "_",
    values_to = "Value"
  ) %>%
  mutate(
    Data_Type = ifelse(Data_Type == "public", "Public", "Private"),
    Importance = ifelse(Importance == "more", "More", "Less")
  ) %>%
  filter(!is.na(Value))  # Removing rows with missing values
```

```r
combined_data <- combined_data %>%
  mutate(
    Data_Type = ifelse(Data_Type == "Private", "Unique",
                       ifelse(Data_Type == "Public", "Common", Data_Type)),
    Importance = ifelse(Importance == "Less", "Low",
                        ifelse(Importance == "More", "High", Importance)),
    Action = case_when(
      Action == "shared" ~ "Shared",
      Action == "withheld" ~ "Withheld",
      Action == "distort" ~ "Distort",
      TRUE ~ Action
    ),
    Action = factor(Action),  # convert to factor first
    Action = fct_relevel(Action, "Shared", "Withheld", "Distort")  # relevel
  )
```

```r
combined_data <- combined_data %>%
  mutate(
    Structure = condition_rev,
    Motivation = condition_rev
  ) %>%
  separate(Structure, into = c("Structure", "Remove"), sep = "-", remove = TRUE) %>%
  separate(Motivation, into = c("Remove", "Motivation"), sep = "-", remove = TRUE) %>%
  select(-Remove)  # Optionally remove the 'Remove' column
```

```r
freq(as.ordered(filtered_data$public_more_withheld), plot = 0)
```

```
as.ordered(filtered_data$public_more_withheld)
      Frequency Percent Cum Percent
0            53   48.62       48.62
1            32   29.36       77.98
2            20   18.35       96.33
3             4    3.67      100.00
Total       109  100.00
```

```r
freq(as.ordered(filtered_data$public_more_shared), plot = 0)
```

```
as.ordered(filtered_data$public_more_shared)
      Frequency Percent Cum Percent
0            32   29.36       29.36
1            21   19.27       48.62
2            22   20.18       68.81
3            34   31.19      100.00
Total       109  100.00
```

```r
freq(as.ordered(filtered_data$public_more_distort), plot = 0)
```

```
as.ordered(filtered_data$public_more_distort)
      Frequency Percent Cum Percent
0            54  49.541       49.54
1            37  33.945       83.49
2            15  13.761       97.25
3             3   2.752      100.00
Total       109 100.000
```

```r
freq(as.ordered(filtered_data$public_less_withheld), plot = 0)
```

```
as.ordered(filtered_data$public_less_withheld)
      Frequency Percent Cum Percent
0            77  70.642       70.64
1            16  14.679       85.32
2            10   9.174       94.50
3             6   5.505      100.00
Total       109 100.000
```

```
freq(as.ordered(filtered_data$public_less_shared), plot = 0)
```

```
as.ordered(filtered_data$public_less_shared)
      Frequency Percent Cum Percent
0            13   11.93       11.93
1            14   12.84       24.77
2            26   23.85       48.62
3            56   51.38      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$public_less_distort), plot = 0)
```

```
as.ordered(filtered_data$public_less_distort)
      Frequency Percent Cum Percent
0            81  74.312       74.31
1            19  17.431       91.74
2             7   6.422       98.17
3             2   1.835      100.00
Total       109 100.000
```

```
freq(as.ordered(filtered_data$private_more_withheld), plot = 0)
```

```
as.ordered(filtered_data$private_more_withheld)
      Frequency Percent Cum Percent
0            42   38.53       38.53
1            43   39.45       77.98
2            20   18.35       96.33
3             4    3.67      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$private_more_shared), plot = 0)
```

```
as.ordered(filtered_data$private_more_shared)
      Frequency Percent Cum Percent
0            34   31.19       31.19
1            29   26.61       57.80
2            21   19.27       77.06
3            25   22.94      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$private_more_distort), plot = 0)
```

```
as.ordered(filtered_data$private_more_distort)
      Frequency Percent Cum Percent
0            51   46.79       46.79
1            34   31.19       77.98
2            20   18.35       96.33
3             4    3.67      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$private_less_withheld), plot = 0)
```

```
as.ordered(filtered_data$private_less_withheld)
      Frequency Percent Cum Percent
0            50   45.87       45.87
1            42   38.53       84.40
2            13   11.93       96.33
3             4    3.67      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$private_less_shared), plot = 0)
```

```
as.ordered(filtered_data$private_less_shared)
      Frequency Percent Cum Percent
0            11   10.09       10.09
1            32   29.36       39.45
2            30   27.52       66.97
3            36   33.03      100.00
Total       109  100.00
```

```
freq(as.ordered(filtered_data$private_less_distort), plot = 0)
```

```
as.ordered(filtered_data$private_less_distort)
      Frequency  Percent Cum Percent
0            72  66.0550       66.06
1            28  25.6881       91.74
2             8   7.3394       99.08
3             1   0.9174      100.00
Total       109 100.0000
```

0.3 Descriptives

0.3.1 Means

```
# View(combined_data)
```

```
combined_data %>%
  filter(Action %in% c("Shared", "Distort")) %>%  # Keep only relevant rows
  group_by(Motivation, Action) %>%  # Group by Motivation and Action type
  summarize(
    MeanValue = mean(Value, na.rm = TRUE),
    SD = sd(Value, na.rm = TRUE),
    N = n(),
    .groups = 'drop'  # Prevents the warning message about grouped output
  ) %>%
  arrange(Motivation, Action)
```

```
# A tibble: 4 x 5
  Motivation Action  MeanValue    SD     N
  <chr>      <fct>       <dbl> <dbl> <int>
1 Proself    Shared      1.49  1.15    208
2 Proself    Distort     0.712 0.859   208
3 Prosocial  Shared      1.92  1.10    228
4 Prosocial  Distort     0.439 0.684   228
```

0.3.2 Intercorrelations

Correlations among all variables that are included in the study.

```
corr_all <- corr.test(filtered_data[, c(
  "structure_number01",
  "motivation_number01",
  "NeedCog_Mean",
  "DirtyDozen_Narcissism",
  "DirtyDozen_Psychopathy",
  "DirtyDozen_Machiavellianism",
  "SVO_angle",
  "competition_score",
  "public_more_withheld",
  "public_more_shared",
  "public_more_distort",
  "public_less_withheld",
  "public_less_shared",
  "public_less_distort",
  "private_more_withheld",
  "private_more_shared",
  "private_more_distort",
  "private_less_withheld",
  "private_less_shared",
  "private_less_distort"
  )], method = "spearman")
```

```
corr_all$r
```

```
                            structure_number01 motivation_number01 NeedCog_Mean
structure_number01                 1.000000000        -0.008763065 -0.081718603
motivation_number01               -0.008763065         1.000000000 -0.138185721
NeedCog_Mean                      -0.081718603        -0.138185721  1.000000000
DirtyDozen_Narcissism              0.099631270        -0.152531386  0.021196300
DirtyDozen_Psychopathy             0.108294412        -0.148608734  0.097636216
DirtyDozen_Machiavellianism        0.089014207        -0.183777530 -0.072344559
SVO_angle                         -0.114686856         0.052798666  0.088633201
competition_score                 -0.266123249         0.332771272 -0.031203117
public_more_withheld               0.132872080        -0.168074719 -0.271852353
public_more_shared                -0.071394734         0.267092617  0.196504904
public_more_distort               -0.059929001        -0.220493790 -0.026383920
public_less_withheld               0.005816278        -0.096793446 -0.043223242
public_less_shared                 0.045305295         0.117659219  0.167160483
public_less_distort               -0.075924036        -0.035136068 -0.181841216
private_more_withheld              0.222539961        -0.230564988  0.007334113
private_more_shared               -0.270373438         0.259458200  0.007901285
private_more_distort               0.157432357        -0.169544678 -0.017022517
private_less_withheld             -0.001903714         0.028584602 -0.251747466
private_less_shared               -0.048723688         0.129248394  0.271763441
private_less_distort               0.121064159        -0.235718507 -0.060978091
                            DirtyDozen_Narcissism DirtyDozen_Psychopathy
structure_number01                    0.099631270             0.10829441
motivation_number01                  -0.152531386            -0.14860873
NeedCog_Mean                          0.021196300             0.09763622
DirtyDozen_Narcissism                 1.000000000             0.35010298
DirtyDozen_Psychopathy                0.350102982             1.00000000
DirtyDozen_Machiavellianism           0.542489777             0.50348866
```

```
SVO_angle                            -0.542581487            -0.26824089
competition_score                    -0.345637812            -0.34610887
public_more_withheld                  0.228325962             0.08103041
public_more_shared                   -0.280657790            -0.04902319
public_more_distort                   0.185554414            -0.03529400
public_less_withheld                  0.093152763             0.04137689
public_less_shared                   -0.071682558             0.07475068
public_less_distort                  -0.002193337            -0.14306970
private_more_withheld                 0.049062907             0.09592664
private_more_shared                  -0.264660617            -0.21911028
private_more_distort                  0.255462721             0.14695739
private_less_withheld                 0.101233137             0.06423522
private_less_shared                  -0.097387210            -0.08490829
private_less_distort                  0.083499341             0.05988015
                            DirtyDozen_Machiavellianism   SVO_angle
structure_number01                           0.08901421 -0.11468686
motivation_number01                         -0.18377753  0.05279867
NeedCog_Mean                                -0.07234456  0.08863320
DirtyDozen_Narcissism                        0.54248978 -0.54258149
DirtyDozen_Psychopathy                       0.50348866 -0.26824089
DirtyDozen_Machiavellianism                  1.00000000 -0.42651455
SVO_angle                                   -0.42651455  1.00000000
competition_score                           -0.42963740  0.16924296
public_more_withheld                         0.12352631 -0.10220334
public_more_shared                          -0.20042745  0.14313443
public_more_distort                          0.20740228 -0.09993950
public_less_withheld                         0.12107536 -0.09136277
public_less_shared                          -0.06054390  0.11294129
public_less_distort                         -0.02514633 -0.03655451
private_more_withheld                       -0.02842063 -0.04860087
private_more_shared                         -0.22042185  0.19154508
private_more_distort                         0.30779939 -0.15086942
private_less_withheld                        0.03820943 -0.10081405
private_less_shared                         -0.09935145  0.21567075
private_less_distort                         0.14551003 -0.26822778
                            competition_score public_more_withheld
structure_number01                -0.26612325           0.13287208
motivation_number01                0.33277127          -0.16807472
NeedCog_Mean                      -0.03120312          -0.27185235
DirtyDozen_Narcissism             -0.34563781           0.22832596
DirtyDozen_Psychopathy            -0.34610887           0.08103041
DirtyDozen_Machiavellianism       -0.42963740           0.12352631
SVO_angle                          0.16924296          -0.10220334
```

```
competition_score                  1.00000000          -0.25625465
public_more_withheld              -0.25625465           1.00000000
public_more_shared                 0.35298951          -0.77054905
public_more_distort               -0.29199621           0.15706705
public_less_withheld              -0.08079737          -0.05606398
public_less_shared                -0.04139251          -0.06035147
public_less_distort                0.09620984           0.21332155
private_more_withheld             -0.26048401           0.37462437
private_more_shared                0.51437598          -0.47604975
private_more_distort              -0.46236922           0.26293369
private_less_withheld             -0.10368886          -0.06925336
private_less_shared                0.20701796          -0.01542995
private_less_distort              -0.23843140           0.10718332
                            public_more_shared public_more_distort
structure_number01                 -0.07139473         -0.05992900
motivation_number01                 0.26709262         -0.22049379
NeedCog_Mean                        0.19650490         -0.02638392
DirtyDozen_Narcissism              -0.28065779          0.18555441
DirtyDozen_Psychopathy             -0.04902319         -0.03529400
DirtyDozen_Machiavellianism        -0.20042745          0.20740228
SVO_angle                           0.14313443         -0.09993950
competition_score                   0.35298951         -0.29199621
public_more_withheld               -0.77054905          0.15706705
public_more_shared                  1.00000000         -0.71538918
public_more_distort                -0.71538918          1.00000000
public_less_withheld                0.06051363         -0.02249041
public_less_shared                  0.08633236         -0.10689770
public_less_distort                -0.23630969          0.20039298
private_more_withheld              -0.36531890          0.18800631
private_more_shared                 0.59554871         -0.45286187
private_more_distort               -0.44978263          0.44800461
private_less_withheld              -0.02529072          0.10342527
private_less_shared                 0.12191426         -0.18249066
private_less_distort               -0.17898119          0.17742415
                            public_less_withheld public_less_shared
structure_number01                   0.005816278         0.04530530
motivation_number01                 -0.096793446         0.11765922
NeedCog_Mean                        -0.043223242         0.16716048
DirtyDozen_Narcissism                0.093152763        -0.07168256
DirtyDozen_Psychopathy               0.041376890         0.07475068
DirtyDozen_Machiavellianism          0.121075356        -0.06054390
SVO_angle                           -0.091362768         0.11294129
competition_score                   -0.080797368        -0.04139251
```

```
public_more_withheld                -0.056063983       -0.06035147
public_more_shared                   0.060513626        0.08633236
public_more_distort                 -0.022490405       -0.10689770
public_less_withheld                 1.000000000       -0.72980812
public_less_shared                  -0.729808116        1.00000000
public_less_distort                 -0.075308685       -0.58224682
private_more_withheld               -0.175059745        0.11716851
private_more_shared                  0.176497157       -0.09220341
private_more_distort                -0.100889052        0.01279302
private_less_withheld                0.262825655       -0.18065953
private_less_shared                 -0.282751487        0.29516803
private_less_distort                 0.143758450       -0.23770622
                            public_less_distort private_more_withheld
structure_number01                 -0.075924036          0.2225399607
motivation_number01                -0.035136068         -0.2305649878
NeedCog_Mean                       -0.181841216          0.0073341133
DirtyDozen_Narcissism              -0.002193337          0.0490629071
DirtyDozen_Psychopathy             -0.143069702          0.0959266446
DirtyDozen_Machiavellianism        -0.025146325         -0.0284206315
SVO_angle                          -0.036554506         -0.0486008726
competition_score                   0.096209837         -0.2604840149
public_more_withheld                0.213321546          0.3746243717
public_more_shared                 -0.236309686         -0.3653188970
public_more_distort                 0.200392978          0.1880063102
public_less_withheld               -0.075308685         -0.1750597454
public_less_shared                 -0.582246822          0.1171685117
public_less_distort                 1.000000000          0.0549822115
private_more_withheld               0.054982211          1.0000000000
private_more_shared                -0.101575946         -0.6642212795
private_more_distort                0.120617246         -0.0009580551
private_less_withheld              -0.085000424          0.0195114170
private_less_shared                -0.059161497         -0.0942691013
private_less_distort                0.168944465          0.1033912051
                            private_more_shared private_more_distort
structure_number01                 -0.270373438         0.1574323566
motivation_number01                 0.259458200        -0.1695446775
NeedCog_Mean                        0.007901285        -0.0170225165
DirtyDozen_Narcissism              -0.264660617         0.2554627207
DirtyDozen_Psychopathy             -0.219110277         0.1469573880
DirtyDozen_Machiavellianism        -0.220421849         0.3077993934
SVO_angle                           0.191545077        -0.1508694245
competition_score                   0.514375978        -0.4623692164
public_more_withheld               -0.476049748         0.2629336899
```

```
public_more_shared                  0.595548712        -0.4497826288
public_more_distort                -0.452861872         0.4480046137
public_less_withheld                0.176497157        -0.1008890519
public_less_shared                 -0.092203411         0.0127930160
public_less_distort                -0.101575946         0.1206172464
private_more_withheld              -0.664221280        -0.0009580551
private_more_shared                 1.000000000        -0.7044623359
private_more_distort               -0.704462336         1.0000000000
private_less_withheld               0.040959118        -0.0661400252
private_less_shared                 0.057878204        -0.0099289502
private_less_distort               -0.152035721         0.1474546590
                            private_less_withheld private_less_shared
structure_number01                   -0.001903714         -0.04872369
motivation_number01                   0.028584602          0.12924839
NeedCog_Mean                         -0.251747466          0.27176344
DirtyDozen_Narcissism                 0.101233137         -0.09738721
DirtyDozen_Psychopathy                0.064235223         -0.08490829
DirtyDozen_Machiavellianism           0.038209430         -0.09935145
SVO_angle                            -0.100814051          0.21567075
competition_score                    -0.103688865          0.20701796
public_more_withheld                 -0.069253358         -0.01542995
public_more_shared                   -0.025290715          0.12191426
public_more_distort                   0.103425267         -0.18249066
public_less_withheld                  0.262825655         -0.28275149
public_less_shared                   -0.180659528          0.29516803
public_less_distort                  -0.085000424         -0.05916150
private_more_withheld                 0.019511417         -0.09426910
private_more_shared                   0.040959118          0.05787820
private_more_distort                 -0.066140025         -0.00992895
private_less_withheld                 1.000000000         -0.77383874
private_less_shared                  -0.773838737          1.00000000
private_less_distort                 -0.012968013         -0.57946658
                            private_less_distort
structure_number01                    0.12106416
motivation_number01                  -0.23571851
NeedCog_Mean                         -0.06097809
DirtyDozen_Narcissism                 0.08349934
DirtyDozen_Psychopathy                0.05988015
DirtyDozen_Machiavellianism           0.14551003
SVO_angle                            -0.26822778
competition_score                    -0.23843140
public_more_withheld                  0.10718332
public_more_shared                   -0.17898119
```

```
public_more_distort                   0.17742415
public_less_withheld                  0.14375845
public_less_shared                   -0.23770622
public_less_distort                   0.16894447
private_more_withheld                 0.10339121
private_more_shared                  -0.15203572
private_more_distort                  0.14745466
private_less_withheld                -0.01296801
private_less_shared                  -0.57946658
private_less_distort                  1.00000000
```

```
corr_all$p
```

```
                            structure_number01 motivation_number01 NeedCog_Mean
structure_number01                 0.000000000        1.0000000000  1.000000000
motivation_number01                0.927940714        0.0000000000  1.000000000
NeedCog_Mean                       0.398253072        0.1518712783  0.000000000
DirtyDozen_Narcissism              0.302655181        0.1133314325  0.826829879
DirtyDozen_Psychopathy             0.262333771        0.1230225064  0.312487796
DirtyDozen_Machiavellianism        0.357337497        0.0557609015  0.454718380
SVO_angle                          0.237246805        0.5873406294  0.361672893
competition_score                  0.005157933        0.0004070048  0.747382395
public_more_withheld               0.168404800        0.0806422542  0.004242271
public_more_shared                 0.460677542        0.0049915976  0.040566689
public_more_distort                0.535902821        0.0212273922  0.785369882
public_less_withheld               0.952136397        0.3167030211  0.655402225
public_less_shared                 0.639935969        0.2230440304  0.082328473
public_less_distort                0.432649938        0.7168183840  0.058437690
private_more_withheld              0.020026786        0.0158648537  0.939666820
private_more_shared                0.004463541        0.0064415536  0.935010874
private_more_distort               0.102068960        0.0779891448  0.860542130
private_less_withheld              0.984325580        0.7679543653  0.008273675
private_less_shared                0.614876663        0.1804204416  0.004255291
private_less_distort               0.209844501        0.0136069331  0.528775134
                            DirtyDozen_Narcissism DirtyDozen_Psychopathy
structure_number01                   1.000000e+00           1.000000e+00
motivation_number01                  1.000000e+00           1.000000e+00
NeedCog_Mean                         1.000000e+00           1.000000e+00
DirtyDozen_Narcissism                0.000000e+00           3.174055e-02
DirtyDozen_Psychopathy               1.900632e-04           0.000000e+00
DirtyDozen_Machiavellianism          1.106855e-09           2.400329e-08
SVO_angle                            1.313448e-09           5.003061e-03
```

```
competition_score                    2.322407e-04           2.274138e-04
public_more_withheld                 1.694290e-02           4.022511e-01
public_more_shared                   3.116311e-03           6.127015e-01
public_more_distort                  5.339392e-02           7.156000e-01
public_less_withheld                 3.353328e-01           6.692409e-01
public_less_shared                   4.588672e-01           4.398158e-01
public_less_distort                  9.819413e-01           1.377778e-01
private_more_withheld                6.124133e-01           3.210766e-01
private_more_shared                  5.418262e-03           2.207376e-02
private_more_distort                 7.340269e-03           1.272882e-01
private_less_withheld                2.949088e-01           5.069530e-01
private_less_shared                  3.137294e-01           3.800331e-01
private_less_distort                 3.880181e-01           5.362359e-01
                            DirtyDozen_Machiavellianism    SVO_angle
structure_number01                         1.000000e+00 1.000000e+00
motivation_number01                        1.000000e+00 1.000000e+00
NeedCog_Mean                               1.000000e+00 1.000000e+00
DirtyDozen_Narcissism                      2.003407e-07 2.364207e-07
DirtyDozen_Psychopathy                     4.272585e-06 7.736976e-01
DirtyDozen_Machiavellianism                0.000000e+00 7.130531e-04
SVO_angle                                  4.169901e-06 0.000000e+00
competition_score                          3.130946e-06 7.994363e-02
public_more_withheld                       2.006536e-01 2.925573e-01
public_more_shared                         3.664896e-02 1.394590e-01
public_more_distort                        3.046683e-02 3.034348e-01
public_less_withheld                       2.098020e-01 3.470175e-01
public_less_shared                         5.317193e-01 2.445089e-01
public_less_distort                        7.952112e-01 7.072212e-01
private_more_withheld                      7.692481e-01 6.174319e-01
private_more_shared                        2.127071e-02 4.704886e-02
private_more_distort                       1.130352e-03 1.190976e-01
private_less_withheld                      6.932391e-01 2.992017e-01
private_less_shared                        3.040219e-01 2.498164e-02
private_less_distort                       1.311194e-01 5.005274e-03
                            competition_score public_more_withheld
structure_number01               7.840059e-01         1.000000e+00
motivation_number01              6.674879e-02         1.000000e+00
NeedCog_Mean                     1.000000e+00         6.702788e-01
DirtyDozen_Narcissism            3.831971e-02         1.000000e+00
DirtyDozen_Psychopathy           3.775068e-02         1.000000e+00
DirtyDozen_Machiavellianism      5.385228e-04         1.000000e+00
SVO_angle                        1.000000e+00         1.000000e+00
competition_score                0.000000e+00         1.000000e+00
```

```
public_more_withheld              7.153799e-03         0.000000e+00
public_more_shared                1.667013e-04         1.167969e-22
public_more_distort               2.064334e-03         1.028769e-01
public_less_withheld              4.036103e-01         5.625671e-01
public_less_shared                6.691233e-01         5.330268e-01
public_less_distort               3.196435e-01         2.593605e-02
private_more_withheld             6.227172e-03         5.988435e-05
private_more_shared               1.056962e-08         1.678100e-07
private_more_distort              4.160010e-07         5.740638e-03
private_less_withheld             2.832899e-01         4.742690e-01
private_less_shared               3.078285e-02         8.734753e-01
private_less_distort              1.253488e-02         2.672901e-01
                            public_more_shared public_more_distort
structure_number01                1.000000e+00        1.000000e+00
motivation_number01               7.736976e-01        1.000000e+00
NeedCog_Mean                      1.000000e+00        1.000000e+00
DirtyDozen_Narcissism             4.954935e-01        1.000000e+00
DirtyDozen_Psychopathy            1.000000e+00        1.000000e+00
DirtyDozen_Machiavellianism       1.000000e+00        1.000000e+00
SVO_angle                         1.000000e+00        1.000000e+00
competition_score                 2.800581e-02        3.323578e-01
public_more_withheld              2.207461e-20        1.000000e+00
public_more_shared                0.000000e+00        4.371823e-16
public_more_distort               2.337873e-18        0.000000e+00
public_less_withheld              5.319249e-01        8.164378e-01
public_less_shared                3.720645e-01        2.685744e-01
public_less_distort               1.336675e-02        3.668195e-02
private_more_withheld             9.384969e-05        5.026418e-02
private_more_shared               8.460056e-12        7.641401e-07
private_more_distort              9.268439e-07        1.035241e-06
private_less_withheld             7.940613e-01        2.845222e-01
private_less_shared               2.066378e-01        5.752840e-02
private_less_distort              6.258309e-02        6.493884e-02
                            public_less_withheld public_less_shared
structure_number01                  1.000000e+00       1.000000e+00
motivation_number01                 1.000000e+00       1.000000e+00
NeedCog_Mean                        1.000000e+00       1.000000e+00
DirtyDozen_Narcissism               1.000000e+00       1.000000e+00
DirtyDozen_Psychopathy              1.000000e+00       1.000000e+00
DirtyDozen_Machiavellianism         1.000000e+00       1.000000e+00
SVO_angle                           1.000000e+00       1.000000e+00
competition_score                   1.000000e+00       1.000000e+00
public_more_withheld                1.000000e+00       1.000000e+00
```

```
public_more_shared                  1.000000e+00       1.000000e+00
public_more_distort                 1.000000e+00       1.000000e+00
public_less_withheld                0.000000e+00       4.179362e-17
public_less_shared                  2.223065e-19       0.000000e+00
public_less_distort                 4.363996e-01       3.119253e-11
private_more_withheld               6.865351e-02       2.249935e-01
private_more_shared                 6.637525e-02       3.403028e-01
private_more_distort                2.965616e-01       8.949617e-01
private_less_withheld               5.761361e-03       6.012235e-02
private_less_shared                 2.891726e-03       1.834173e-03
private_less_distort                1.358731e-01       1.281397e-02
                            public_less_distort private_more_withheld
structure_number01                 1.000000e+00          1.000000e+00
motivation_number01                1.000000e+00          1.000000e+00
NeedCog_Mean                       1.000000e+00          1.000000e+00
DirtyDozen_Narcissism              1.000000e+00          1.000000e+00
DirtyDozen_Psychopathy             1.000000e+00          1.000000e+00
DirtyDozen_Machiavellianism        1.000000e+00          1.000000e+00
SVO_angle                          1.000000e+00          1.000000e+00
competition_score                  1.000000e+00          9.216215e-01
public_more_withheld               1.000000e+00          1.018034e-02
public_more_shared                 1.000000e+00          1.586060e-02
public_more_distort                1.000000e+00          1.000000e+00
public_less_withheld               1.000000e+00          1.000000e+00
public_less_shared                 5.708233e-09          1.000000e+00
public_less_distort                0.000000e+00          1.000000e+00
private_more_withheld              5.701416e-01          0.000000e+00
private_more_shared                2.932682e-01          3.448634e-15
private_more_distort               2.115445e-01          9.921114e-01
private_less_withheld              3.795145e-01          8.404047e-01
private_less_shared                5.411474e-01          3.295478e-01
private_less_distort               7.906387e-02          2.846817e-01
                            private_more_shared private_more_distort
structure_number01                 6.963125e-01         1.000000e+00
motivation_number01                9.469084e-01         1.000000e+00
NeedCog_Mean                       1.000000e+00         1.000000e+00
DirtyDozen_Narcissism              8.181576e-01         1.000000e+00
DirtyDozen_Psychopathy             1.000000e+00         1.000000e+00
DirtyDozen_Machiavellianism        1.000000e+00         1.842474e-01
SVO_angle                          1.000000e+00         1.000000e+00
competition_score                  1.891963e-06         7.321617e-05
public_more_withheld               2.970237e-05         8.610957e-01
public_more_shared                 1.556650e-09         1.612708e-04
```

```
public_more_distort                1.337245e-04         1.790967e-04
public_less_withheld               1.000000e+00         1.000000e+00
public_less_shared                 1.000000e+00         1.000000e+00
public_less_distort                1.000000e+00         1.000000e+00
private_more_withheld              6.379973e-13         1.000000e+00
private_more_shared                0.000000e+00         2.353129e-15
private_more_distort               1.265123e-17         0.000000e+00
private_less_withheld              6.723877e-01         4.944110e-01
private_less_shared                5.499726e-01         9.183847e-01
private_less_distort               1.145222e-01         1.259919e-01
                            private_less_withheld private_less_shared
structure_number01                   1.000000e+00        1.000000e+00
motivation_number01                  1.000000e+00        1.000000e+00
NeedCog_Mean                         1.000000e+00        6.702788e-01
DirtyDozen_Narcissism                1.000000e+00        1.000000e+00
DirtyDozen_Psychopathy               1.000000e+00        1.000000e+00
DirtyDozen_Machiavellianism          1.000000e+00        1.000000e+00
SVO_angle                            1.000000e+00        1.000000e+00
competition_score                    1.000000e+00        1.000000e+00
public_more_withheld                 1.000000e+00        1.000000e+00
public_more_shared                   1.000000e+00        1.000000e+00
public_more_distort                  1.000000e+00        1.000000e+00
public_less_withheld                 8.610957e-01        4.626762e-01
public_less_shared                   1.000000e+00        2.971360e-01
public_less_distort                  1.000000e+00        1.000000e+00
private_more_withheld                1.000000e+00        1.000000e+00
private_more_shared                  1.000000e+00        1.000000e+00
private_more_distort                 1.000000e+00        1.000000e+00
private_less_withheld                0.000000e+00        1.127165e-20
private_less_shared                  5.932447e-23        0.000000e+00
private_less_distort                 8.935332e-01        4.067079e-11
                            private_less_distort
structure_number01                  1.000000e+00
motivation_number01                 1.000000e+00
NeedCog_Mean                        1.000000e+00
DirtyDozen_Narcissism               1.000000e+00
DirtyDozen_Psychopathy              1.000000e+00
DirtyDozen_Machiavellianism         1.000000e+00
SVO_angle                           7.736976e-01
competition_score                   1.000000e+00
public_more_withheld                1.000000e+00
public_more_shared                  1.000000e+00
public_more_distort                 1.000000e+00
```

```
public_less_withheld                1.000000e+00
public_less_shared                  1.000000e+00
public_less_distort                 1.000000e+00
private_more_withheld               1.000000e+00
private_more_shared                 1.000000e+00
private_more_distort                1.000000e+00
private_less_withheld               1.000000e+00
private_less_shared                 7.402084e-09
private_less_distort                0.000000e+00
```

```
# Create table


corr_all_table <- {
  r <- corr_all$r
  p <- corr_all$p
  stars <- ifelse(p < 0.001, "***",
           ifelse(p < 0.01, "**",
           ifelse(p < 0.05, "*", "")))
  formatted <- matrix(paste0(format(round(r, 2), nsmall = 2), stars),
                      nrow = nrow(r), dimnames = dimnames(r))
  formatted[upper.tri(formatted, diag = TRUE)] <- ""
  as.data.frame(formatted)
}

corr_all_table
```

```
                            structure_number01 motivation_number01 NeedCog_Mean
structure_number01
motivation_number01                      -0.01
NeedCog_Mean                             -0.08               -0.14
DirtyDozen_Narcissism                     0.10               -0.15         0.02
DirtyDozen_Psychopathy                    0.11               -0.15         0.10
DirtyDozen_Machiavellianism               0.09               -0.18        -0.07
SVO_angle                                -0.11                0.05         0.09
competition_score                      -0.27**             0.33***        -0.03
public_more_withheld                      0.13               -0.17      -0.27**
public_more_shared                       -0.07              0.27**        0.20*
public_more_distort                      -0.06              -0.22*        -0.03
public_less_withheld                      0.01               -0.10        -0.04
public_less_shared                        0.05                0.12         0.17
public_less_distort                      -0.08               -0.04        -0.18
```

```
private_more_withheld                    0.22*              -0.23*         0.01
private_more_shared                    -0.27**              0.26**         0.01
private_more_distort                      0.16               -0.17        -0.02
private_less_withheld                    0.00                0.03       -0.25**
private_less_shared                      -0.05                0.13       0.27**
private_less_distort                      0.12              -0.24*        -0.06
                            DirtyDozen_Narcissism DirtyDozen_Psychopathy
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy                    0.35***
DirtyDozen_Machiavellianism               0.54***                0.50***
SVO_angle                                -0.54***                -0.27**
competition_score                        -0.35***               -0.35***
public_more_withheld                        0.23*                   0.08
public_more_shared                        -0.28**                  -0.05
public_more_distort                          0.19                  -0.04
public_less_withheld                         0.09                   0.04
public_less_shared                          -0.07                   0.07
public_less_distort                          0.00                  -0.14
private_more_withheld                        0.05                   0.10
private_more_shared                       -0.26**                 -0.22*
private_more_distort                       0.26**                   0.15
private_less_withheld                        0.10                   0.06
private_less_shared                         -0.10                  -0.08
private_less_distort                         0.08                   0.06
                            DirtyDozen_Machiavellianism SVO_angle
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle                                      -0.43***
competition_score                              -0.43***      0.17
public_more_withheld                               0.12     -0.10
public_more_shared                               -0.20*      0.14
public_more_distort                               0.21*     -0.10
public_less_withheld                               0.12     -0.09
public_less_shared                                -0.06      0.11
public_less_distort                               -0.03     -0.04
private_more_withheld                             -0.03     -0.05
```

```
private_more_shared                              -0.22*     0.19*
private_more_distort                             0.31**     -0.15
private_less_withheld                              0.04     -0.10
private_less_shared                               -0.10     0.22*
private_less_distort                               0.15   -0.27**
                            competition_score public_more_withheld
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld                  -0.26**
public_more_shared                    0.35***             -0.77***
public_more_distort                   -0.29**                 0.16
public_less_withheld                    -0.08                -0.06
public_less_shared                      -0.04                -0.06
public_less_distort                      0.10                0.21*
private_more_withheld                 -0.26**              0.37***
private_more_shared                   0.51***             -0.48***
private_more_distort                 -0.46***               0.26**
private_less_withheld                   -0.10                -0.07
private_less_shared                     0.21*                -0.02
private_less_distort                   -0.24*                 0.11
                            public_more_shared public_more_distort
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort                   -0.72***
public_less_withheld                      0.06               -0.02
public_less_shared                        0.09               -0.11
public_less_distort                     -0.24*               0.20*
private_more_withheld                 -0.37***                0.19
private_more_shared                    0.60***            -0.45***
```

```
private_more_distort                  -0.45***             0.45***
private_less_withheld                    -0.03                0.10
private_less_shared                       0.12               -0.18
private_less_distort                     -0.18                0.18
                            public_less_withheld public_less_shared
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort
public_less_withheld
public_less_shared                      -0.73***
public_less_distort                        -0.08           -0.58***
private_more_withheld                      -0.18               0.12
private_more_shared                         0.18              -0.09
private_more_distort                       -0.10               0.01
private_less_withheld                     0.26**              -0.18
private_less_shared                      -0.28**             0.30**
private_less_distort                        0.14             -0.24*
                            public_less_distort private_more_withheld
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort
public_less_withheld
public_less_shared
public_less_distort
private_more_withheld                     0.05
private_more_shared                      -0.10              -0.66***
private_more_distort                      0.12                  0.00
```

```
private_less_withheld                     -0.09                 0.02
private_less_shared                       -0.06                -0.09
private_less_distort                       0.17                 0.10
                            private_more_shared private_more_distort
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort
public_less_withheld
public_less_shared
public_less_distort
private_more_withheld
private_more_shared
private_more_distort                   -0.70***
private_less_withheld                      0.04                -0.07
private_less_shared                        0.06                -0.01
private_less_distort                      -0.15                 0.15
                            private_less_withheld private_less_shared
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort
public_less_withheld
public_less_shared
public_less_distort
private_more_withheld
private_more_shared
private_more_distort
private_less_withheld
```

```
private_less_shared                      -0.77***
private_less_distort                        -0.01            -0.58***
                            private_less_distort
structure_number01
motivation_number01
NeedCog_Mean
DirtyDozen_Narcissism
DirtyDozen_Psychopathy
DirtyDozen_Machiavellianism
SVO_angle
competition_score
public_more_withheld
public_more_shared
public_more_distort
public_less_withheld
public_less_shared
public_less_distort
private_more_withheld
private_more_shared
private_more_distort
private_less_withheld
private_less_shared
private_less_distort
```

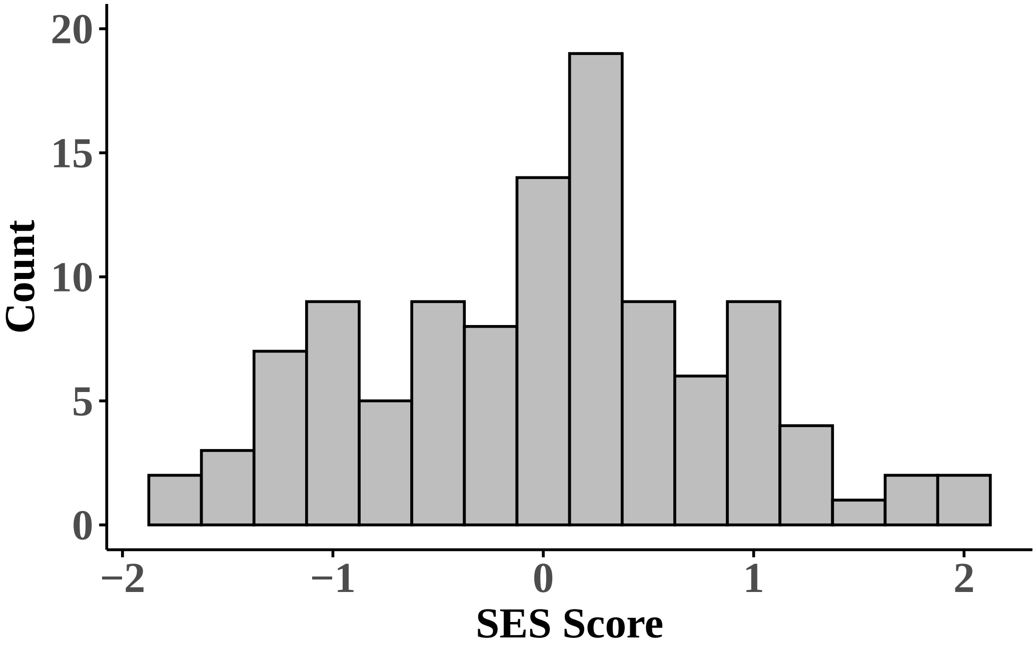
0.3.3 Fig 1: Socioeconomic status

```r
# Calculate average for three items
filtered_data$SES_composite <- rowMeans(scale(filtered_data[c("Q14.3", "Q14.4", "Q14.5")]))
```

```r
# summary(filtered_data$SES_composite)
figure_ses <- ggplot(filtered_data, aes(x = SES_composite)) +
  geom_histogram(binwidth = 0.25, fill = "gray", color = "black") +
  labs(
    x = "SES Score",
    y = "Count"
  ) +
  scale_y_continuous(breaks = seq(0, 20, 5), limits = c(0, 20)) +
  coord_cartesian(ylim = c(0, 20)) +
  theme_minimal(base_family = "serif") +
  theme(
    text = element_text(size = 16, family = "serif"),
    axis.title = element_text(size = 16, face = "bold"),
    axis.text = element_text(size = 16, face = "bold"),

    #   These lines control the TICK MARKS
    axis.ticks = element_line(color = "black", size = 0.5),
    axis.ticks.length = unit(0.10, "cm"),

    #   These restore AXIS LINES that ticks sit on
    axis.line = element_line(color = "black"),

    #   Remove background gridlines (APA prefers a clean look)
    panel.grid.major = element_blank(),
    panel.grid.minor = element_blank(),
    panel.border = element_blank()
  )
```

```
Warning: The `size` argument of `element_line()` is deprecated as of ggplot2 3.4.0.
i Please use the `linewidth` argument instead.
```

```
print(figure_ses)
```



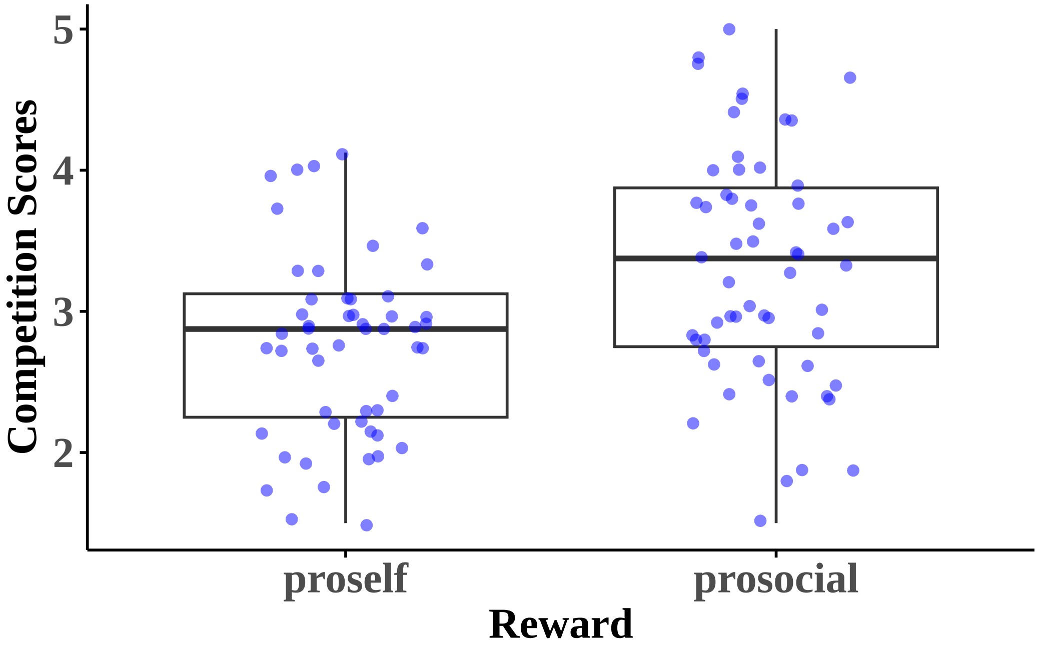
```
ggsave(
  "../figures/figure_ses.png",
  plot = figure_ses,
  width = 6.5,   height = 4.5,
  units = "in",
  scale = 2,
  dpi = 72
  # device = Cairo::CairoPNG
  )
```

0.4 Manipulation Check

0.4.1 Fig 4: Reward Conditions Only

```
figure_manipulation_check <- ggplot(filtered_data, aes(x = motivation, y = competition_score
  geom_boxplot(outlier.shape = NA) +  # Removes default outliers
  geom_jitter(width = 0.2, alpha = 0.5, color = "blue") +
  theme_classic()+
  theme(
    text = element_text(size = 16, family = "serif"),
    axis.title = element_text(size = 16, face = "bold"),
    axis.text = element_text(size = 16, face = "bold"),

    #  These lines control the TICK MARKS
    axis.ticks = element_line(color = "black", size = 0.5),
    axis.ticks.length = unit(0.10, "cm"),

    #  These restore AXIS LINES that ticks sit on
    axis.line = element_line(color = "black"),

    #  Remove background gridlines (APA prefers a clean look)
    panel.grid.major = element_blank(),
    panel.grid.minor = element_blank(),
    panel.border = element_blank()
  )+
    labs(
    x = "Reward",
    y = "Competition Scores"
  )
```

```
print(figure_manipulation_check)
```



```
ggsave(
  "../figures/figure_manipulation_check.png",
  plot = figure_manipulation_check,
  width = 6.5,   height = 4.5,
  units = "in",
  scale = 2,
  dpi = 72
  # device = Cairo::CairoPNG
  )
```

0.4.2 Means for Manipulation Check by B/w Manipulations

```
filtered_data$motivation <- as.factor(filtered_data$motivation)
levels(filtered_data$motivation)
```

```
[1] "proself"   "prosocial"
```

```
filtered_data %>%
  group_by(motivation) %>%
  summarise(
    mean = mean(competition_score, na.rm = TRUE),
    sd = sd(competition_score, na.rm = TRUE),
    n = n()
  )
```

```
# A tibble: 2 x 4
  motivation  mean    sd     n
  <fct>      <dbl> <dbl> <int>
1 proself     2.75 0.650    52
2 prosocial   3.30 0.827    57
```

```
freq(as.ordered(filtered_data$structure_rev), plot = 0)
```

```
as.ordered(filtered_data$structure_rev)
      Frequency Percent Cum Percent
group        55   50.46       50.46
MTS          54   49.54      100.00
Total       109  100.00
```

```
filtered_data %>%
  group_by(structure_rev) %>%
  summarise(
    mean = mean(competition_score, na.rm = TRUE),
    sd = sd(competition_score, na.rm = TRUE),
    n = n()
  )
```

```
# A tibble: 2 x 4
  structure_rev  mean    sd     n
  <chr>         <dbl> <dbl> <int>
1 MTS            2.81 0.678    54
2 group          3.27 0.839    55
```

0.4.3 ANOVA

```
# var.test(competition_score ~ motivation, data = filtered_data)
```

```
anova_manipulation_check <- aov(competition_score ~ motivation * structure_rev, data = filte
summary(anova_manipulation_check)
```

```
                           Df Sum Sq Mean Sq F value   Pr(>F)    
motivation                  1   8.38   8.377  16.460 9.57e-05 ***
structure_rev               1   5.65   5.654  11.109  0.00119 ** 
motivation:structure_rev    1   0.73   0.734   1.443  0.23232    
Residuals                 105  53.44   0.509                     
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
etaSquared(anova_manipulation_check, type = 1, anova = FALSE)
```

```
                             eta.sq eta.sq.part
motivation               0.12282532  0.13551846
structure_rev            0.08289430  0.09567610
motivation:structure_rev 0.01076919  0.01355842
```

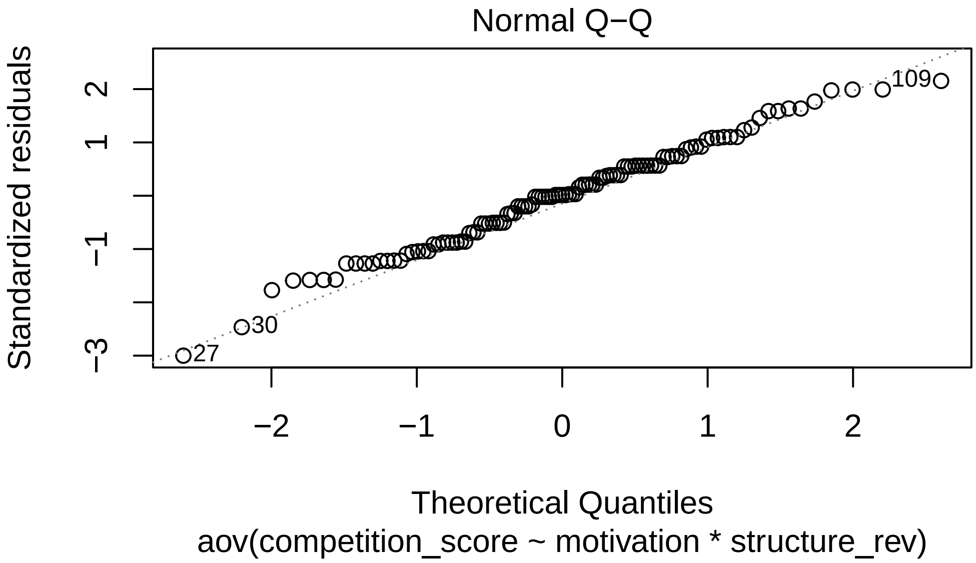
```
# eta.sq: Eta-squared (proportion of total variance explained)
#
# eta.sq.part: Partial eta-squared (proportion of effect + error variance explained)
```

```
emmeans(anova_manipulation_check, ~ motivation * structure_rev)
```

```
 motivation structure_rev emmean    SE  df lower.CL upper.CL
 proself    group           2.89 0.140 105     2.61     3.17
 prosocial  group           3.60 0.132 105     3.34     3.87
 proself    MTS             2.61 0.140 105     2.33     2.88
 prosocial  MTS             2.99 0.135 105     2.72     3.26

Confidence level used: 0.95
```

0.4.3.1 Assumptions for ANOVA

```r
plot(anova_manipulation_check, which = 2)  # QQ plot
```



```r
# This opens a Q-Q plot (quantile-quantile plot), which compares your residuals to a normal
#
# How to interpret:
#
#   Good fit: If the points fall roughly along the straight diagonal line, your residuals are
#
#   Bad fit: If points curve away from the line (especially at the ends), your residuals devi


shapiro.test(residuals(anova_manipulation_check))  # Shapiro-Wilk test
```

```

    Shapiro-Wilk normality test

data:  residuals(anova_manipulation_check)
W = 0.98856, p-value = 0.4863
```

```r
# How to interpret:
#
```

```
# Null hypothesis: Residuals are normally distributed.
#
#   If p > 0.05: You fail to reject the null → normality is not violated.
#
#   If p < 0.05: You reject the null → indicates non-normality.
#
# Note: The Shapiro test is sensitive to large sample sizes. In large samples, slight non-no
```

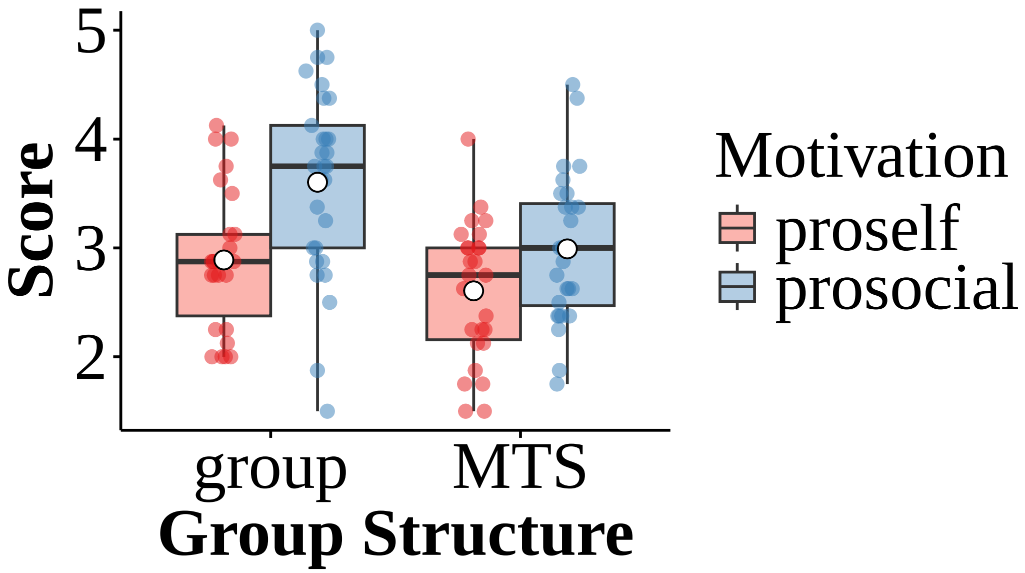
```
leveneTest(competition_score ~ motivation * structure_rev, data = filtered_data)
```

```
Levene's Test for Homogeneity of Variance (center = median)
       Df F value Pr(>F)
group   3   0.918 0.4349
      105
```

```
# How to interpret:
#
# Null hypothesis: Variances are equal across all groups.
#
#   If p > 0.05: You fail to reject the null → meaning that we have equal variances → assumpt

#   If p < 0.05: You reject the null → meaning that we have unequal variances → assumption vi
#
# If violated, you might:
#
# Use robust ANOVA methods (e.g., Welch’s ANOVA)
#
# Use transformation or bootstrapping
#
# Proceed with caution if your group sizes are roughly equal (ANOVA is robust in that case)
```

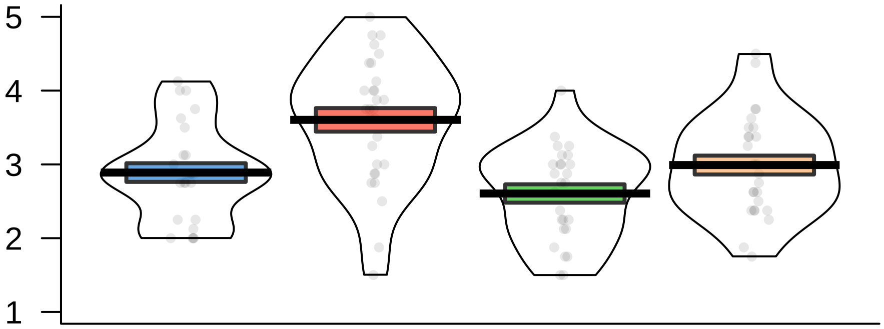
0.4.3.2 Fig: Manipulation Check

```
figure_manipulation_check_anova <- ggplot(filtered_data, aes(x = structure_rev, y = competiti
  geom_boxplot(position = position_dodge(width = 0.75), outlier.shape = NA) +
  geom_jitter(aes(color = motivation),
              position = position_jitterdodge(jitter.width = 0.2, dodge.width = 0.75),
              alpha = 0.5, size = 2, show.legend = FALSE) +
    stat_summary(
    fun = mean,
    geom = "point",
    aes(group = motivation),
    position = position_dodge(width = 0.75),
    shape = 21,           # Filled circle
    size = 3,
    color = "black",
    fill = "white"        # So it stands out on colored boxplots
  ) +
  scale_fill_brewer(palette = "Pastel1") +
  scale_color_brewer(palette = "Set1") +
  theme_classic() +
  theme(
    text = element_text(size = 25, family = "serif"),
    axis.title = element_text(size = 25, face = "bold", color = "black"),
    axis.text = element_text(size = 25, face = "plain", color = "black"),
    axis.ticks = element_line(color = "black", linewidth = 0.5),
    axis.ticks.length = unit(0.10, "cm"),
    axis.line = element_line(color = "black"),
    panel.grid.major = element_blank(),
    panel.grid.minor = element_blank(),
    panel.border = element_blank(),
    legend.title = element_text(size = 25, color = "black"),
    legend.text = element_text(size = 25, color = "black")
  ) +
  labs(
    title = "",
    x = "Group Structure",
    y = "Score",
    fill = "Motivation"
  )

print(figure_manipulation_check_anova)
```



```
ggsave(
  "../figures/figure_manipulation_check_anova.png",
  plot = figure_manipulation_check_anova,
  width = 6.5,   height = 4.5,
  units = "in",
  scale = 2,
  dpi = 72
  # device = Cairo::CairoPNG
  )
```

```
# # pirate plot based on how participants shared information broken out by condition.
# pirateplot(competition_score ~ condition_rev,
#            data = filtered_data,
#            main = NULL,
#            xlab = "",
#            ylab = "",
#            pal = "xmen",
#            inf.method = "se",
#            avg.line.fun = mean,
#            theme = 2)

pirateplot(competition_score ~ condition_rev,
           data = filtered_data,
           main = NULL,
           xlab = "",
           ylab = "",
           yaxt = "n",
           xaxt = "n",
           ylim = c(1, 5),
           gl.col = NA,
           bty = "n",
           pal = "xmen",
           inf.method = "se",
           avg.line.fun = mean,
           theme = 2)

axis(side = 2, at = 1:5, labels = 1:5, las = 1)
box(bty = "l")
```



0.4.4 t-test for motivation condition on competition

```
t.test(competition_score ~ motivation, data = filtered_data, var.equal = TRUE)
```

```
    Two Sample t-test

data:  competition_score by motivation
t = -3.8707, df = 107, p-value = 0.000187
alternative hypothesis: true difference in means between group proself and group prosocial i
95 percent confidence interval:
 -0.8392953 -0.2707756
sample estimates:
  mean in group proself mean in group prosocial
               2.747596                3.302632
```

```
cohen.d(competition_score ~ motivation, data = filtered_data)
```

```
Call: cohen.d(x = competition_score ~ motivation, data = filtered_data)
Cohen d statistic of difference between two means
                  lower effect upper
competition_score  0.36   0.75  1.14

Multivariate (Mahalanobis) distance between groups
[1] 0.75
r equivalent of difference between two means
competition_score
             0.35
```

0.5 (1) Reason for Choices

```
# EFA for the variables to see how the load
# Variables are dicotomous

# Create data set with just these items from filtered_data
reasons_df <- filtered_data %>%
  select(
    condition,
    structure,
    motivation,
    REASONS_1,
    REASONS_2,
    REASONS_3,
    REASONS_4,
    REASONS_5,
    REASONS_6,
    REASONS_7,
    REASONS_8
  )

head(reasons_df)
```

```
# A tibble: 6 x 11
  condition         structure motivation REASONS_1 REASONS_2 REASONS_3 REASONS_4
  <fct>             <chr>     <fct>          <dbl>     <dbl>     <dbl>     <dbl>
1 individual-prose~ individu~ proself            0         1         0         0
2 individual-prose~ individu~ proself            0         0         0         1
3 individual-prose~ individu~ proself            0         0         0         1
4 individual-prose~ individu~ proself            1         0         0         0
5 individual-prose~ individu~ proself            0         1         0         1
6 individual-prose~ individu~ proself            1         0         0         1
# i 4 more variables: REASONS_5 <dbl>, REASONS_6 <dbl>, REASONS_7 <dbl>,
#   REASONS_8 <dbl>
```

0.5.1 EFA

```
# Convert non-endorsement to 0s rather than as NAs
reasons_df <- reasons_df %>%
    mutate(across(everything(), ~ ifelse(is.na(.), 0, .)))
```

```
reasons_df_all <- reasons_df %>%
  select(REASONS_1:REASONS_8)

reasons_df_ind <-reasons_df %>%
  filter(structure == "individual") %>%
  select(REASONS_1:REASONS_8)

reasons_df_sys <- reasons_df %>%
  filter(structure == "group") %>%
  select(REASONS_1:REASONS_8)
```

```
# Step 1: Compute tetrachoric correlation matrix
tetra_corr_all <- tetrachoric(reasons_df_all)$rho
```

```
Warning in cor.smooth(mat): Matrix was not positive definite, smoothing was
done
```

```
# Step 2: Run factor analysis
fa_result_all <- fa(tetra_corr_all, nfactors = 1, rotate = "none", fm = "ml")
```

```
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```
print(fa_result_all$loadings, cutoff = 0.3)
```

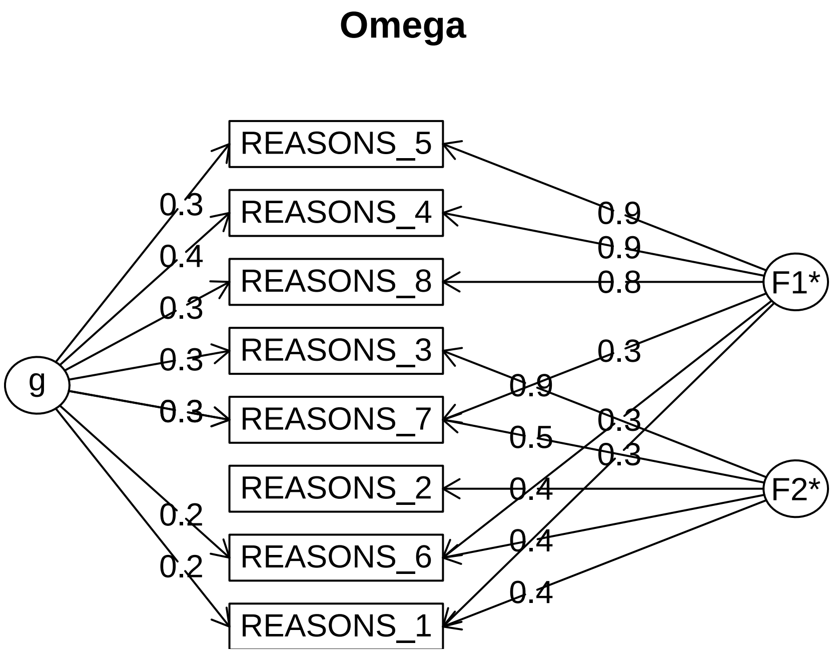
```
Loadings:
          ML1
REASONS_1 0.470
REASONS_2
REASONS_3
REASONS_4 0.998
REASONS_5 0.873
REASONS_6 0.504
REASONS_7 0.394
REASONS_8 0.816

                 ML1
SS loadings    3.087
Proportion Var 0.386
```

```
# Step 3: Run omega to check dimensionality
omega_result <- omega(tetra_corr_all, nfactors = 2, fm = "minres")  # adjust nfactors based
```

```
Loading required namespace: GPArotation
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```
Three factors are required for identification -- general factor loadings set to be equal.
Proceed with caution.
Think about redoing the analysis with alternative values of the 'option' setting.
```

```
In smc, smcs < 0 were set to .0
```



```r
# Test 1-factor solution
fa1 <- fa(tetra_corr_all, nfactors = 1, rotate = "none", fm = "ml")
```

```
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```r
cat("1-Factor Solution Loadings:\n")
```

```
1-Factor Solution Loadings:
```

```r
print(fa1$loadings, cutoff = 0.3)
```

```
Loadings:
          ML1
REASONS_1 0.470
REASONS_2
REASONS_3
```

```
REASONS_4 0.998
REASONS_5 0.873
REASONS_6 0.504
REASONS_7 0.394
REASONS_8 0.816

                 ML1
SS loadings    3.087
Proportion Var 0.386
```

```
# Test 2-factor solution
fa2 <- fa(tetra_corr_all, nfactors = 2, rotate = "oblimin", fm = "ml")
```

```
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```
cat("\n2-Factor Solution Loadings:\n")
```

```

2-Factor Solution Loadings:
```

```
print(fa2$loadings, cutoff = 0.3)
```

```

Loadings:
          ML2    ML1
REASONS_1  0.341  0.335
REASONS_2         0.393
REASONS_3         0.992
REASONS_4  0.928
REASONS_5  0.973
REASONS_6  0.311  0.399
REASONS_7  0.326  0.527
REASONS_8  0.856

                 ML2   ML1
SS loadings    2.886 1.744
Proportion Var 0.361 0.218
Cumulative Var 0.361 0.579
```

```
# Test 3-factor solution
fa3 <- fa(tetra_corr_all, nfactors = 3, rotate = "oblimin", fm = "ml")
```

```
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```
cat("\n3-Factor Solution Loadings:\n")
```

```

3-Factor Solution Loadings:
```

```
print(fa3$loadings, cutoff = 0.3)
```

```

Loadings:
          ML1    ML3    ML2   
REASONS_1  0.332              
REASONS_2         0.667 -0.390
REASONS_3         0.834       
REASONS_4  0.919              
REASONS_5  1.006              
REASONS_6                0.584
REASONS_7         0.643       
REASONS_8  0.840              

                 ML1   ML3   ML2
SS loadings    2.842 1.677 0.730
Proportion Var 0.355 0.210 0.091
Cumulative Var 0.355 0.565 0.656
```

```
# Extract values from 2-factor solution
eigenvalues <- fa2$Vaccounted["SS loadings", ]
percent_var <- fa2$Vaccounted["Proportion Var", ] * 100
cumulative_var <- fa2$Vaccounted["Cumulative Var", ] * 100

# Create a table rounded to 4 decimals
summary_table <- data.frame(
  Factor = 1:2,
  Eigenvalue = round(eigenvalues, 4),
  Percent_of_Variance = round(percent_var, 4),
  Cumulative_Percent = round(cumulative_var, 4)
)

# View the table
summary_table
```

```
    Factor Eigenvalue Percent_of_Variance Cumulative_Percent
ML2      1     2.9199             36.4992            36.4992
ML1      2     1.7786             22.2330            58.7322
```

```
# # Extract values from 3-factor solution
# eigenvalues <- fa3$Vaccounted["SS loadings", ]
# percent_var <- fa3$Vaccounted["Proportion Var", ] * 100
# cumulative_var <- fa3$Vaccounted["Cumulative Var", ] * 100
#
# # Create a table rounded to 4 decimals
# summary_table <- data.frame(
#   Factor = 1:3,
#   Eigenvalue = round(eigenvalues, 4),
#   Percent_of_Variance = round(percent_var, 4),
#   Cumulative_Percent = round(cumulative_var, 4)
# )
#
# # View the table
# summary_table
```

```
fa2$communality
```

```
REASONS_1 REASONS_2 REASONS_3 REASONS_4 REASONS_5 REASONS_6 REASONS_7 REASONS_8
0.2497624 0.1840713 0.9768544 0.9032620 0.9482536 0.2787017 0.4155597 0.7421095
```

```
# Test 2-factor solution
fa2 <- fa(tetra_corr_all, nfactors = 2, rotate = "oblimin", fm = "ml")
```

```
In smc, smcs < 0 were set to .0
In smc, smcs < 0 were set to .0
```

```r
# Round loadings to 2 decimals
rounded_loadings <- round(as.matrix(fa2$loadings), 2)

# Suppress small loadings (absolute value < 0.3)
rounded_loadings[abs(rounded_loadings) < 0.3] <- NA

# Print cleanly without quote argument
print(rounded_loadings, na.print = "")
```

```
Loadings:
          ML2  ML1
REASONS_1 0.34 0.34
REASONS_2   NA 0.39
REASONS_3   NA 0.99
REASONS_4 0.93   NA
REASONS_5 0.97   NA
REASONS_6 0.31 0.40
REASONS_7 0.33 0.53
REASONS_8 0.86   NA

               ML2 ML1
SS loadings     NA  NA
Proportion Var  NA  NA
Cumulative Var  NA  NA
```

0.5.2 Scaling

```r
describe(reasons_df)
```

```
           vars   n mean   sd median trimmed  mad min max range  skew kurtosis
condition     1 109 2.53 1.13      3    2.54 1.48   1   4     3 -0.02    -1.40
structure*    2 109 1.50 0.50      2    1.51 0.00   1   2     1 -0.02    -2.02
motivation    3 109 1.52 0.50      2    1.53 0.00   1   2     1 -0.09    -2.01
REASONS_1     4 109 0.27 0.44      0    0.21 0.00   0   1     1  1.04    -0.92
REASONS_2     5 109 0.18 0.39      0    0.11 0.00   0   1     1  1.61     0.61
REASONS_3     6 109 0.21 0.41      0    0.15 0.00   0   1     1  1.40    -0.05
REASONS_4     7 109 0.17 0.37      0    0.09 0.00   0   1     1  1.78     1.18
REASONS_5     8 109 0.07 0.26      0    0.00 0.00   0   1     1  3.23     8.49
```

```
REASONS_6     9 109 0.16 0.36      0    0.08 0.00   0   1     1  1.87     1.51
REASONS_7    10 109 0.19 0.40      0    0.12 0.00   0   1     1  1.54     0.37
REASONS_8    11 109 0.07 0.26      0    0.00 0.00   0   1     1  3.23     8.49
             se
condition  0.11
structure* 0.05
motivation 0.05
REASONS_1  0.04
REASONS_2  0.04
REASONS_3  0.04
REASONS_4  0.04
REASONS_5  0.03
REASONS_6  0.03
REASONS_7  0.04
REASONS_8  0.03
```

0.5.2.1 fa1

```r
reasons_fa1_items <- reasons_df_all[, c(
  "REASONS_1",
  "REASONS_4",
  "REASONS_5",
  "REASONS_6",
  "REASONS_7",
  "REASONS_8"
  )]
```

```r
reasons_fa1_alpha <- alpha(reasons_fa1_items)
print(reasons_fa1_alpha)
```

```
Reliability analysis
Call: alpha(x = reasons_fa1_items)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.62      0.65    0.68      0.24 1.9 0.056 0.15 0.21     0.17

    95% confidence boundaries
         lower alpha upper
Feldt     0.50  0.62  0.72
Duhachek  0.51  0.62  0.73
```

```
 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
REASONS_1      0.63      0.66    0.66      0.28 1.9    0.057 0.041  0.20
REASONS_4      0.47      0.51    0.53      0.17 1.0    0.080 0.027  0.13
REASONS_5      0.56      0.57    0.57      0.21 1.3    0.066 0.022  0.20
REASONS_6      0.60      0.65    0.66      0.27 1.9    0.061 0.045  0.19
REASONS_7      0.64      0.67    0.69      0.29 2.0    0.055 0.043  0.27
REASONS_8      0.57      0.58    0.57      0.22 1.4    0.064 0.019  0.19

 Item statistics
            n raw.r std.r r.cor r.drop  mean   sd
REASONS_1 109  0.58  0.50  0.33   0.27 0.266 0.44
REASONS_4 109  0.77  0.79  0.78   0.60 0.165 0.37
REASONS_5 109  0.61  0.68  0.64   0.45 0.073 0.26
REASONS_6 109  0.55  0.52  0.35   0.30 0.156 0.36
REASONS_7 109  0.51  0.47  0.26   0.22 0.193 0.40
REASONS_8 109  0.58  0.67  0.63   0.41 0.073 0.26

Non missing response frequency for each item
             0    1 miss
REASONS_1 0.73 0.27    0
REASONS_4 0.83 0.17    0
REASONS_5 0.93 0.07    0
REASONS_6 0.84 0.16    0
REASONS_7 0.81 0.19    0
REASONS_8 0.93 0.07    0
```

0.5.2.2 fa2

```
# Factor 1: Cooperative Motives
reasons_coop_items <- reasons_df_all[, c("REASONS_2", "REASONS_3", "REASONS_7")]

# Factor 2: Strategic Motives
reasons_strategic_items <- reasons_df_all[, c("REASONS_4", "REASONS_5", "REASONS_8")]
```

```
# ALPHA with recoded 3 with 458
# Cooperative Motives
reasons_coop_alpha <- alpha(reasons_coop_items)
print(reasons_coop_alpha)
```

```
Reliability analysis
Call: alpha(x = reasons_coop_items)

  raw_alpha std.alpha G6(smc) average_r S/N  ase mean   sd median_r
      0.52      0.52    0.42      0.26 1.1 0.08  0.2 0.28     0.25

    95% confidence boundaries
         lower alpha upper
Feldt     0.33  0.52  0.65
Duhachek  0.36  0.52  0.67

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r  S/N alpha se var.r med.r
REASONS_2      0.48      0.48    0.32      0.32 0.93    0.099    NA  0.32
REASONS_3      0.40      0.40    0.25      0.25 0.66    0.115    NA  0.25
REASONS_7      0.36      0.36    0.22      0.22 0.56    0.122    NA  0.22

 Item statistics
            n raw.r std.r r.cor r.drop mean   sd
REASONS_2 109  0.68  0.69  0.40   0.29 0.18 0.39
REASONS_3 109  0.73  0.72  0.48   0.34 0.21 0.41
REASONS_7 109  0.73  0.73  0.51   0.36 0.19 0.40

Non missing response frequency for each item
             0    1 miss
REASONS_2 0.82 0.18    0
REASONS_3 0.79 0.21    0
REASONS_7 0.81 0.19    0
```

```r
# Strategic Motives
reasons_strategic_alpha <- alpha(reasons_strategic_items)
print(reasons_strategic_alpha)
```

```
Reliability analysis
Call: alpha(x = reasons_strategic_items)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.77      0.79    0.72      0.56 3.8 0.037  0.1 0.25     0.54

    95% confidence boundaries
         lower alpha upper
```

```
Feldt     0.68  0.77  0.84
Duhachek  0.70  0.77  0.84

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
REASONS_4      0.75      0.75    0.60      0.60 2.9    0.049    NA  0.60
REASONS_5      0.67      0.70    0.54      0.54 2.3    0.058    NA  0.54
REASONS_8      0.67      0.70    0.54      0.54 2.3    0.058    NA  0.54

 Item statistics
            n raw.r std.r r.cor r.drop  mean   sd
REASONS_4 109  0.87  0.82  0.67   0.60 0.165 0.37
REASONS_5 109  0.82  0.85  0.73   0.64 0.073 0.26
REASONS_8 109  0.82  0.85  0.73   0.64 0.073 0.26

Non missing response frequency for each item
             0    1 miss
REASONS_4 0.83 0.17    0
REASONS_5 0.93 0.07    0
REASONS_8 0.93 0.07    0
```

```
# Calculate summary score for participants
filtered_data <- filtered_data %>%
  mutate(reasons_strategy_score = rowSums(select(., REASONS_4, REASONS_5, REASONS_8), na.rm =
```

0.5.3 Split between competition and cooperation

```
# reasons_coop_mean
# reasons_comp_mean
reasons_cooperation_items <- filtered_data %>%
  select(REASONS_1, REASONS_2, REASONS_3)

reasons_competition_items <- filtered_data %>%
  select(REASONS_4, REASONS_5, REASONS_6, REASONS_7, REASONS_8)
```

```
alpha_reasons_cooperation <- alpha(reasons_cooperation_items)
alpha_reasons_competition <- alpha(reasons_competition_items)
```

```r
print(alpha_reasons_cooperation)
```

```


Reliability analysis   
Call: alpha(x = reasons_cooperation_items)

  raw_alpha std.alpha G6(smc) average_r  S/N   ase mean   sd median_r
      0.41      0.41    0.32      0.19 0.69 0.098 0.22 0.28      0.2

    95% confidence boundaries 
         lower alpha upper
Feldt     0.18  0.41  0.58
Duhachek  0.21  0.41  0.60

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r  S/N alpha se var.r med.r
REASONS_1      0.36      0.36    0.22      0.22 0.56     0.12    NA  0.22
REASONS_2      0.33      0.33    0.20      0.20 0.49     0.13    NA  0.20
REASONS_3      0.25      0.25    0.14      0.14 0.34     0.14    NA  0.14

 Item statistics 
            n raw.r std.r r.cor r.drop mean   sd
REASONS_1 109  0.69  0.66  0.34   0.22 0.27 0.44
REASONS_2 109  0.65  0.67  0.37   0.23 0.18 0.39
REASONS_3 109  0.69  0.70  0.43   0.27 0.21 0.41

Non missing response frequency for each item
             0    1 miss
REASONS_1 0.73 0.27    0
REASONS_2 0.82 0.18    0
REASONS_3 0.79 0.21    0
```

```r
print(alpha_reasons_competition)
```

```


Reliability analysis   
Call: alpha(x = reasons_competition_items)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.63      0.66    0.66      0.28 1.9 0.057 0.13 0.21      0.2
```

```
    95% confidence boundaries
         lower alpha upper
Feldt     0.50  0.63  0.73
Duhachek  0.51  0.63  0.74

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
REASONS_4      0.45      0.50    0.50      0.20 1.0    0.088 0.038  0.13
REASONS_5      0.54      0.56    0.53      0.24 1.3    0.072 0.025  0.20
REASONS_6      0.65      0.69    0.67      0.36 2.2    0.056 0.049  0.38
REASONS_7      0.67      0.70    0.69      0.37 2.3    0.051 0.049  0.41
REASONS_8      0.52      0.54    0.52      0.23 1.2    0.074 0.029  0.18

 Item statistics
            n raw.r std.r r.cor r.drop  mean   sd
REASONS_4 109  0.80  0.79  0.76   0.59 0.165 0.37
REASONS_5 109  0.65  0.72  0.67   0.48 0.073 0.26
REASONS_6 109  0.54  0.50  0.28   0.23 0.156 0.36
REASONS_7 109  0.55  0.49  0.24   0.21 0.193 0.40
REASONS_8 109  0.69  0.75  0.70   0.52 0.073 0.26

Non missing response frequency for each item
             0    1 miss
REASONS_4 0.83 0.17    0
REASONS_5 0.93 0.07    0
REASONS_6 0.84 0.16    0
REASONS_7 0.81 0.19    0
REASONS_8 0.93 0.07    0
```

```r
# Drop REASONS_6 & _7
reasons_competition_items <- reasons_competition_items %>%
  select(
    -REASONS_6,
    -REASONS_7
  )

alpha_reasons_competition <- alpha(reasons_competition_items)
print(alpha_reasons_competition)
```

```
Reliability analysis
Call: alpha(x = reasons_competition_items)
```

```
  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.77      0.79    0.72      0.56 3.8 0.037  0.1 0.25     0.54

    95% confidence boundaries 
         lower alpha upper
Feldt     0.68  0.77  0.84
Duhachek  0.70  0.77  0.84

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
REASONS_4      0.75      0.75    0.60      0.60 2.9    0.049    NA  0.60
REASONS_5      0.67      0.70    0.54      0.54 2.3    0.058    NA  0.54
REASONS_8      0.67      0.70    0.54      0.54 2.3    0.058    NA  0.54

 Item statistics
            n raw.r std.r r.cor r.drop  mean   sd
REASONS_4 109  0.87  0.82  0.67   0.60 0.165 0.37
REASONS_5 109  0.82  0.85  0.73   0.64 0.073 0.26
REASONS_8 109  0.82  0.85  0.73   0.64 0.073 0.26

Non missing response frequency for each item
             0    1 miss
REASONS_4 0.83 0.17    0
REASONS_5 0.93 0.07    0
REASONS_8 0.93 0.07    0
```

0.5.4 Reversed cooperation with competition

```
reasons_matched <- filtered_data %>%
  select(REASONS_1:REASONS_8)

reasons_matched <- reasons_matched %>%
  mutate(
    REASONS_1_rev = ifelse(REASONS_1 == 1, 0,
                    ifelse(REASONS_1 == 0, 1, NA)),
    REASONS_2_rev = ifelse(REASONS_2 == 1, 0,
                    ifelse(REASONS_2 == 0, 1, NA)),
    REASONS_3_rev = ifelse(REASONS_3 == 1, 0,
                    ifelse(REASONS_3 == 0, 1, NA))
  )
```

```
# View(reasons_matched)

reasons_matched <- reasons_matched %>%
  select(
    -REASONS_1,
    -REASONS_2,
    -REASONS_3
  )
```

```
alpha_reasons_matched <- alpha(reasons_matched, check.keys = TRUE)
```

```
Warning in alpha(reasons_matched, check.keys = TRUE): Some items were negatively correlated
 This is indicated by a negative sign for the variable name.
```

```
print(alpha_reasons_matched)
```

```
Reliability analysis
Call: alpha(x = reasons_matched, check.keys = TRUE)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.63      0.65    0.69      0.19 1.9 0.053 0.17 0.19     0.15

    95% confidence boundaries
         lower alpha upper
Feldt     0.52  0.63  0.73
Duhachek  0.53  0.63  0.74

 Reliability if an item is dropped:
               raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
REASONS_4           0.56      0.56    0.60      0.16 1.3    0.064 0.019  0.14
REASONS_5           0.60      0.61    0.63      0.18 1.5    0.058 0.015  0.17
REASONS_6           0.60      0.63    0.67      0.20 1.7    0.058 0.032  0.14
REASONS_7           0.60      0.62    0.66      0.19 1.6    0.059 0.033  0.15
REASONS_8           0.60      0.60    0.61      0.18 1.5    0.058 0.016  0.15
REASONS_1_rev-      0.61      0.63    0.66      0.20 1.7    0.058 0.031  0.14
REASONS_2_rev-      0.63      0.65    0.68      0.21 1.8    0.055 0.031  0.17
REASONS_3_rev-      0.61      0.64    0.67      0.20 1.8    0.056 0.028  0.14

 Item statistics
```

```
                 n raw.r std.r r.cor r.drop  mean   sd
REASONS_4      109  0.66  0.69  0.69   0.48 0.165 0.37
REASONS_5      109  0.49  0.57  0.54   0.34 0.073 0.26
REASONS_6      109  0.51  0.50  0.37   0.31 0.156 0.36
REASONS_7      109  0.56  0.53  0.41   0.35 0.193 0.40
REASONS_8      109  0.51  0.60  0.58   0.37 0.073 0.26
REASONS_1_rev- 109  0.56  0.50  0.38   0.31 0.266 0.44
REASONS_2_rev- 109  0.47  0.44  0.29   0.24 0.183 0.39
REASONS_3_rev- 109  0.52  0.46  0.33   0.28 0.211 0.41

Non missing response frequency for each item
                 0    1 miss
REASONS_4     0.83 0.17    0
REASONS_5     0.93 0.07    0
REASONS_6     0.84 0.16    0
REASONS_7     0.81 0.19    0
REASONS_8     0.93 0.07    0
REASONS_1_rev 0.27 0.73    0
REASONS_2_rev 0.18 0.82    0
REASONS_3_rev 0.21 0.79    0
```

```
alpha_reasons_matched$item.stats
```

```
                 n     raw.r     std.r     r.cor    r.drop      mean        sd
REASONS_4      109 0.6572239 0.6946213 0.6865340 0.4846689 0.1651376 0.3730197
REASONS_5      109 0.4865204 0.5745482 0.5377639 0.3422557 0.0733945 0.2619875
REASONS_6      109 0.5146612 0.5025056 0.3693576 0.3109712 0.1559633 0.3644964
REASONS_7      109 0.5592628 0.5307507 0.4086310 0.3450542 0.1926606 0.3962104
REASONS_8      109 0.5092219 0.6012149 0.5777238 0.3683016 0.0733945 0.2619875
REASONS_1_rev- 109 0.5585065 0.5002581 0.3813572 0.3129835 0.2660550 0.4439345
REASONS_2_rev- 109 0.4676912 0.4416615 0.2861353 0.2393771 0.1834862 0.3888525
REASONS_3_rev- 109 0.5167450 0.4612184 0.3264353 0.2838581 0.2110092 0.4099095
```

0.5.5 4 items 3, 4, 5, 8

```
reasons_3458 <- filtered_data %>%
  select(
    REASONS_3,
    REASONS_4,
    REASONS_5,
    REASONS_8
  )

alpha_reasons_3458 <- alpha(reasons_3458, check.keys = TRUE)
print(alpha_reasons_3458)
```

```
Reliability analysis
Call: alpha(x = reasons_3458, check.keys = TRUE)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.55      0.61    0.63      0.29 1.6 0.074 0.13 0.22     0.31

    95% confidence boundaries
         lower alpha upper
Feldt     0.39  0.55  0.67
Duhachek  0.40  0.55  0.69

 Reliability if an item is dropped:
          raw_alpha std.alpha G6(smc) average_r  S/N alpha se  var.r med.r
REASONS_3      0.77      0.79    0.72      0.56 3.77    0.037 0.0011 0.538
REASONS_4      0.30      0.41    0.45      0.19 0.69    0.124 0.1265 0.027
REASONS_5      0.39      0.45    0.44      0.21 0.81    0.103 0.0800 0.073
REASONS_8      0.35      0.40    0.42      0.18 0.68    0.110 0.0985 0.073

 Item statistics
            n raw.r std.r r.cor r.drop  mean   sd
REASONS_3 109  0.49  0.38 0.028  0.025 0.211 0.41
REASONS_4 109  0.79  0.79 0.703  0.506 0.165 0.37
REASONS_5 109  0.69  0.76 0.696  0.466 0.073 0.26
REASONS_8 109  0.73  0.79 0.733  0.525 0.073 0.26

Non missing response frequency for each item
             0    1 miss
REASONS_3 0.79 0.21    0
REASONS_4 0.83 0.17    0
REASONS_5 0.93 0.07    0
REASONS_8 0.93 0.07    0
```

0.6 (2) Responses to Task

0.6.1 General Estimating Equation

```
# geepack
# Data needs to be modified to long format

# Between variables should be factors
str(filtered_data$structure)
```

```
 chr [1:109] "individual" "individual" "individual" "individual" ...
 - attr(*, "label")= chr "structure"
 - attr(*, "format.spss")= chr "A2000"
 - attr(*, "display_width")= int 15
```

```
str(filtered_data$motivation)
```

```
 Factor w/ 2 levels "proself","prosocial": 1 1 1 1 1 1 1 1 1 1 ...
```

```
# Limit data
gee_wide <- filtered_data %>%
  select(
    "ResponseId",
    "structure",
    "motivation",
    "public_more_withheld",
    "public_more_shared",
    "public_more_distort",
    "public_less_withheld",
    "public_less_shared",
    "public_less_distort",
    "private_more_withheld",
    "private_more_shared",
    "private_more_distort",
    "private_less_withheld",
    "private_less_shared",
    "private_less_distort"
  )

gee_long <- gee_wide %>%
```

```r
  pivot_longer(
    cols = matches("^(public|private)_(more|less)_(shared|withheld|distort)$"),
    names_to = "Condition",
    values_to = "Count"
  ) %>%
  separate(
    col = Condition,
    into = c("InfoType", "InfoImportance", "Behavior"),
    sep = "_"
  )

gee_long <- gee_long %>%
    mutate(
    InfoType        = as.factor(InfoType),
    InfoImportance  = as.factor(InfoImportance),
    Behavior        = as.factor(Behavior),
    ResponseId      = as.factor(ResponseId)
  )

gee_long <- gee_long %>%
  filter(Behavior != "shared")

gee_long <- gee_long %>%
  mutate(Behavior = droplevels(Behavior))

# View(gee_long)
```

```r
colnames(gee_long)
```

```
[1] "ResponseId"     "structure"      "motivation"     "InfoType"
[5] "InfoImportance" "Behavior"       "Count"
```

```r
str(gee_long)
```

```
tibble [872 x 7] (S3: tbl_df/tbl/data.frame)
 $ ResponseId    : Factor w/ 109 levels "R_1CKgzOXGVqMK2Qs",..: 96 96 96 96 96 96 96 96 4 4
 $ structure     : chr [1:872] "individual" "individual" "individual" "individual" ...
  ..- attr(*, "label")= chr "structure"
  ..- attr(*, "format.spss")= chr "A2000"
  ..- attr(*, "display_width")= int 15
 $ motivation    : Factor w/ 2 levels "proself","prosocial": 1 1 1 1 1 1 1 1 1 1 ...
 $ InfoType      : Factor w/ 2 levels "private","public": 2 2 2 2 1 1 1 1 2 2 ...
 $ InfoImportance: Factor w/ 2 levels "less","more": 2 2 1 1 2 2 1 1 2 2 ...
 $ Behavior      : Factor w/ 2 levels "distort","withheld": 2 1 2 1 2 1 2 1 2 1 ...
 $ Count         : num [1:872] 1 2 0 0 1 2 0 0 1 2 ...
```

```r
colSums(is.na(gee_long))
```

```
    ResponseId      structure     motivation       InfoType InfoImportance 
             0              0              0              0              0 
      Behavior          Count 
             0              0 
```

```r
gee_model <- geeglm(
  Count ~ structure + motivation + InfoType + InfoImportance + Behavior,
  id = ResponseId,
  family = poisson(link = "log"),
  data = gee_long,
  corstr = "exchangeable"
)

summary(gee_model)
```

```

Call:
geeglm(formula = Count ~ structure + motivation + InfoType + 
    InfoImportance + Behavior, family = poisson(link = "log"), 
    data = gee_long, id = ResponseId, corstr = "exchangeable")

 Coefficients:
                    Estimate  Std.err   Wald Pr(>|W|)    
(Intercept)         -0.47331  0.10128 21.841 2.96e-06 ***
structureindividual -0.16084  0.09352  2.958 0.085459 .  
motivationprosocial -0.33756  0.09470 12.704 0.000365 ***
InfoTypepublic      -0.19669  0.06642  8.769 0.003063 ** 
InfoImportancemore   0.43821  0.10001 19.198 1.18e-05 ***
Behaviorwithheld     0.23275  0.09927  5.497 0.019047 *  
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation structure = exchangeable 
```

```
Estimated Scale Parameters:

            Estimate Std.err
(Intercept)    1.048  0.0638
  Link = identity

Estimated Correlation Parameters:
      Estimate Std.err
alpha  0.03267 0.02164
Number of clusters:   109  Maximum cluster size: 8
```

```r
exp(coef(gee_model))
```

```
        (Intercept) structureindividual motivationprosocial      InfoTypepublic
             0.6229              0.8514              0.7135              0.8214
 InfoImportancemore    Behaviorwithheld
             1.5499              1.2621
```

```r
tidy(gee_model, exponentiate = TRUE, conf.int = TRUE)
```

```
# A tibble: 6 x 7
  term                estimate std.error statistic    p.value conf.low conf.high
  <chr>                  <dbl>     <dbl>     <dbl>      <dbl>    <dbl>     <dbl>
1 (Intercept)            0.623    0.101      21.8  0.00000296    0.511     0.760
2 structureindividual    0.851    0.0935      2.96 0.0855        0.709     1.02
3 motivationprosocial    0.714    0.0947     12.7  0.000365      0.593     0.859
4 InfoTypepublic         0.821    0.0664      8.77 0.00306       0.721     0.936
5 InfoImportancemore     1.55     0.100      19.2  0.0000118     1.27      1.89
6 Behaviorwithheld       1.26     0.0993      5.50 0.0190        1.04      1.53
```

0.6.1.1 Shared vs Other

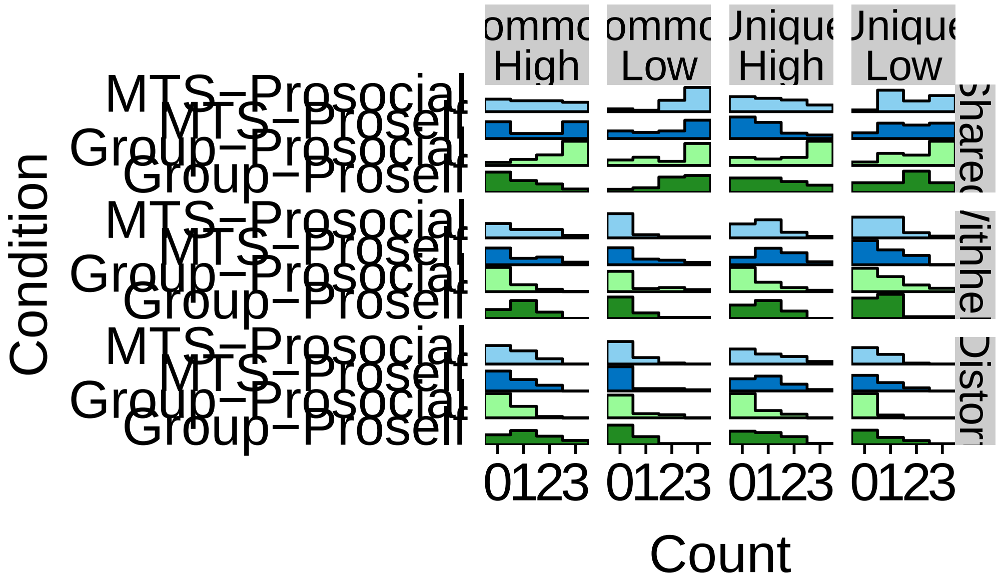
```r
# gee_long_shared <- gee_long %>%
#   mutate(
#     SharedBinary = ifelse(Behavior == "shared", 1, 0)
#   )
#
# str(gee_long_shared)
#
# gee_shared_model <- geeglm(
#   SharedBinary ~ structure + motivation + InfoType + InfoImportance,
#   id = ResponseId,
#   family = binomial(link = "logit"),
#   data = gee_long_shared,
#   corstr = "independence"
# )
```

```
# table(gee_long_shared$SharedBinary, gee_long_shared$structure)
# table(gee_long_shared$SharedBinary, gee_long_shared$InfoType)
```

0.6.2 Fig: Histogram s/w/d

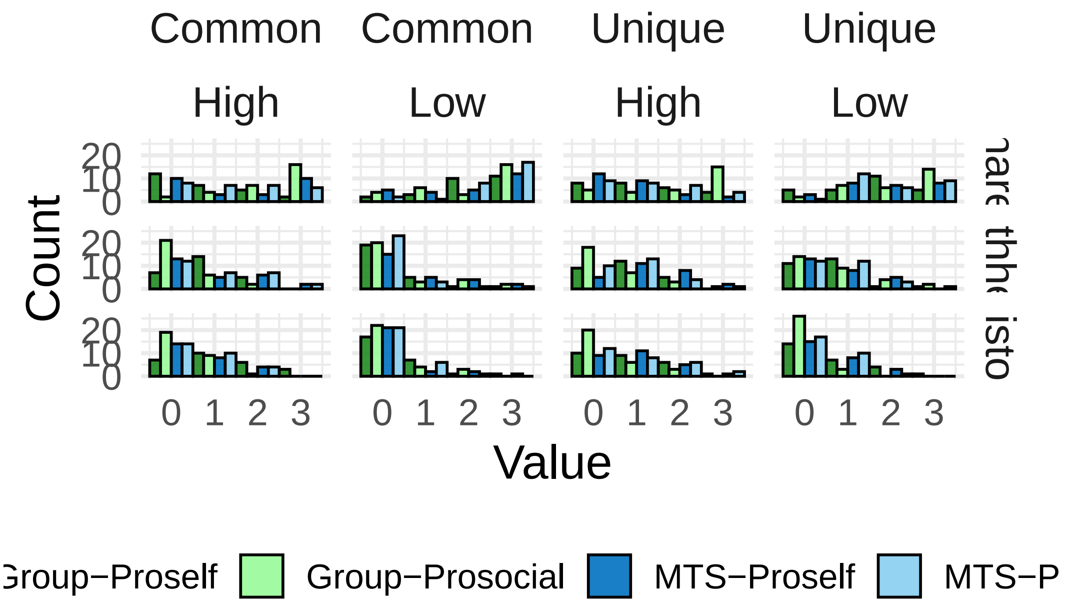
```
not_jittered_hist_plot <- ggplot(combined_data, aes(
  x = Value,
  y = condition_rev,
  fill = condition_rev
)) +
  geom_density_ridges2(
    stat = "binline",
    binwidth = 1,
    scale = 0.9,
    draw_baseline = TRUE,
    show.legend = FALSE
  ) +
  scale_x_continuous(
    breaks = seq(0, 3, by = 1),  # Show 0, 1, 2, 3 on the axis
    limits = c(-0.5, 3.5),       # Extend limits to ensure visibility of 0 and 3
    expand = c(0, 0),
    name = "Count"
  ) +
  scale_y_discrete(
    expand = expansion(add = c(0, 1.0)),
    name = "Condition"
  ) +
  labs(
    title = "",
    x = "",
    y = "Condition"
  ) +
  scale_fill_manual(
```

```r
    values = c(
      "MTS-Proself" = "#0073C2",     # Darker Blue
      "MTS-Prosocial" = "#89CFF0",   # Lighter Blue
      "Group-Proself" = "#228B22",   # Darker Green
      "Group-Prosocial" = "#98FB98"  # Lighter Green
    )
  ) +
  theme_ridges(grid = FALSE) +
  theme(
    axis.title.x = element_text(hjust = 0.5, size = 20),
    axis.title.y = element_text(hjust = 0.5, size = 20),
    axis.text.x = element_text(size = 20),
    axis.text.y = element_text(size = 20),
    strip.text.x = element_text(size = 16),
    strip.text.y = element_text(size = 16)
  ) +
  facet_grid(rows = vars(Action), cols = vars(Data_Type, Importance), scales = "fixed")

print(not_jittered_hist_plot)
```



```r
ggsave(
  filename = "not_jittered_hist_plot.png",   # Change the file name as needed
  plot = not_jittered_hist_plot,
  width = 12.95,               # Width in inches
  height = 8.97,              # Height in inches
  dpi = 300                   # Resolution in dots per inch (use 300 for high-quality)
)
```

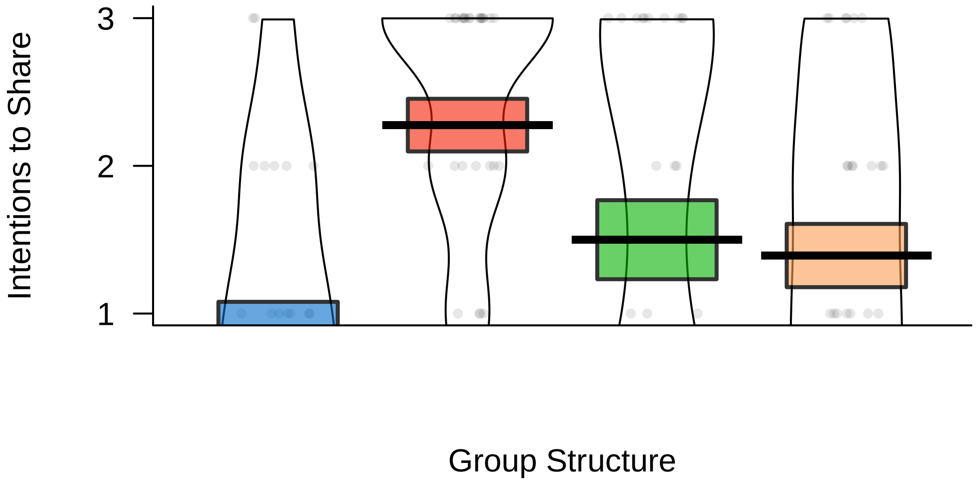
```
ggplot(combined_data, aes(
  x = Value,
  fill = condition_rev,
  group = condition_rev  # group by condition so bars dodge correctly
)) +
  geom_histogram(
    binwidth = 1,
    boundary = -0.5,
    color = "black",
    position = position_dodge(preserve = "single"),
    alpha = 0.9
  ) +
  facet_grid(
    rows = vars(Action),
    cols = vars(Data_Type, Importance),
    scales = "fixed"
  ) +
  scale_x_continuous(
    breaks = seq(0, 3, 1),
    limits = c(-0.5, 3.5),
    name = "Value"
  ) +
  scale_y_continuous(name = "Count") +
  scale_fill_manual(
    values = c(
      "MTS-Proself" = "#0073C2",
      "MTS-Prosocial" = "#89CFF0",
      "Group-Proself" = "#228B22",
      "Group-Prosocial" = "#98FB98"
    )
  ) +
  theme_minimal(base_size = 16) +
  theme(
    axis.title = element_text(size = 18),
    axis.text = element_text(size = 14),
    strip.text = element_text(size = 16),
    legend.position = "bottom",
    legend.title = element_blank()
  )
```



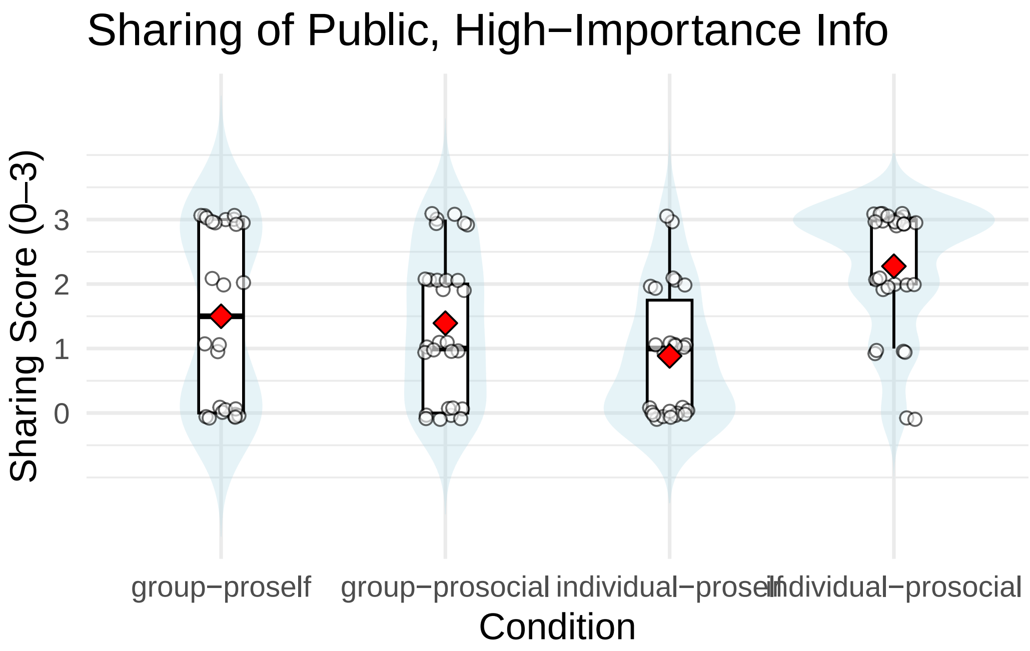
0.6.3 Fig: Response by Condition

```
# pirate plot based on how participants shared information broken out by condition.
pirateplot(public_more_shared ~ interaction(motivation, structure_rev),
           data = filtered_data,
           xlab = "Group Structure",
           ylab = "Intentions to Share",
           ylim = c(1, 3),
           yaxt = "n",
           xaxt = "n",
           gl.col = NA,
           bty = "n",
           pal = "xmen",
           inf.method = "se",
           avg.line.fun = mean,
           jitter.val = 0.1,
           theme = 2)
```

```
axis(side = 2, at = 1:3, labels = 1:3, las = 1)
box(bty = "l")
```

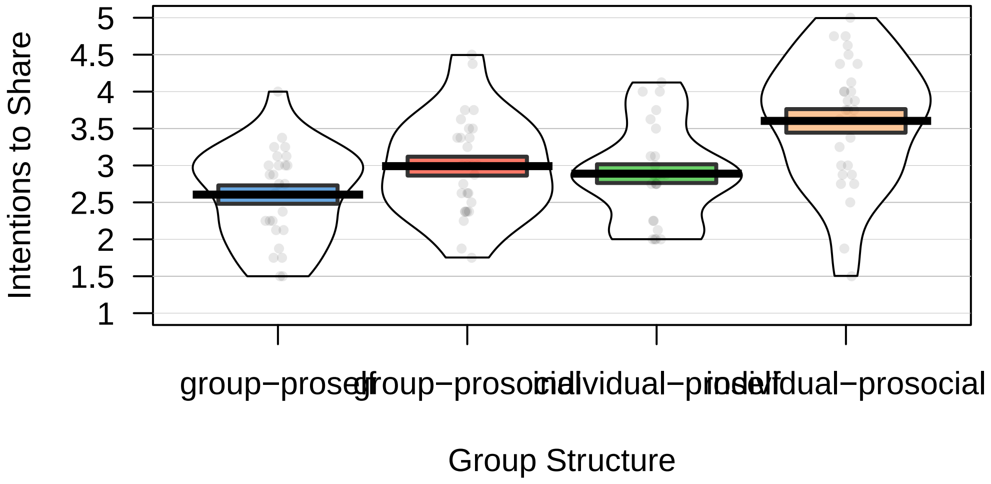


```
ggplot(filtered_data, aes(x = condition, y = public_more_shared)) +
  geom_violin(trim = FALSE, fill = "lightblue", color = NA, alpha = 0.3) +   # Distribution
  geom_boxplot(width = 0.2, outlier.shape = NA, fill = "white", color = "black") +  # Summar
  geom_jitter(width = 0.1, height = 0.1, shape = 21, fill = "white", color = "black", alpha =
  stat_summary(fun = mean, geom = "point", shape = 23, size = 3, fill = "red") +  # Mean
  theme_minimal(base_size = 14) +
  labs(
    title = "Sharing of Public, High-Importance Info",
    x = "Condition",
    y = "Sharing Score (0-3)"
  ) +
  scale_y_continuous(breaks = 0:3)  # Only whole numbers on y-axis
```



0.6.4 Fig: Pirate plot, mean responses by reward and structure

```
pirateplot(competition_score ~ condition,
           data = filtered_data,
           xlab = "Group Structure",
           ylab = "Intentions to Share",
           ylim = c(1, 5),
           pal = "xmen",
           inf.method = "se",
           avg.line.fun = mean,
           theme = 2)
```



0.6.5 Fig: Spider plot of distributions

```
summary_table_public_more <- filtered_data %>%
  group_by(condition) %>%
  summarise(
    Share = mean(public_more_withheld, na.rm = TRUE),
    Withhold = mean(public_more_shared, na.rm = TRUE),
    Distort = mean(public_more_distort, na.rm = TRUE)
  ) %>%
  ungroup()

print(summary_table)
```

```
    Factor Eigenvalue Percent_of_Variance Cumulative_Percent
ML2      1      2.920               36.50              36.50
ML1      2      1.779               22.23              58.73
```

```
summary_table_public_less <- filtered_data %>%
  group_by(condition) %>%
  summarise(
    Share = mean(public_less_withheld, na.rm = TRUE),
    Withhold = mean(public_less_shared, na.rm = TRUE),
    Distort = mean(public_less_distort, na.rm = TRUE)
  ) %>%
  ungroup()

print(summary_table)
```

```
    Factor Eigenvalue Percent_of_Variance Cumulative_Percent
ML2      1      2.920               36.50              36.50
ML1      2      1.779               22.23              58.73
```

```
summary_table_private_more <- filtered_data %>%
  group_by(condition) %>%
  summarise(
    Share = mean(private_more_withheld, na.rm = TRUE),
    Withhold = mean(private_more_shared, na.rm = TRUE),
    Distort = mean(private_more_distort, na.rm = TRUE)
  ) %>%
  ungroup()

print(summary_table)
```

```
    Factor Eigenvalue Percent_of_Variance Cumulative_Percent
ML2      1      2.920               36.50              36.50
ML1      2      1.779               22.23              58.73
```

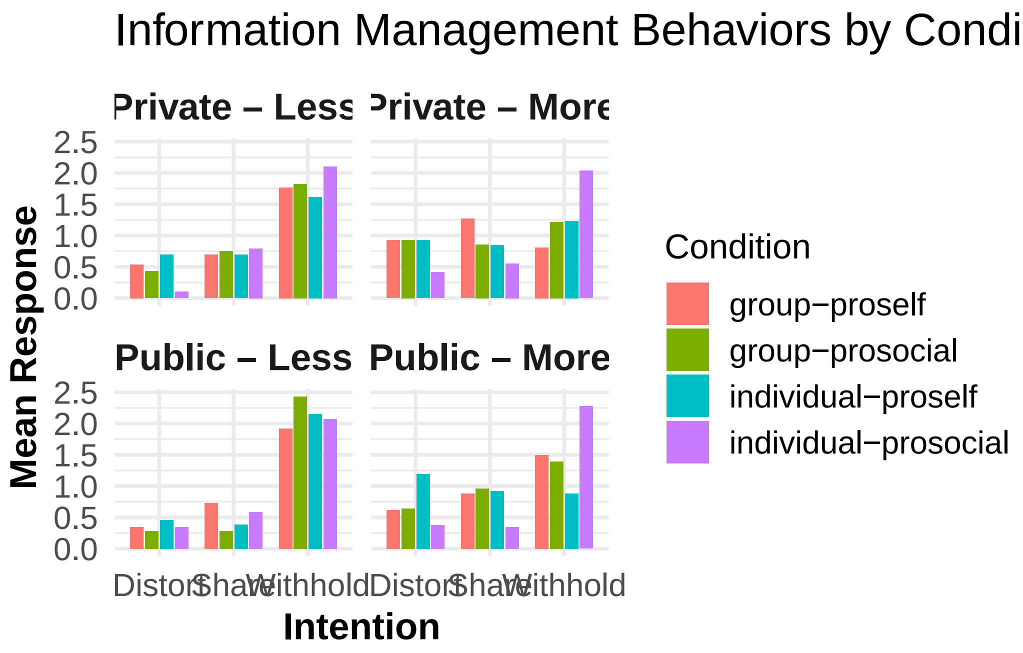
```
summary_table_private_less <- filtered_data %>%
  group_by(condition) %>%
  summarise(
    Share = mean(private_less_withheld, na.rm = TRUE),
    Withhold = mean(private_less_shared, na.rm = TRUE),
    Distort = mean(private_less_distort, na.rm = TRUE)
  ) %>%
  ungroup()

print(summary_table)
```

```
    Factor Eigenvalue Percent_of_Variance Cumulative_Percent
ML2      1      2.920               36.50              36.50
ML1      2      1.779               22.23              58.73
```

```
combined_data <- bind_rows(
  summary_table_public_more   %>% mutate(info_type = "Public - More"),
  summary_table_public_less   %>% mutate(info_type = "Public - Less"),
  summary_table_private_more  %>% mutate(info_type = "Private - More"),
  summary_table_private_less  %>% mutate(info_type = "Private - Less")
)
```

```
long_data <- combined_data %>%
  pivot_longer(cols = c(Share, Withhold, Distort),
               names_to = "behavior",
               values_to = "mean_value")
```

```
ggplot(long_data, aes(x = behavior, y = mean_value, fill = condition)) +
  geom_col(position = position_dodge(width = 0.8), width = 0.7) +
  facet_wrap(~ info_type) +
  labs(
    title = "Information Management Behaviors by Condition and Info Type",
    x = "Intention",
    y = "Mean Response",
    fill = "Condition"
  ) +
  theme_minimal(base_size = 14) +
  theme(
    strip.text = element_text(size = 14, face = "bold"),
    axis.text = element_text(size = 12),
    axis.title = element_text(size = 14, face = "bold"),
    legend.title = element_text(size = 13),
    legend.text = element_text(size = 12)
  )
```



0.7 (3) Individual Differences

0.7.1 Dark Triad

```
summary(filtered_data[c(
  "DirtyDozen_Narcissism",
  "DirtyDozen_Machiavellianism",
  "DirtyDozen_Psychopathy")])
```

```
 DirtyDozen_Narcissism DirtyDozen_Machiavellianism DirtyDozen_Psychopathy
 Min.   :1.00          Min.   :1.00                Min.   :1.00
 1st Qu.:1.75          1st Qu.:1.50                1st Qu.:1.00
 Median :2.50          Median :2.00                Median :1.50
 Mean   :2.55          Mean   :2.33                Mean   :1.76
 3rd Qu.:3.25          3rd Qu.:3.00                3rd Qu.:2.25
 Max.   :5.00          Max.   :5.00                Max.   :4.75
```

```
# Alphas full scale
alpha(filtered_data[,c(
  "Q10.1_1",
```

```r
  "Q10.1_2",
  "Q10.1_3",
  "Q10.1_4",
  "Q10.1_5",
  "Q10.1_6",
  "Q10.1_7",
  "Q10.1_8",
  "Q10.1_9",
  "Q10.1_10",
  "Q10.1_11",
  "Q10.1_12"
  )])
```

```
Reliability analysis
Call: alpha(x = filtered_data[, c("Q10.1_1", "Q10.1_2", "Q10.1_3",
    "Q10.1_4", "Q10.1_5", "Q10.1_6", "Q10.1_7", "Q10.1_8", "Q10.1_9",
    "Q10.1_10", "Q10.1_11", "Q10.1_12")])

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.87      0.88    0.92      0.37 7.1 0.018  2.2 0.77     0.36

    95% confidence boundaries
         lower alpha upper
Feldt     0.83  0.87  0.91
Duhachek  0.84  0.87  0.91

 Reliability if an item is dropped:
         raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Q10.1_1       0.86      0.86    0.91      0.36 6.1    0.021 0.034  0.36
Q10.1_2       0.86      0.86    0.90      0.36 6.2    0.021 0.033  0.36
Q10.1_3       0.86      0.86    0.91      0.37 6.3    0.020 0.034  0.37
Q10.1_4       0.86      0.86    0.90      0.35 6.0    0.021 0.031  0.34
Q10.1_5       0.87      0.87    0.91      0.38 6.8    0.019 0.030  0.38
Q10.1_6       0.86      0.87    0.91      0.37 6.5    0.019 0.030  0.36
Q10.1_7       0.87      0.87    0.91      0.37 6.5    0.019 0.032  0.36
Q10.1_8       0.87      0.87    0.92      0.39 6.9    0.019 0.033  0.38
Q10.1_9       0.86      0.87    0.90      0.38 6.7    0.019 0.028  0.37
Q10.1_10      0.87      0.88    0.91      0.39 7.0    0.019 0.025  0.38
Q10.1_11      0.86      0.87    0.91      0.37 6.5    0.020 0.033  0.36
Q10.1_12      0.86      0.86    0.91      0.36 6.3    0.020 0.035  0.36
```

```
 Item statistics
           n raw.r std.r r.cor r.drop mean   sd
Q10.1_1  109  0.74  0.74  0.72   0.68  2.1 1.15
Q10.1_2  109  0.74  0.72  0.70   0.66  2.7 1.35
Q10.1_3  109  0.70  0.68  0.66   0.62  2.8 1.34
Q10.1_4  109  0.76  0.79  0.78   0.72  1.7 0.94
Q10.1_5  109  0.53  0.56  0.52   0.44  1.6 1.03
Q10.1_6  109  0.61  0.65  0.62   0.54  1.6 1.06
Q10.1_7  109  0.61  0.64  0.60   0.53  1.8 1.04
Q10.1_8  109  0.54  0.55  0.49   0.43  2.0 1.20
Q10.1_9  109  0.64  0.60  0.59   0.54  3.0 1.31
Q10.1_10 109  0.55  0.52  0.50   0.45  2.7 1.26
Q10.1_11 109  0.67  0.64  0.61   0.57  2.6 1.34
Q10.1_12 109  0.71  0.71  0.69   0.64  1.9 1.16

Non missing response frequency for each item
            1    2    3    4    5 miss
Q10.1_1  0.39 0.32 0.16 0.09 0.05    0
Q10.1_2  0.22 0.29 0.15 0.22 0.12    0
Q10.1_3  0.22 0.24 0.15 0.29 0.10    0
Q10.1_4  0.54 0.31 0.08 0.05 0.02    0
Q10.1_5  0.66 0.16 0.11 0.05 0.03    0
Q10.1_6  0.66 0.17 0.08 0.05 0.04    0
Q10.1_7  0.51 0.33 0.08 0.03 0.05    0
Q10.1_8  0.48 0.18 0.18 0.13 0.03    0
Q10.1_9  0.19 0.15 0.23 0.31 0.12    0
Q10.1_10 0.21 0.28 0.23 0.19 0.09    0
Q10.1_11 0.28 0.26 0.18 0.17 0.10    0
Q10.1_12 0.49 0.25 0.15 0.07 0.05    0
```

```
# Alpha for sub-scales
```

```
corr.test(filtered_data[, c(
  "DirtyDozen_Narcissism",
  "DirtyDozen_Machiavellianism",
  "DirtyDozen_Psychopathy")])
```

```
Call:corr.test(x = filtered_data[, c("DirtyDozen_Narcissism", "DirtyDozen_Machiavellianism",
    "DirtyDozen_Psychopathy")])
Correlation matrix
                            DirtyDozen_Narcissism DirtyDozen_Machiavellianism
DirtyDozen_Narcissism                        1.00                        0.52
```

```
DirtyDozen_Machiavellianism                  0.52                        1.00
DirtyDozen_Psychopathy                       0.25                        0.55
                            DirtyDozen_Psychopathy
DirtyDozen_Narcissism                         0.25
DirtyDozen_Machiavellianism                   0.55
DirtyDozen_Psychopathy                        1.00
Sample Size
[1] 109
Probability values (Entries above the diagonal are adjusted for multiple tests.)
                            DirtyDozen_Narcissism DirtyDozen_Machiavellianism
DirtyDozen_Narcissism                        0.00                           0
DirtyDozen_Machiavellianism                  0.00                           0
DirtyDozen_Psychopathy                       0.01                           0
                            DirtyDozen_Psychopathy
DirtyDozen_Narcissism                         0.01
DirtyDozen_Machiavellianism                   0.00
DirtyDozen_Psychopathy                        0.00

 To see confidence intervals of the correlations, print with the short=FALSE option
```

```
vif(lm(competition_score ~ DirtyDozen_Machiavellianism + DirtyDozen_Narcissism + DirtyDozen_I
  data = filtered_data))
```

```
DirtyDozen_Machiavellianism       DirtyDozen_Narcissism
                      1.855                       1.382
     DirtyDozen_Psychopathy
                      1.438
```

0.7.2 Social Value Orientation

```
# SVO_angle
```

0.7.3 Need for Cognition

```
# NeedCog_Sum
# NeedCog_Mean
```

```r
# Long data for GEE is called gee_long

# Create a subscire of the data for individual factors
individual_data <- filtered_data %>%
  select(
    "ResponseId",
    "NeedCog_Sum",
    "NeedCog_Mean",
    "DirtyDozen_Narcissism",
    "DirtyDozen_Psychopathy",
    "DirtyDozen_Machiavellianism",
    "DirtyDozen_Mean",
    "SVO_angle",
    "SVO_type",
    "DIA",
    "DJG",
    "DAL",
    "DIC",
    "IA_Index"
  )
```

```r
# Merge the data with scores on the individual variables
merged_long_data <- left_join(gee_long, individual_data, by = "ResponseId")
```

```r
colnames(merged_long_data)
```

```
 [1] "ResponseId"                  "structure"
 [3] "motivation"                  "InfoType"
 [5] "InfoImportance"              "Behavior"
 [7] "Count"                       "NeedCog_Sum"
 [9] "NeedCog_Mean"                "DirtyDozen_Narcissism"
[11] "DirtyDozen_Psychopathy"      "DirtyDozen_Machiavellianism"
[13] "DirtyDozen_Mean"             "SVO_angle"
[15] "SVO_type"                    "DIA"
[17] "DJG"                         "DAL"
[19] "DIC"                         "IA_Index"
```

```r
str(merged_long_data)
```

```
tibble [872 x 20] (S3: tbl_df/tbl/data.frame)
```

```
$ ResponseId                 : chr [1:872] "R_r9AHnY4cz3OJZD3" "R_r9AHnY4cz3OJZD3" "R_r9AHn
$ structure                  : chr [1:872] "individual" "individual" "individual" "individua
 ..- attr(*, "label")= chr "structure"
 ..- attr(*, "format.spss")= chr "A2000"
 ..- attr(*, "display_width")= int 15
$ motivation                 : Factor w/ 2 levels "proself","prosocial": 1 1 1 1 1 1 1 1 1
$ InfoType                   : Factor w/ 2 levels "private","public": 2 2 2 2 1 1 1 1 2 2 .
$ InfoImportance             : Factor w/ 2 levels "less","more": 2 2 1 1 2 2 1 1 2 2 ...
$ Behavior                   : Factor w/ 2 levels "distort","withheld": 2 1 2 1 2 1 2 1 2 1
$ Count                      : num [1:872] 1 2 0 0 1 2 0 0 1 2 ...
$ NeedCog_Sum                : num [1:872] 82 82 82 82 82 82 82 82 49 49 ...
 ..- attr(*, "label")= chr "Sum of Need for Cognition"
 ..- attr(*, "format.spss")= chr "F8.2"
 ..- attr(*, "display_width")= int 13
$ NeedCog_Mean               : num [1:872] 4.56 4.56 4.56 4.56 4.56 ...
 ..- attr(*, "label")= chr "Mean of Need for Cognition"
 ..- attr(*, "format.spss")= chr "F8.2"
 ..- attr(*, "display_width")= int 14
$ DirtyDozen_Narcissism      : dbl+lbl [1:872] 2.50, 2.50, 2.50, 2.50, 2.50, 2.50, 2.50, 2.
  ..@ label        : chr "Dirty Dozen Narcissism Sub-scale"
  ..@ format.spss  : chr "F8.2"
  ..@ display_width: int 23
  ..@ labels       : Named num [1:2] 1 5
  .. ..- attr(*, "names")= chr [1:2] "Strongly disagree" "Strongly agree"
$ DirtyDozen_Psychopathy     : dbl+lbl [1:872] 1.75, 1.75, 1.75, 1.75, 1.75, 1.75, 1.75, 1.
  ..@ label        : chr "Dirty Dozen Psychopathy Sub-scale"
  ..@ format.spss  : chr "F8.2"
  ..@ display_width: int 24
  ..@ labels       : Named num [1:2] 1 5
  .. ..- attr(*, "names")= chr [1:2] "Strongly disagree" "Strongly agree"
$ DirtyDozen_Machiavellianism: num [1:872] 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.75 2.75 ...
 ..- attr(*, "label")= chr "Dirty Dozen Machiavellianism Sub-scale"
 ..- attr(*, "format.spss")= chr "F8.2"
 ..- attr(*, "display_width")= int 29
$ DirtyDozen_Mean            : num [1:872] 2.25 2.25 2.25 2.25 2.25 ...
 ..- attr(*, "label")= chr "Dirty Dozen Mean"
 ..- attr(*, "format.spss")= chr "F8.2"
 ..- attr(*, "display_width")= int 17
$ SVO_angle                  : num [1:872] 37.5 37.5 37.5 37.5 37.5 ...
 ..- attr(*, "format.spss")= chr "F8.2"
 ..- attr(*, "display_width")= int 11
$ SVO_type                   : dbl+lbl [1:872] 3, 3, 3, 3, 3, 3, 3, 3, 2, 2, 2, 2, 2, 2, 2,
  ..@ format.spss  : chr "F8.2"
```

```
   ..@ display_width: int 10
   ..@ labels       : Named num [1:4] 1 2 3 4
   .. ..- attr(*, "names")= chr [1:4] "competitive" "individualistic" "prosocial" "altruistic
 $ DIA                        : num [1:872] 0.0139 0.0139 0.0139 0.0139 0.0139 ...
  ..- attr(*, "label")= chr "Difference to inequality averse type"
  ..- attr(*, "format.spss")= chr "F8.2"
  ..- attr(*, "display_width")= int 10
 $ DJG                        : num [1:872] 0.229 0.229 0.229 0.229 0.229 ...
  ..- attr(*, "label")= chr "Difference to joint gain type"
  ..- attr(*, "format.spss")= chr "F8.2"
  ..- attr(*, "display_width")= int 10
 $ DAL                        : num [1:872] 0.486 0.486 0.486 0.486 0.486 ...
  ..- attr(*, "label")= chr "Difference to altruistic type"
  ..- attr(*, "format.spss")= chr "F8.2"
  ..- attr(*, "display_width")= int 10
 $ DIC                        : num [1:872] 0.514 0.514 0.514 0.514 0.514 ...
  ..- attr(*, "label")= chr "Difference to individualistic type"
  ..- attr(*, "format.spss")= chr "F8.2"
  ..- attr(*, "display_width")= int 10
 $ IA_Index                   : dbl+lbl [1:872] 0.0571, 0.0571, 0.0571, 0.0571, 0.0571, 0.057
   ..@ label        : chr "Inequality Aversion Index"
   ..@ format.spss  : chr "F8.2"
   ..@ display_width: int 10
   ..@ labels       : Named num [1:2] 0 1
   .. ..- attr(*, "names")= chr [1:2] "perfect IA Type" "perfect JG Type"
```

0.8 End of Page