Social Acceptability

Load the packages and the dataset

```
library(readxl)
library(dplyr)
```

```
Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag

The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

```
library(tidyr)
library(car)
```

```
Loading required package: carData


Attaching package: 'car'

The following object is masked from 'package:dplyr':

    recode
```

```r
library(emmeans)
```

```
Welcome to emmeans.
Caution: You lose important information if you filter this package's results.
See '? untidy'
```

```r
library(effectsize)
library(ggplot2)
library(forcats)

file_path <- "/Users/daryani/Desktop/data_reversed.xlsx"
data <- read_excel(file_path)
```

Ensure factors are factors

```r
data <- data %>%
  mutate(
    group_clean = case_when(
      group %in% c(1, "1", "Prolife", "prolife") ~ "Prolife",
      group %in% c(2, "2", "Prochoice", "prochoice") ~ "Prochoice",
      TRUE ~ NA_character_
    ),
    condition_clean = case_when(
      condition %in% c(1, "1", "Outgroup", "outgroup", "Actual", "Actual Perception") ~ "Outg
      condition %in% c(2, "2", "Metaperception", "metaperception", "Meta") ~ "Metaperception"
      condition %in% c(3, "3", "Ingroup", "ingroup") ~ "Ingroup",
      TRUE ~ NA_character_
    ),
    group = factor(group_clean, levels = c("Prolife", "Prochoice")),
    condition = factor(condition_clean, levels = c("Outgroup", "Metaperception", "Ingroup"))
  ) %>%
  select(-group_clean, -condition_clean) %>%
  mutate(
    group = droplevels(group),
    condition = droplevels(condition)
  )

table(data$group, data$condition, useNA="ifany")
```

```
           Outgroup Metaperception Ingroup
  Prolife         89             85      89
  Prochoice       96             97      96
```

Create the Social Acceptability composite

```
data <- data %>%
  mutate(
    social_avg = rowMeans(pick(social_1:social_3), na.rm = TRUE)
  )
```

Simple descriptives

```
desc_social <- data %>%
  group_by(group, condition) %>%
  summarise(
    n = dplyr::n(),
    mean_social = mean(social_avg, na.rm = TRUE),
    sd_social   = sd(social_avg, na.rm = TRUE),
    .groups = "drop"
  )

print(as.data.frame(desc_social), row.names = FALSE)
```

```
     group      condition  n mean_social sd_social
   Prolife       Outgroup 89    3.153558  1.680290
   Prolife Metaperception 85    2.152941  1.233948
   Prolife        Ingroup 89    5.779026  1.710738
 Prochoice       Outgroup 96    2.826389  1.335944
 Prochoice Metaperception 97    2.323024  1.627636
 Prochoice        Ingroup 96    6.062500  1.424360
```

```
social_wide <- tidyr::pivot_wider(
  desc_social |> select(group, condition, mean_social),
  names_from = condition, values_from = mean_social
)
cat("\nSocial Acceptability (means):\n")
```

Social Acceptability (means):

```
print(as.data.frame(social_wide), row.names = FALSE)
```

```
     group Outgroup Metaperception  Ingroup
   Prolife 3.153558       2.152941 5.779026
 Prochoice 2.826389       2.323024 6.062500
```

Fit the model

```
fit_social <- lm(social_avg ~ group * condition + ideology, data = data)

Anova(fit_social, type = 3)
```

```
Anova Table (Type III tests)

Response: social_avg
                 Sum Sq  Df  F value Pr(>F)
(Intercept)      192.99   1  84.4658 <2e-16 ***
group              0.59   1   0.2588 0.6111
condition        609.96   2 133.4815 <2e-16 ***
ideology           5.28   1   2.3127 0.1289
group:condition   10.16   2   2.2236 0.1092
Residuals       1245.23 545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
eta_squared(Anova(fit_social, type = 3), partial = TRUE, ci = 0.95)
```

```
Type 3 ANOVAs only give sensible and informative results when covariates
  are mean-centered and factors are coded with orthogonal contrasts (such
  as those produced by `contr.sum`, `contr.poly`, or `contr.helmert`, but
  *not* by the default `contr.treatment`).

# Effect Size for ANOVA (Type III)

Parameter       | Eta2 (partial) |       95% CI
```

```
-----------------------------------------------
group           |       4.75e-04 | [0.00, 1.00]
condition       |           0.33 | [0.28, 1.00]
ideology        |       4.23e-03 | [0.00, 1.00]
group:condition |       8.09e-03 | [0.00, 1.00]

- One-sided CIs: upper bound fixed at [1.00].
```

Planned contrasts - Estimated marginal means for the Group × Condition cells

```
emm_social <- emmeans(fit_social, ~ group * condition)

labs_s <- with(as.data.frame(emm_social), paste(group, condition, sep = "."))
make_s <- function(pos_names, neg_names, labels = labs_s) {
  w <- setNames(rep(0, length(labels)), labels)
  w[pos_names] <- w[pos_names] + 1
  w[neg_names] <- w[neg_names] - 1
  w
}
```

Ingroup vs Outgroup

```
h1_social <- contrast(
  emm_social,
  method = list(
    "Prolife Ingroup vs Prochoice Outgroup"  = make_s("Prolife.Ingroup",  "Prochoice.Outgrou
    "Prochoice Ingroup vs Prolife Outgroup"  = make_s("Prochoice.Ingroup","Prolife.Outgroup"
  ),
  adjust = "none"
)

summary(h1_social, infer = c(TRUE, TRUE))
```

```
 contrast                              estimate    SE  df lower.CL upper.CL
 Prolife Ingroup vs Prochoice Outgroup     2.74 0.263 545     2.22     3.26
 Prochoice Ingroup vs Prolife Outgroup     3.10 0.256 545     2.60     3.61
 t.ratio p.value
  10.434  <.0001
```

```
  12.109  <.0001

Confidence level used: 0.95
```

```r
eff_size(h1_social, sigma = sigma(fit_social), edf = df.residual(fit_social))
```

```
 contrast
 Prolife Ingroup vs Prochoice Outgroup - Prochoice Ingroup vs Prolife Outgroup
 effect.size    SE  df lower.CL upper.CL
       -0.24 0.273 545   -0.776    0.297

sigma used for effect sizes: 1.512
Confidence level used: 0.95
```

Outgroup vs Metaperception

```r
h2_social <- contrast(
  emm_social,
  method = list(
    "Prolife Outgroup vs Prochoice Meta" = make_s("Prolife.Outgroup",
                                                  "Prochoice.Metaperception"),
    "Prochoice Outgroup vs Prolife Meta" = make_s("Prochoice.Outgroup",
                                                  "Prolife.Metaperception")
  ),
  adjust = "none"
)

summary(h2_social, infer = c(TRUE, TRUE))
```

```
 contrast                           estimate    SE  df lower.CL upper.CL
 Prolife Outgroup vs Prochoice Meta    0.629 0.258 545    0.122     1.14
 Prochoice Outgroup vs Prolife Meta    0.877 0.262 545    0.363     1.39
 t.ratio p.value
   2.436  0.0152
   3.348  0.0009

Confidence level used: 0.95
```

```
eff_size(h2_social, sigma = sigma(fit_social), edf = df.residual(fit_social))
```

```
 contrast
 Prolife Outgroup vs Prochoice Meta - Prochoice Outgroup vs Prolife Meta
 effect.size    SE  df lower.CL upper.CL
      -0.164 0.273 545   -0.701    0.373

sigma used for effect sizes: 1.512
Confidence level used: 0.95
```

Ideology-adjusted scores + violin plot

```
if (!is.numeric(data$ideology)) {
  data <- data %>% mutate(ideology = suppressWarnings(as.numeric(ideology)))
}

fit_social <- lm(social_avg ~ ideology + group * condition, data = data)

b_social <- coef(fit_social)[["ideology"]]
xbar <- mean(data$ideology, na.rm = TRUE)

data <- data %>%
  mutate(
    social_adj = social_avg - b_social * (ideology - xbar)
  )

plot_df_social <- data %>%
  filter(!is.na(group), !is.na(condition)) %>%
  mutate(
    group_label = fct_recode(group, "Pro-life" = "Prolife", "Pro-choice" =
                               "Prochoice"),
    condition_label = fct_recode(
      condition,
      "Outgroup Perception" = "Outgroup",
      "Metaperception" = "Metaperception",
      "Ingroup Perception" = "Ingroup"
    ),
    condition_label = factor(
      condition_label,
      levels = c("Ingroup Perception","Outgroup Perception","Metaperception")
```

```
    )
  ) %>%
  select(group_label, condition_label, social_adj)

sum_df_social <- plot_df_social %>%
  group_by(group_label, condition_label) %>%
  summarise(
    mean = mean(social_adj, na.rm = TRUE),
    sd   = sd(social_adj, na.rm = TRUE),
    n    = sum(!is.na(social_adj)),
    se   = sd / sqrt(n),
    .groups = "drop"
  )

print(sum_df_social)
```

```
# A tibble: 6 x 6
  group_label condition_label      mean    sd     n    se
  <fct>       <fct>               <dbl> <dbl> <int> <dbl>
1 Pro-life    Ingroup Perception   5.66  1.70    89 0.180
2 Pro-life    Outgroup Perception  3.05  1.72    89 0.182
3 Pro-life    Metaperception       2.05  1.23    85 0.134
4 Pro-choice  Ingroup Perception   6.16  1.45    96 0.148
5 Pro-choice  Outgroup Perception  2.92  1.29    96 0.132
6 Pro-choice  Metaperception       2.42  1.60    97 0.163
```

```
ggplot(plot_df_social, aes(x = group_label, y = social_adj, fill = condition_label)) +
  geom_violin(position = position_dodge(width = 0.8), alpha = 0.7, width = 0.7, trim = TRUE)
  geom_point(
    data = sum_df_social,
    aes(x = group_label, y = mean, group = condition_label),
    position = position_dodge(width = 0.8),
    size = 2, color = "black", inherit.aes = FALSE
  ) +
  geom_errorbar(
    data = sum_df_social,
    aes(x = group_label, ymin = mean - se, ymax = mean + se, group = condition_label),
    width = 0.15,
    position = position_dodge(width = 0.8),
    inherit.aes = FALSE
  ) +
```

```r
  scale_fill_manual(
    values = c(
      "Ingroup Perception" = "#66c2a5",
      "Outgroup Perception" = "#8da0cb",
      "Metaperception" = "#fc8d62"
    ),
    name = "Condition"
  ) +
  labs(
    title = "Social Acceptability Across Pro-life and Pro-choice Groups",
    subtitle = "Ideology-adjusted scores with means and SE bars",
    x = NULL, y = "Rating (scale units)"
  ) +
  theme_minimal() +
  theme(
    legend.position = "bottom",
    plot.title = element_text(hjust = 0.5, face = "bold", size = 14),
    plot.subtitle = element_text(hjust = 0.5, size = 12),
    panel.grid.major.x = element_blank(),
    panel.border = element_rect(fill = NA, color = "gray90"),
    axis.text = element_text(color = "black", size = 10)
  ) +
  geom_hline(yintercept = 4, linetype = "dashed", color = "gray50", alpha = 0.5)
```