wamth_competence

Load the data

```
## Load the data
library(readxl)

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

Sys.setenv(RGL_USE_NULL = "TRUE")
options(rgl.useNULL = TRUE)

# Packages
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(car)
```

```
Loading required package: carData
```

```
Attaching package: 'car'

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

    recode
```

```
library(heplots)
```

```
Loading required package: broom
```

```
library(MVN)
library(emmeans)
```

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

```
library(effectsize)
```

Ensure factors are factors

```
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")            ~ "Meta
      condition %in% c(3, "3", "Ingroup", "ingroup")                                   ~ "Ing
      TRUE ~ NA_character_
    ),
    group     = factor(group_clean, levels = c("Prolife", "Prochoice")),
    condition = factor(condition_clean, levels = c("Outgroup", "Metaperception", "Ingroup"))
  ) %>%
```

```r
  select(-group_clean, -condition_clean)

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

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

Create Composite Scores for Warmth & Competence

```r
data <- data %>%
  mutate(
    warmth_avg     = rowMeans(pick(warmth_1:warmth_4), na.rm = TRUE),
    competence_avg = rowMeans(pick(competence_5:competence_8), na.rm = TRUE)
  )
```

Simple Descriptives

```r
desc <- data %>%
  group_by(group, condition) %>%
  summarise(
    n           = dplyr::n(),
    mean_warmth = mean(warmth_avg, na.rm = TRUE),
    sd_warmth   = sd(warmth_avg, na.rm = TRUE),
    mean_comp   = mean(competence_avg, na.rm = TRUE),
    sd_comp     = sd(competence_avg, na.rm = TRUE),
    .groups     = "drop"
  )

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

```
     group      condition  n mean_warmth sd_warmth mean_comp  sd_comp
   Prolife       Outgroup 89    3.971910  1.782346  4.171348 1.687014
   Prolife Metaperception 85    3.088235  1.576287  3.005882 1.693816
   Prolife        Ingroup 89    5.867978  1.330952  5.750000 1.341005
 Prochoice       Outgroup 96    3.643229  1.351775  3.390625 1.440857
```

```
 Prochoice Metaperception 97    2.832474  1.851140  2.917526 1.857460
 Prochoice        Ingroup 96    5.622396  1.250786  5.494792 1.411876
```

```r
warmth_wide <- tidyr::pivot_wider(desc |> select(group, condition, mean_warmth),
                                  names_from = condition, values_from = mean_warmth)
comp_wide <- tidyr::pivot_wider(desc |> select(group, condition, mean_comp),
                                names_from = condition, values_from = mean_comp)

cat("\nWarmth (means):\n");     print(as.data.frame(warmth_wide), row.names = FALSE)
```

```
Warmth (means):

     group Outgroup Metaperception  Ingroup
   Prolife 3.971910       3.088235 5.867978
 Prochoice 3.643229       2.832474 5.622396
```

```r
cat("\nCompetence (means):\n"); print(as.data.frame(comp_wide), row.names = FALSE)
```

```
Competence (means):

     group Outgroup Metaperception  Ingroup
   Prolife 4.171348       3.005882 5.750000
 Prochoice 3.390625       2.917526 5.494792
```

Fit MANCOVA

```r
mancova_model <- manova(cbind(warmth_avg, competence_avg) ~ group * condition + ideology,
                        data = data)

summary(mancova_model, test = "Pillai")
```

```
                Df  Pillai approx F num Df den Df    Pr(>F)
group            1 0.01636    4.524      2    544  0.011257 *
condition        2 0.37127   62.116      4   1090 < 2.2e-16 ***
ideology         1 0.00632    1.730      2    544  0.178331
group:condition  2 0.02813    3.887      4   1090  0.003847 **
```

```
Residuals       545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
summary(mancova_model, test = "Wilks")
```

```
                 Df   Wilks approx F num Df den Df    Pr(>F)
group             1 0.98364    4.524      2    544  0.011257 *
condition         2 0.62873   71.032      4   1088 < 2.2e-16 ***
ideology          1 0.99368    1.730      2    544  0.178331
group:condition   2 0.97187    3.908      4   1088  0.003709 **
Residuals       545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Univariate ANCOVAs + Effect Sizes

```r
fit_warmth <- lm(warmth_avg ~ group * condition + ideology, data = data)
fit_comp   <- lm(competence_avg ~ group * condition + ideology, data = data)

Anova(fit_warmth, type = 3)
```

```
Anova Table (Type III tests)

Response: warmth_avg
                 Sum Sq  Df  F value Pr(>F)
(Intercept)      322.30   1 136.1905 <2e-16 ***
group              0.56   1   0.2369 0.6267
condition        349.70   2  73.8837 <2e-16 ***
ideology           5.55   1   2.3471 0.1261
group:condition    0.26   2   0.0543 0.9472
Residuals       1289.78 545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
Anova(fit_comp, type = 3)
```

```
Anova Table (Type III tests)
```

```
Response: competence_avg
                 Sum Sq  Df  F value  Pr(>F)
(Intercept)      337.99   1 135.6123 < 2e-16 ***
group              9.41   1   3.7759 0.05251 .
condition        327.30   2  65.6609 < 2e-16 ***
ideology           9.18   1   3.6837 0.05547 .
group:condition   12.60   2   2.5275 0.08079 .
Residuals       1358.33 545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
eta_squared(Anova(fit_warmth, 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           |       4.34e-04 | [0.00, 1.00]
condition       |           0.21 | [0.16, 1.00]
ideology        |       4.29e-03 | [0.00, 1.00]
group:condition |       1.99e-04 | [0.00, 1.00]

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

```
eta_squared(Anova(fit_comp, 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           |       6.88e-03 | [0.00, 1.00]
condition       |           0.19 | [0.15, 1.00]
ideology        |       6.71e-03 | [0.00, 1.00]
group:condition |       9.19e-03 | [0.00, 1.00]

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

Planned Contrasts – RQ1: Ingroup vs Outgroup

```r
# Warmth
emm_warmth <- emmeans(fit_warmth, ~ group * condition)
labs <- with(as.data.frame(emm_warmth), paste(group, condition, sep = "."))
make_w <- function(pos_names, neg_names, labels = labs) {
  w <- setNames(rep(0, length(labels)), labels)
  w[pos_names] <- w[pos_names] + 1
  w[neg_names] <- w[neg_names] - 1
  w
}
h1_warmth <- contrast(
  emm_warmth,
  method = list(
    "Prolife Ingroup vs Prochoice Outgroup"  = make_w("Prolife.Ingroup", "Prochoice.Outgroup"
    "Prochoice Ingroup vs Prolife Outgroup"  = make_w("Prochoice.Ingroup", "Prolife.Outgroup"
  ),
  adjust = "none"
)
summary(h1_warmth, infer = c(TRUE, TRUE))
```

```
 contrast                                estimate    SE  df lower.CL upper.CL
 Prolife Ingroup vs Prochoice Outgroup     2.01 0.267 545     1.48     2.53
 Prochoice Ingroup vs Prolife Outgroup     1.85 0.261 545     1.34     2.36
 t.ratio p.value
   7.509  <.0001
   7.090  <.0001

Confidence level used: 0.95
```

```r
eff_size(h1_warmth, sigma = sigma(fit_warmth), edf = df.residual(fit_warmth))
```

```
 contrast
 Prolife Ingroup vs Prochoice Outgroup - Prochoice Ingroup vs Prolife Outgroup
 effect.size    SE  df lower.CL upper.CL
       0.103 0.273 545   -0.433    0.639

sigma used for effect sizes: 1.538
Confidence level used: 0.95
```

```
# Competence
emm_comp <- emmeans(fit_comp, ~ group * condition)
labs_c <- with(as.data.frame(emm_comp), paste(group, condition, sep = "."))
make_c <- function(pos_names, neg_names, labels = labs_c) {
  w <- setNames(rep(0, length(labels)), labels)
  w[pos_names] <- w[pos_names] + 1
  w[neg_names] <- w[neg_names] - 1
  w
}
h1_comp <- contrast(
  emm_comp,
  method = list(
    "Prolife Ingroup vs Prochoice Outgroup"  = make_c("Prolife.Ingroup", "Prochoice.Outgroup"
    "Prochoice Ingroup vs Prolife Outgroup"  = make_c("Prochoice.Ingroup", "Prolife.Outgroup"
  ),
  adjust = "none"
)
summary(h1_comp, infer = c(TRUE, TRUE))
```

```
 contrast                              estimate    SE  df lower.CL upper.CL
 Prolife Ingroup vs Prochoice Outgroup     2.08 0.274 545     1.54     2.62
 Prochoice Ingroup vs Prolife Outgroup     1.58 0.268 545     1.05     2.10
 t.ratio p.value
   7.581  <.0001
   5.898  <.0001

Confidence level used: 0.95
```

```
eff_size(h1_comp, sigma = sigma(fit_comp), edf = df.residual(fit_comp))
```

```
 contrast
 Prolife Ingroup vs Prochoice Outgroup - Prochoice Ingroup vs Prolife Outgroup
 effect.size    SE  df lower.CL upper.CL
```

```
       0.317 0.273 545   -0.219    0.854

sigma used for effect sizes: 1.579
Confidence level used: 0.95
```

Planned Contrasts – RQ2: Outgroup vs Metaperception

```r
# Warmth
h2_warmth <- contrast(
  emm_warmth,
  method = list(
    "Prolife Outgroup vs Prochoice Meta" = make_w("Prolife.Outgroup", "Prochoice.Metapercepti
    "Prochoice Outgroup vs Prolife Meta" = make_w("Prochoice.Outgroup", "Prolife.Metapercepti
  ),
  adjust = "none"
)
summary(h2_warmth, infer = c(TRUE, TRUE))
```

```
 contrast                          estimate    SE  df lower.CL upper.CL
 Prolife Outgroup vs Prochoice Meta    0.933 0.263 545    0.417     1.45
 Prochoice Outgroup vs Prolife Meta    0.764 0.267 545    0.240     1.29
 t.ratio p.value
   3.549  0.0004
   2.865  0.0043

Confidence level used: 0.95
```

```r
eff_size(h2_warmth, sigma = sigma(fit_warmth), edf = df.residual(fit_warmth))
```

```
 contrast
 Prolife Outgroup vs Prochoice Meta - Prochoice Outgroup vs Prolife Meta
 effect.size    SE  df lower.CL upper.CL
        0.11 0.273 545   -0.427    0.647

sigma used for effect sizes: 1.538
Confidence level used: 0.95
```

```r
# Competence
h2_comp <- contrast(
  emm_comp,
  method = list(
    "Prolife Outgroup vs Prochoice Meta" = make_c("Prolife.Outgroup", "Prochoice.Metapercepti
    "Prochoice Outgroup vs Prolife Meta" = make_c("Prochoice.Outgroup", "Prolife.Metapercepti
  ),
  adjust = "none"
)
summary(h2_comp, infer = c(TRUE, TRUE))
```

```
 contrast                           estimate    SE  df lower.CL upper.CL
 Prolife Outgroup vs Prochoice Meta    0.989 0.270 545    0.459     1.52
 Prochoice Outgroup vs Prolife Meta    0.653 0.274 545    0.116     1.19
 t.ratio p.value
   3.664  0.0003
   2.388  0.0173

Confidence level used: 0.95
```

```r
eff_size(h2_comp, sigma = sigma(fit_comp), edf = df.residual(fit_comp))
```

```
 contrast
 Prolife Outgroup vs Prochoice Meta - Prochoice Outgroup vs Prolife Meta
 effect.size    SE  df lower.CL upper.CL
       0.212 0.273 545   -0.325     0.75

sigma used for effect sizes: 1.579
Confidence level used: 0.95
```

Graph

```r
# ========================================
# Ideology-adjusted scores + violin plots for Warmth & Competence
# ========================================
library(dplyr)
library(tidyr)
library(ggplot2)
library(forcats)
```

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

# 1) Fit ANCOVA-style models (no interactions)
fit_warmth <- lm(warmth_avg ~ ideology + group * condition, data = data)
fit_comp   <- lm(competence_avg ~ ideology + group * condition, data = data)

b_warmth <- coef(fit_warmth)[["ideology"]]
b_comp   <- coef(fit_comp)[["ideology"]]
xbar     <- mean(data$ideology, na.rm = TRUE)

# 2) Compute ideology-adjusted scores
data <- data %>%
  mutate(
    warmth_adj     = warmth_avg - b_warmth * (ideology - xbar),
    competence_adj = competence_avg - b_comp * (ideology - xbar)
  )

# 3) Tidy for plotting
plot_df_adj <- 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","Metaperc
  ) %>%
  select(group_label, condition_label, warmth_adj, competence_adj) %>%
  pivot_longer(
    cols = c(warmth_adj, competence_adj),
    names_to = "dimension",
    values_to = "value_adj"
  ) %>%
  mutate(
    dimension_label = if_else(
```

```
      dimension == "warmth_adj", "Warmth", "Competence"
    )
  )

# 4) Summary stats (means and SEs)
sum_df_adj <- plot_df_adj %>%
  group_by(group_label, condition_label, dimension_label) %>%
  summarise(
    mean = mean(value_adj, na.rm = TRUE),
    sd   = sd(value_adj, na.rm = TRUE),
    n    = sum(!is.na(value_adj)),
    se   = sd / sqrt(n),
    .groups = "drop"
  )

# Optional: inspect means
print(sum_df_adj %>% arrange(dimension_label, group_label, condition_label))
```

```
# A tibble: 12 x 7
   group_label condition_label     dimension_label  mean    sd     n    se
   <fct>       <fct>               <chr>           <dbl> <dbl> <int> <dbl>
 1 Pro-life    Ingroup Perception  Competence       5.60  1.32    89 0.139
 2 Pro-life    Outgroup Perception Competence       4.04  1.73    89 0.183
 3 Pro-life    Metaperception      Competence       2.87  1.70    85 0.184
 4 Pro-choice  Ingroup Perception  Competence       5.62  1.43    96 0.146
 5 Pro-choice  Outgroup Perception Competence       3.52  1.41    96 0.144
 6 Pro-choice  Metaperception      Competence       3.05  1.82    97 0.185
 7 Pro-life    Ingroup Perception  Warmth           5.75  1.31    89 0.138
 8 Pro-life    Outgroup Perception Warmth           3.87  1.82    89 0.193
 9 Pro-life    Metaperception      Warmth           2.98  1.58    85 0.171
10 Pro-choice  Ingroup Perception  Warmth           5.72  1.26    96 0.129
11 Pro-choice  Outgroup Perception Warmth           3.74  1.34    96 0.136
12 Pro-choice  Metaperception      Warmth           2.94  1.82    97 0.185
```

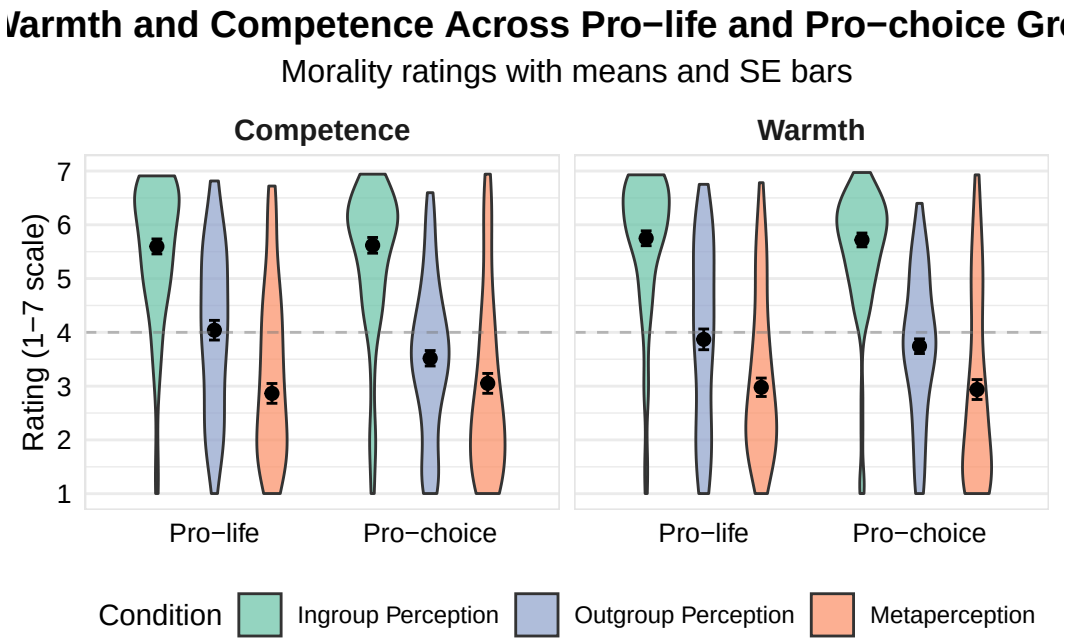
```
# 5) Plot: violins
ggplot(plot_df_adj, aes(x = group_label, y = value_adj, fill = condition_label)) +
  geom_violin(position = position_dodge(width = 0.8), alpha = 0.7, width = 0.7, trim = TRUE)

  # mean points
  geom_point(
    data = sum_df_adj,
```

```
  aes(x = group_label, y = mean, group = condition_label),
  position = position_dodge(width = 0.8),
  size = 2, color = "black", inherit.aes = FALSE
) +

# error bars
geom_errorbar(
  data = sum_df_adj,
  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
) +

facet_wrap(~ dimension_label, ncol = 2) +
scale_fill_manual(
  values = c(
    "Ingroup Perception"  = "#66c2a5",
    "Outgroup Perception" = "#8da0cb",
    "Metaperception"      = "#fc8d62"
  ),
  name = "Condition"
) +
labs(
  title = "Warmth and Competence Across Pro-life and Pro-choice Groups",
  subtitle = "Morality ratings with means and SE bars",
  x = NULL, y = "Rating (1-7 scale)"
) +
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),
  strip.text = element_text(face = "bold", size = 11),
  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) +
scale_y_continuous(limits = c(1, 7), breaks = 1:7)
```




```
# 6) Save plot
ggsave(
  filename = "/Users/daryani/Desktop/warmth_competence_plot_adjusted.jpg",
  width = 8, height = 6, dpi = 300
)
```