

Social Distance

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") ~ "Outgroup",
      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)

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

```

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

Create Descriptives

```

desc_distance <- data %>%
  group_by(group, condition) %>%
  summarise(
    n = dplyr::n(),
    mean_distance = mean(distance_1, na.rm = TRUE),
    sd_distance = sd(distance_1, na.rm = TRUE),
    .groups = "drop"
  )

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

```

group	condition	n	mean_distance	sd_distance
Prolife	Outgroup	89	3.966292	1.256342
Prolife	Metaperception	85	5.341176	1.286865
Prolife	Ingroup	89	2.977528	1.437940
Prochoice	Outgroup	96	4.875000	1.250263
Prochoice	Metaperception	97	5.216495	1.445012
Prochoice	Ingroup	96	3.104167	1.235264

```

# Optional: Wide format to see group x condition more clearly
distance_wide <- tidyr::pivot_wider(desc_distance,
                                      names_from = condition, values_from = mean_distance)
cat("\nSocial Distance (means):\n"); print(as.data.frame(distance_wide), row.names = FALSE)

```

Social Distance (means):

	group	n	sd_distance	Outgroup	Metaperception	Ingroup
Prolife	89	1.256342	3.966292		NA	NA
Prolife	85	1.286865		NA	5.341176	NA
Prolife	89	1.437940		NA		2.977528
Prochoice	96	1.250263	4.875000		NA	NA
Prochoice	97	1.445012		NA	5.216495	NA
Prochoice	96	1.235264		NA		3.104167

Fit ANCOVA

```
fit_distance <- lm(distance_1 ~ group * condition + ideology, data = data)

Anova(fit_distance, type = 3)
```

Anova Table (Type III tests)

```
Response: distance_1
           Sum Sq Df F value    Pr(>F)
(Intercept) 448.22  1 256.6841 < 2.2e-16 ***
group        21.15  1 12.1113 0.0005413 ***
condition    243.40  2  69.6950 < 2.2e-16 ***
ideology      2.19  1   1.2519 0.2636887
group:condition 27.09  2   7.7570 0.0004767 ***
Residuals    951.69 545
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
eta_squared(Anova(fit_distance, 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	0.02	[0.01, 1.00]

```

condition      |      0.20 | [0.16, 1.00]
ideology       |  2.29e-03 | [0.00, 1.00]
group:condition |      0.03 | [0.01, 1.00]

```

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

Planned Contrasts – RQ1: Ingroup vs Outgroup

```

emmeans(fit_distance, ~ group * condition)

labs_d <- with(as.data.frame(emmeans(fit_distance, ~ group * condition), paste(group, condition, sep = "."))

make_d <- function(pos_names, neg_names, labels = labs_d) {
  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 (RQ1)
h1_distance <- contrast(
  emm_dist,
  method = list(
    "Prolife Ingroup vs Prochoice Outgroup" = make_d("Prolife.Ingroup", "Prochoice.Outgroup"),
    "Prochoice Ingroup vs Prolife Outgroup" = make_d("Prochoice.Ingroup", "Prolife.Outgroup")
  ),
  adjust = "none"
)

summary(h1_distance, infer = c(TRUE, TRUE))

```

contrast	estimate	SE	df	lower.CL	upper.CL
Prolife Ingroup vs Prochoice Outgroup	-1.761	0.230	545	-2.21	-1.310
Prochoice Ingroup vs Prolife Outgroup	-0.986	0.224	545	-1.43	-0.547
t.ratio					
p.value					
-7.669	<.0001				
-4.404	<.0001				

Confidence level used: 0.95

```

eff_size(h1_distance, sigma = sigma(fit_distance), edf = df.residual(fit_distance))

contrast
Prolife Ingroup vs Prochoice Outgroup - Prochoice Ingroup vs Prolife Outgroup
effect.size    SE   df lower.CL upper.CL
-0.586 0.273 545     -1.12  -0.0489

sigma used for effect sizes: 1.321
Confidence level used: 0.95

```

Planned Contrasts – RQ2: Outgroup vs Metaperception

```

# Outgroup vs Metaperception (RQ2)
h2_distance <- contrast(
  emm_dist,
  method = list(
    "Prolife Outgroup vs Prochoice Meta" = make_d("Prolife.Outgroup", "Prochoice.Metapercept"),
    "Prochoice Outgroup vs Prolife Meta" = make_d("Prochoice.Outgroup", "Prolife.Metapercept"),
  ),
  adjust = "none"
)

summary(h2_distance, infer = c(TRUE, TRUE))

contrast                      estimate    SE   df lower.CL upper.CL
Prolife Outgroup vs Prochoice Meta -1.121 0.226 545     -1.56  -0.677
Prochoice Outgroup vs Prolife Meta -0.597 0.229 545     -1.05  -0.147
t.ratio p.value
-4.963 <.0001
-2.608 0.0094

Confidence level used: 0.95

eff_size(h2_distance, sigma = sigma(fit_distance), edf = df.residual(fit_distance))

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

```

-0.396 0.274 545 -0.934 0.141

sigma used for effect sizes: 1.321

Confidence level used: 0.95