Cognition Paper: Ex. 4 Social Norms

9/24/2020

Hypotheses

- H1: It is **more acceptable** to use **positive thick terms** without intending to communicate the evaluation they usually (based on intuition and sentiment analysis) convey, **than** it is to use **negative thick terms** without intending to communicate the evaluation they usually convey.
  - $y =$ Social Norm, $H_A : \mu_{pos} < \mu_{neg}$, for the one-sided t-test
  - **CANNOT BE REJECTED**
- H2: It is **more problematic** to get a wrong impression of a person if the impression is **wrongly negative**, **compared to** when it is **wrongly positive**.
  - $y =$ Problem, $H_A : \mu_{pos} < \mu_{neg}$, for the one-sided t-test
  - **CANNOT BE REJECTED**

Since there could be order effects, we first tested each of the hypotheses on the first item only. In a second step, we tested for order effects in the collapsed model (both item of each participant). Since in both cases the order effects were not significant on .05-alpha level, we can use the pooled data for hypothesis testing.

H1: Social Norms

The ANOVA-assumptions are partially met. The more important of both assumptions, homogeneity of variance, cannot be rejected. This means **we can use standard parametric methods** (i.e. ANOVA, and one-sided t-tests) to test the hypothesis. The first result of each test is for the pooled data (`h1`), the second for the first item subset (`h1_V1`).

```
## homogeneity of variances
# pooled data
lawstat::levene.test(h1$value, h1$polarity, location = 'mean', trim.alpha=0.25,
                     correction.method = 'correction.factor')
```

```
##
##  Classical Levene's test based on the absolute deviations from the mean
##  with correction factor
##
## data:  h1$value
## Test Statistic = 2.1663, p-value = 0.1416
```

```
# first item subset
lawstat::levene.test(h1_V1$value, h1_V1$polarity, location = 'mean', trim.alpha=0.25,
                     correction.method = 'correction.factor')
```

```
##
##  Classical Levene's test based on the absolute deviations from the mean
##  with correction factor
##
## data:  h1_V1$value
## Test Statistic = 0.0024372, p-value = 0.9607
```

```
## global normality
# pooled data
shapiro.test(h1$value)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  h1$value
## W = 0.88519, p-value < 2.2e-16
```

```
# first item subset
shapiro.test(h1_V1$value)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  h1_V1$value
## W = 0.89341, p-value = 9.035e-14
```

The one-sided t-test supports that the positive thick terms have a lower average agreement rating than negative thick terms, which indicates that it is more acceptable for positive thick terms to be used without intending to communicate the evaluation they usually. Thus, H_1 cannot be rejected for the first order subset.

```
# testing h1 for first item subset
m1 <- aov(value ~ polarity, data = h1_V1)

t.test(h1_V1$value[h1_V1$polarity == 'positive'],
       h1_V1$value[h1_V1$polarity == 'negative'],
       alternative = 'less')
```

```
##
##  Welch Two Sample t-test
##
## data:  h1_V1$value[h1_V1$polarity == "positive"] and h1_V1$value[h1_V1$polarity == "negative"]
## t = -1.7236, df = 301.72, p-value = 0.0429
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##         -Inf -0.01949423
## sample estimates:
## mean of x mean of y
##   6.154839  6.610738
```

Next, we test for order effects in the pooled data. As can be seen in the ANOVA results, the order effects (`item_step`) are not significant on .05-alpha level. Thus, we proceeded to compute a one-sided t-test with $H_A : \mu_{pos} < \mu_{neg}$. As we can see H_0 has to be rejected in favour of H_A. This means that H_1 cannot be rejected for the pooled data.

```
# are there order effects
m2 <- aov(value ~ polarity*item_step, data = h1)
summary(m2)
```

```
##                     Df Sum Sq Mean Sq F value  Pr(>F)
## polarity             1   75.3   75.32  14.827 0.00013 ***
## item_step            1   14.5   14.47   2.848 0.09199 .
## polarity:item_step   1    8.9    8.90   1.751 0.18625
## Residuals          604 3068.4    5.08
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
# order effects are not significant on 0.05-level

t.test(h1$value[h1$polarity == 'positive'],
       h1$value[h1$polarity == 'negative'],
       alternative = 'less')

##
##  Welch Two Sample t-test
##
## data:  h1$value[h1$polarity == "positive"] and h1$value[h1$polarity == "negative"]
## t = -3.8424, df = 604.88, p-value = 6.737e-05
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##       -Inf -0.402136
## sample estimates:
## mean of x mean of y
##  6.187500  6.891447
```

H2: How Problematic..

For H_2, the homogenity of variance is not violated on a significance level of .01, neither for the pooled data (h2), nor the first item subset (h2_V1). We can use the same tests as above.

```
# homogeneity of variances
lawstat::levene.test(h2$value, h2$polarity, location = 'mean', trim.alpha=0.25,
                     correction.method = 'correction.factor')

##
##  Classical Levene's test based on the absolute deviations from the mean
##  with correction factor
##
## data:  h2$value
## Test Statistic = 5.58, p-value = 0.01848
lawstat::levene.test(h2_V1$value, h2_V1$polarity, location = 'mean', trim.alpha=0.25,
                     correction.method = 'correction.factor')

##
##  Classical Levene's test based on the absolute deviations from the mean
##  with correction factor
##
## data:  h2_V1$value
## Test Statistic = 0.33178, p-value = 0.565
# global normality
shapiro.test(h2$value)

##
##  Shapiro-Wilk normality test
##
## data:  h2$value
## W = 0.93995, p-value = 5.986e-15

shapiro.test(h2_V1$value)
```

```
## 
##  Shapiro-Wilk normality test
## 
## data:  h2_V1$value
## W = 0.94285, p-value = 1.834e-09
```

The one-sided t-test shows that H_0 has to be rejected in favor of $H_A : \mu_{pos} < \mu_{neg}$. Thus, H_2 cannot be rejected for the first item subset.

```r
# testing
m1 <- aov(value ~ polarity, data = h2_V1)
summary(m1)
```

```
##               Df Sum Sq Mean Sq F value   Pr(>F)    
## polarity       1   85.9   85.95   24.82 1.06e-06 ***
## Residuals    302 1045.9    3.46                     
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
t.test(h1_V1$value[h1_V1$polarity == 'positive'],
       h1_V1$value[h1_V1$polarity == 'negative'],
       alternative = 'less')
```

```
## 
##  Welch Two Sample t-test
## 
## data:  h1_V1$value[h1_V1$polarity == "positive"] and h1_V1$value[h1_V1$polarity == "negative"]
## t = -1.7236, df = 301.72, p-value = 0.0429
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##        -Inf -0.01949423
## sample estimates:
## mean of x mean of y 
##  6.154839  6.610738
```

Analogous to above, we tested for order effects, and they were also not significant on .05-alpha level. For the pooled data, H_0 also has to be rejected in favor of $H_A : \mu_{pos} < \mu_{neg}$. Thus H_2 cannot be rejected.

```r
# are there order effects
m2 <- aov(value ~ polarity*item_step, data = h1)
summary(m2)
```

```
##                     Df Sum Sq Mean Sq F value  Pr(>F)    
## polarity             1   75.3   75.32  14.827 0.00013 ***
## item_step            1   14.5   14.47   2.848 0.09199 .  
## polarity:item_step   1    8.9    8.90   1.751 0.18625    
## Residuals          604 3068.4    5.08                    
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# order effects are not significant on 0.05-level

t.test(h1$value[h1$polarity == 'positive'],
       h1$value[h1$polarity == 'negative'],
       alternative = 'less')
```

```
## 
##  Welch Two Sample t-test
```

```
## 
## data:  h1$value[h1$polarity == "positive"] and h1$value[h1$polarity == "negative"]
## t = -3.8424, df = 604.88, p-value = 6.737e-05
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##       -Inf -0.402136
## sample estimates:
## mean of x mean of y
##  6.187500  6.891447
```

Differences Between the Domains

We further explored domain differences in a 2x6x1 ANOVA. We computed both the estimated means and Tukey's HSD, which yield very similar results. As we can see, some of the within-domain differences are not significant.

```r
m3 <- aov(value ~ polarity*domain + item_step, data = h1)
summary(m3)
```

```
##                Df Sum Sq Mean Sq F value   Pr(>F)
## polarity        1   75.3   75.32  15.275 0.000104 ***
## domain          5   66.3   13.26   2.689 0.020479 *
## item_step       1   14.5   14.47   2.934 0.087240 .
## polarity:domain 5   76.9   15.37   3.118 0.008689 **
## Residuals     595 2934.1    4.93
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# estimated means
fittedMeans <- emmeans(m3, ~ polarity|domain)
# pairwise valence differences within domains
pairs(fittedMeans)
```

```
## domain = compassionate/cruel:
##  contrast            estimate    SE  df t.ratio p.value
##  positive - negative  -0.8723 0.440 595  -1.982  0.0479
## 
## domain = courageous/reckless:
##  contrast            estimate    SE  df t.ratio p.value
##  positive - negative  -0.2762 0.444 595  -0.622  0.5344
## 
## domain = friendly/rude:
##  contrast            estimate    SE  df t.ratio p.value
##  positive - negative  -0.1400 0.444 595  -0.315  0.7527
## 
## domain = generous/selfish:
##  contrast            estimate    SE  df t.ratio p.value
##  positive - negative  -0.7157 0.445 595  -1.609  0.1080
## 
## domain = honest/manipulative:
##  contrast            estimate    SE  df t.ratio p.value
##  positive - negative  -2.1357 0.440 595  -4.849  <.0001
## 
## domain = virtous/vicious:
##  contrast            estimate    SE  df t.ratio p.value
```

```
## positive - negative  -0.0426 0.436 595 -0.098  0.9221
##
## Results are averaged over the levels of: item_step
```

```
# valence contrasts within domains
contrast(fittedMeans)
```

```
## domain = compassionate/cruel:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -0.4361 0.220 595 -1.982  0.0479
##  negative effect   0.4361 0.220 595  1.982  0.0479
##
## domain = courageous/reckless:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -0.1381 0.222 595 -0.622  0.5344
##  negative effect   0.1381 0.222 595  0.622  0.5344
##
## domain = friendly/rude:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -0.0700 0.222 595 -0.315  0.7527
##  negative effect   0.0700 0.222 595  0.315  0.7527
##
## domain = generous/selfish:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -0.3578 0.222 595 -1.609  0.1080
##  negative effect   0.3578 0.222 595  1.609  0.1080
##
## domain = honest/manipulative:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -1.0678 0.220 595 -4.849  <.0001
##  negative effect   1.0678 0.220 595  4.849  <.0001
##
## domain = virtous/vicious:
##  contrast        estimate    SE  df t.ratio p.value
##  positive effect  -0.0213 0.218 595 -0.098  0.9221
##  negative effect   0.0213 0.218 595  0.098  0.9221
##
## Results are averaged over the levels of: item_step
## P value adjustment: fdr method for 2 tests
```

```
# Tukey's honestly significant difference
TukeyHSD(m3)
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = value ~ polarity * domain + item_step, data = h1)
##
## $polarity
##                        diff       lwr      upr      p adj
## negative-positive 0.7039474 0.3502036 1.057691 0.0001036
##
## $domain
##                                                 diff       lwr      upr
## courageous/reckless-compassionate/cruel -0.440196078 -1.3336507  0.4532586
## friendly/rude-compassionate/cruel       -0.700196078 -1.5936507  0.1932586
```

```
## generous/selfish-compassionate/cruel       -0.270196078 -1.1636507  0.6232586
## honest/manipulative-compassionate/cruel -1.019607843 -1.9086285 -0.1305872
## virtous/vicious-compassionate/cruel         -0.278657617 -1.1633938  0.6060785
## friendly/rude-courageous/reckless           -0.260000000 -1.1578668  0.6378668
## generous/selfish-courageous/reckless         0.170000000 -0.7278668  1.0678668
## honest/manipulative-courageous/reckless -0.579411765 -1.4728664  0.3140429
## virtous/vicious-courageous/reckless          0.161538462 -0.7276531  1.0507300
## generous/selfish-friendly/rude               0.430000000 -0.4678668  1.3278668
## honest/manipulative-friendly/rude           -0.319411765 -1.2128664  0.5740429
## virtous/vicious-friendly/rude                0.421538462 -0.4676531  1.3107300
## honest/manipulative-generous/selfish        -0.749411765 -1.6428664  0.1440429
## virtous/vicious-generous/selfish            -0.008461538 -0.8976531  0.8807300
## virtous/vicious-honest/manipulative          0.740950226 -0.1437859  1.6256864
##                                               p adj
## courageous/reckless-compassionate/cruel 0.7218459
## friendly/rude-compassionate/cruel          0.2207977
## generous/selfish-compassionate/cruel       0.9547041
## honest/manipulative-compassionate/cruel 0.0139914
## virtous/vicious-compassionate/cruel        0.9463252
## friendly/rude-courageous/reckless          0.9623144
## generous/selfish-courageous/reckless       0.9944324
## honest/manipulative-courageous/reckless 0.4318059
## virtous/vicious-courageous/reckless        0.9954140
## generous/selfish-friendly/rude             0.7455035
## honest/manipulative-friendly/rude          0.9105124
## virtous/vicious-friendly/rude              0.7536344
## honest/manipulative-generous/selfish       0.1584858
## virtous/vicious-generous/selfish           1.0000000
## virtous/vicious-honest/manipulative        0.1597895
##
## $item_step
##          diff        lwr       upr     p adj
## V2-V1 0.3084747 -0.04526901 0.6622185 0.0873018
##
## $`polarity:domain`
##                                                                    diff
## negative:compassionate/cruel-positive:compassionate/cruel  0.879482350
## positive:courageous/reckless-positive:compassionate/cruel -0.141156451
## negative:courageous/reckless-positive:compassionate/cruel  0.140246644
## positive:friendly/rude-positive:compassionate/cruel         -0.333500248
## negative:friendly/rude-positive:compassionate/cruel         -0.187409559
## positive:generous/selfish-positive:compassionate/cruel      -0.192015944
## negative:generous/selfish-positive:compassionate/cruel       0.531106137
## positive:honest/manipulative-positive:compassionate/cruel -1.649969223
## negative:honest/manipulative-positive:compassionate/cruel  0.490235887
## positive:virtous/vicious-positive:compassionate/cruel        0.137380229
## negative:virtous/vicious-positive:compassionate/cruel        0.184786887
## positive:courageous/reckless-negative:compassionate/cruel -1.020638801
## negative:courageous/reckless-negative:compassionate/cruel -0.739235706
## positive:friendly/rude-negative:compassionate/cruel         -1.212982598
## negative:friendly/rude-negative:compassionate/cruel         -1.066891909
## positive:generous/selfish-negative:compassionate/cruel      -1.071498294
## negative:generous/selfish-negative:compassionate/cruel      -0.348376212
## positive:honest/manipulative-negative:compassionate/cruel -2.529451573
```

```
## negative:honest/manipulative-negative:compassionate/cruel  -0.389246463
## positive:virtous/vicious-negative:compassionate/cruel        -0.742102121
## negative:virtous/vicious-negative:compassionate/cruel        -0.694695462
## negative:courageous/reckless-positive:courageous/reckless     0.281403095
## positive:friendly/rude-positive:courageous/reckless          -0.192343797
## negative:friendly/rude-positive:courageous/reckless          -0.046253108
## positive:generous/selfish-positive:courageous/reckless       -0.050859493
## negative:generous/selfish-positive:courageous/reckless        0.672262588
## positive:honest/manipulative-positive:courageous/reckless    -1.508812772
## negative:honest/manipulative-positive:courageous/reckless     0.631392338
## positive:virtous/vicious-positive:courageous/reckless         0.278536680
## negative:virtous/vicious-positive:courageous/reckless         0.325943338
## positive:friendly/rude-negative:courageous/reckless          -0.473746892
## negative:friendly/rude-negative:courageous/reckless          -0.327656203
## positive:generous/selfish-negative:courageous/reckless       -0.332262588
## negative:generous/selfish-negative:courageous/reckless        0.390859493
## positive:honest/manipulative-negative:courageous/reckless    -1.790215867
## negative:honest/manipulative-negative:courageous/reckless     0.349989243
## positive:virtous/vicious-negative:courageous/reckless        -0.002866415
## negative:virtous/vicious-negative:courageous/reckless         0.044540243
## negative:friendly/rude-positive:friendly/rude                 0.146090689
## positive:generous/selfish-positive:friendly/rude              0.141484304
## negative:generous/selfish-positive:friendly/rude              0.864606386
## positive:honest/manipulative-positive:friendly/rude          -1.316468975
## negative:honest/manipulative-positive:friendly/rude           0.823736135
## positive:virtous/vicious-positive:friendly/rude               0.470880477
## negative:virtous/vicious-positive:friendly/rude               0.518287136
## positive:generous/selfish-negative:friendly/rude             -0.004606386
## negative:generous/selfish-negative:friendly/rude              0.718515696
## positive:honest/manipulative-negative:friendly/rude          -1.462559665
## negative:honest/manipulative-negative:friendly/rude           0.677645446
## positive:virtous/vicious-negative:friendly/rude               0.324789787
## negative:virtous/vicious-negative:friendly/rude               0.372196446
## negative:generous/selfish-positive:generous/selfish           0.723122082
## positive:honest/manipulative-positive:generous/selfish       -1.457953279
## negative:honest/manipulative-positive:generous/selfish        0.682251831
## positive:virtous/vicious-positive:generous/selfish            0.329396173
## negative:virtous/vicious-positive:generous/selfish            0.376802832
## positive:honest/manipulative-negative:generous/selfish       -2.181075361
## negative:honest/manipulative-negative:generous/selfish       -0.040870250
## positive:virtous/vicious-negative:generous/selfish           -0.393725909
## negative:virtous/vicious-negative:generous/selfish           -0.346319250
## negative:honest/manipulative-positive:honest/manipulative     2.140205110
## positive:virtous/vicious-positive:honest/manipulative         1.787349452
## negative:virtous/vicious-positive:honest/manipulative         1.834756111
## positive:virtous/vicious-negative:honest/manipulative        -0.352855658
## negative:virtous/vicious-negative:honest/manipulative        -0.305449000
## negative:virtous/vicious-positive:virtous/vicious             0.047406659
##                                                                      lwr
## negative:compassionate/cruel-positive:compassionate/cruel    -0.5634126
## positive:courageous/reckless-positive:compassionate/cruel    -1.5912479
## negative:courageous/reckless-positive:compassionate/cruel    -1.3098448
## positive:friendly/rude-positive:compassionate/cruel          -1.7835917
## negative:friendly/rude-positive:compassionate/cruel          -1.6375010
```

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```
## positive:generous/selfish-positive:compassionate/cruel        -1.6421074
## negative:generous/selfish-positive:compassionate/cruel        -0.9189853
## positive:honest/manipulative-positive:compassionate/cruel     -3.0928642
## negative:honest/manipulative-positive:compassionate/cruel     -0.9526591
## positive:virtous/vicious-positive:compassionate/cruel         -1.2985610
## negative:virtous/vicious-positive:compassionate/cruel         -1.2511543
## positive:courageous/reckless-negative:compassionate/cruel     -2.4707303
## negative:courageous/reckless-negative:compassionate/cruel     -2.1893272
## positive:friendly/rude-negative:compassionate/cruel           -2.6630741
## negative:friendly/rude-negative:compassionate/cruel           -2.5169834
## positive:generous/selfish-negative:compassionate/cruel        -2.5215898
## negative:generous/selfish-negative:compassionate/cruel        -1.7984677
## positive:honest/manipulative-negative:compassionate/cruel     -3.9723465
## negative:honest/manipulative-negative:compassionate/cruel     -1.8321414
## positive:virtous/vicious-negative:compassionate/cruel         -2.1780433
## negative:virtous/vicious-negative:compassionate/cruel         -2.1306367
## negative:courageous/reckless-positive:courageous/reckless     -1.1758494
## positive:friendly/rude-positive:courageous/reckless           -1.6495963
## negative:friendly/rude-positive:courageous/reckless           -1.5035056
## positive:generous/selfish-positive:courageous/reckless        -1.5081120
## negative:generous/selfish-positive:courageous/reckless        -0.7849899
## positive:honest/manipulative-positive:courageous/reckless     -2.9589042
## negative:honest/manipulative-positive:courageous/reckless     -0.8186991
## positive:virtous/vicious-positive:courageous/reckless         -1.1646357
## negative:virtous/vicious-positive:courageous/reckless         -1.1172291
## positive:friendly/rude-negative:courageous/reckless           -1.9309994
## negative:friendly/rude-negative:courageous/reckless           -1.7849087
## positive:generous/selfish-negative:courageous/reckless        -1.7895151
## negative:generous/selfish-negative:courageous/reckless        -1.0663930
## positive:honest/manipulative-negative:courageous/reckless     -3.2403073
## negative:honest/manipulative-negative:courageous/reckless     -1.1001022
## positive:virtous/vicious-negative:courageous/reckless         -1.4460388
## negative:virtous/vicious-negative:courageous/reckless         -1.3986322
## negative:friendly/rude-positive:friendly/rude                 -1.3111618
## positive:generous/selfish-positive:friendly/rude              -1.3157682
## negative:generous/selfish-positive:friendly/rude              -0.5926461
## positive:honest/manipulative-positive:friendly/rude           -2.7665604
## negative:honest/manipulative-positive:friendly/rude           -0.6263553
## positive:virtous/vicious-positive:friendly/rude               -0.9722919
## negative:virtous/vicious-positive:friendly/rude               -0.9248853
## positive:generous/selfish-negative:friendly/rude              -1.4618588
## negative:generous/selfish-negative:friendly/rude              -0.7387368
## positive:honest/manipulative-negative:friendly/rude           -2.9126511
## negative:honest/manipulative-negative:friendly/rude           -0.7724460
## positive:virtous/vicious-negative:friendly/rude               -1.1183826
## negative:virtous/vicious-negative:friendly/rude               -1.0709760
## negative:generous/selfish-positive:generous/selfish           -0.7341304
## positive:honest/manipulative-positive:generous/selfish        -2.9080448
## negative:honest/manipulative-positive:generous/selfish        -0.7678396
## positive:virtous/vicious-positive:generous/selfish            -1.1137762
## negative:virtous/vicious-positive:generous/selfish            -1.0663696
## positive:honest/manipulative-negative:generous/selfish        -3.6311668
## negative:honest/manipulative-negative:generous/selfish        -1.4909617
## positive:virtous/vicious-negative:generous/selfish            -1.8368983
```

```
## negative:virtous/vicious-negative:generous/selfish            -1.7894916
## negative:honest/manipulative-positive:honest/manipulative      0.6973102
## positive:virtous/vicious-positive:honest/manipulative          0.3514083
## negative:virtous/vicious-positive:honest/manipulative          0.3988149
## positive:virtous/vicious-negative:honest/manipulative         -1.7887969
## negative:virtous/vicious-negative:honest/manipulative         -1.7413902
## negative:virtous/vicious-positive:virtous/vicious             -1.3815469
##                                                                       upr
## negative:compassionate/cruel-positive:compassionate/cruel     2.322377295
## positive:courageous/reckless-positive:compassionate/cruel     1.308935023
## negative:courageous/reckless-positive:compassionate/cruel     1.590338118
## positive:friendly/rude-positive:compassionate/cruel           1.116591226
## negative:friendly/rude-positive:compassionate/cruel           1.262681915
## positive:generous/selfish-positive:compassionate/cruel        1.258075530
## negative:generous/selfish-positive:compassionate/cruel        1.981197611
## positive:honest/manipulative-positive:compassionate/cruel    -0.207074278
## negative:honest/manipulative-positive:compassionate/cruel     1.933130833
## positive:virtous/vicious-positive:compassionate/cruel         1.573321423
## negative:virtous/vicious-positive:compassionate/cruel         1.620728082
## positive:courageous/reckless-negative:compassionate/cruel     0.429452673
## negative:courageous/reckless-negative:compassionate/cruel     0.710855768
## positive:friendly/rude-negative:compassionate/cruel           0.237108876
## negative:friendly/rude-negative:compassionate/cruel           0.383199565
## positive:generous/selfish-negative:compassionate/cruel        0.378593180
## negative:generous/selfish-negative:compassionate/cruel        1.101715261
## positive:honest/manipulative-negative:compassionate/cruel    -1.086556627
## negative:honest/manipulative-negative:compassionate/cruel     1.053648483
## positive:virtous/vicious-negative:compassionate/cruel         0.693839074
## negative:virtous/vicious-negative:compassionate/cruel         0.741245732
## negative:courageous/reckless-positive:courageous/reckless     1.738655558
## positive:friendly/rude-positive:courageous/reckless           1.264908666
## negative:friendly/rude-positive:courageous/reckless           1.410999355
## positive:generous/selfish-positive:courageous/reckless        1.406392970
## negative:generous/selfish-positive:courageous/reckless        2.129515051
## positive:honest/manipulative-positive:courageous/reckless    -0.058721299
## negative:honest/manipulative-positive:courageous/reckless     2.081483812
## positive:virtous/vicious-positive:courageous/reckless         1.721709079
## negative:virtous/vicious-positive:courageous/reckless         1.769115737
## positive:friendly/rude-negative:courageous/reckless           0.983505571
## negative:friendly/rude-negative:courageous/reckless           1.129596260
## positive:generous/selfish-negative:courageous/reckless        1.124989875
## negative:generous/selfish-negative:courageous/reckless        1.848111956
## positive:honest/manipulative-negative:courageous/reckless    -0.340124393
## negative:honest/manipulative-negative:courageous/reckless     1.800080717
## positive:virtous/vicious-negative:courageous/reckless         1.440305984
## negative:virtous/vicious-negative:courageous/reckless         1.487712642
## negative:friendly/rude-positive:friendly/rude                 1.603343153
## positive:generous/selfish-positive:friendly/rude              1.598736767
## negative:generous/selfish-positive:friendly/rude              2.321858849
## positive:honest/manipulative-positive:friendly/rude           0.133622499
## negative:honest/manipulative-positive:friendly/rude           2.273827609
## positive:virtous/vicious-positive:friendly/rude               1.914052876
## negative:virtous/vicious-positive:friendly/rude               1.961459535
## positive:generous/selfish-negative:friendly/rude              1.452646078
```

```
## negative:generous/selfish-negative:friendly/rude                 2.175768159
## positive:honest/manipulative-negative:friendly/rude             -0.012468191
## negative:honest/manipulative-negative:friendly/rude              2.127736920
## positive:virtous/vicious-negative:friendly/rude                  1.767962186
## negative:virtous/vicious-negative:friendly/rude                  1.815368845
## negative:generous/selfish-positive:generous/selfish              2.180374545
## positive:honest/manipulative-positive:generous/selfish          -0.007861805
## negative:honest/manipulative-positive:generous/selfish           2.132343305
## positive:virtous/vicious-positive:generous/selfish               1.772568572
## negative:virtous/vicious-positive:generous/selfish               1.819975231
## positive:honest/manipulative-negative:generous/selfish          -0.730983887
## negative:honest/manipulative-negative:generous/selfish           1.409221224
## positive:virtous/vicious-negative:generous/selfish               1.049446490
## negative:virtous/vicious-negative:generous/selfish               1.096853149
## negative:honest/manipulative-positive:honest/manipulative        3.583100056
## positive:virtous/vicious-positive:honest/manipulative            3.223290647
## negative:virtous/vicious-positive:honest/manipulative            3.270697305
## positive:virtous/vicious-negative:honest/manipulative            1.083085536
## negative:virtous/vicious-negative:honest/manipulative            1.130492195
## negative:virtous/vicious-positive:virtous/vicious                1.476360264
##                                                                        p adj
## negative:compassionate/cruel-positive:compassionate/cruel 0.6934390
## positive:courageous/reckless-positive:compassionate/cruel 1.0000000
## negative:courageous/reckless-positive:compassionate/cruel 1.0000000
## positive:friendly/rude-positive:compassionate/cruel       0.9998363
## negative:friendly/rude-positive:compassionate/cruel       0.9999996
## positive:generous/selfish-positive:compassionate/cruel    0.9999994
## negative:generous/selfish-positive:compassionate/cruel    0.9887489
## positive:honest/manipulative-positive:compassionate/cruel 0.0103770
## negative:honest/manipulative-positive:compassionate/cruel 0.9939859
## positive:virtous/vicious-positive:compassionate/cruel     1.0000000
## negative:virtous/vicious-positive:compassionate/cruel     0.9999996
## positive:courageous/reckless-negative:compassionate/cruel 0.4709729
## negative:courageous/reckless-negative:compassionate/cruel 0.8800197
## positive:friendly/rude-negative:compassionate/cruel       0.2072622
## negative:friendly/rude-negative:compassionate/cruel       0.3980573
## positive:generous/selfish-negative:compassionate/cruel    0.3910418
## negative:generous/selfish-negative:compassionate/cruel    0.9997494
## positive:honest/manipulative-negative:compassionate/cruel 0.0000009
## negative:honest/manipulative-negative:compassionate/cruel 0.9992420
## positive:virtous/vicious-negative:compassionate/cruel     0.8698539
## negative:virtous/vicious-negative:compassionate/cruel     0.9132932
## negative:courageous/reckless-positive:courageous/reckless 0.9999714
## positive:friendly/rude-positive:courageous/reckless       0.9999995
## negative:friendly/rude-positive:courageous/reckless       1.0000000
## positive:generous/selfish-positive:courageous/reckless    1.0000000
## negative:generous/selfish-positive:courageous/reckless    0.9365953
## positive:honest/manipulative-positive:courageous/reckless 0.0330168
## negative:honest/manipulative-positive:courageous/reckless 0.9575777
## positive:virtous/vicious-positive:courageous/reckless     0.9999716
## negative:virtous/vicious-positive:courageous/reckless     0.9998630
## positive:friendly/rude-negative:courageous/reckless       0.9958874
## negative:friendly/rude-negative:courageous/reckless       0.9998689
## positive:generous/selfish-negative:courageous/reckless    0.9998496
```

```
## negative:generous/selfish-negative:courageous/reckless      0.9992820
## positive:honest/manipulative-negative:courageous/reckless 0.0033318
## negative:honest/manipulative-negative:courageous/reckless 0.9997379
## positive:virtous/vicious-negative:courageous/reckless        1.0000000
## negative:virtous/vicious-negative:courageous/reckless        1.0000000
## negative:friendly/rude-positive:friendly/rude                1.0000000
## positive:generous/selfish-positive:friendly/rude             1.0000000
## negative:generous/selfish-positive:friendly/rude             0.7290824
## positive:honest/manipulative-positive:friendly/rude          0.1174068
## negative:honest/manipulative-positive:friendly/rude          0.7811025
## positive:virtous/vicious-positive:friendly/rude              0.9957550
## negative:virtous/vicious-positive:friendly/rude              0.9904243
## positive:generous/selfish-negative:friendly/rude             1.0000000
## negative:generous/selfish-negative:friendly/rude             0.9022150
## positive:honest/manipulative-negative:friendly/rude          0.0458728
## negative:honest/manipulative-negative:friendly/rude          0.9308642
## positive:virtous/vicious-negative:friendly/rude              0.9998677
## negative:virtous/vicious-negative:friendly/rude              0.9995045
## negative:generous/selfish-positive:generous/selfish         0.8982384
## positive:honest/manipulative-positive:generous/selfish       0.0473623
## negative:honest/manipulative-positive:generous/selfish       0.9276848
## positive:virtous/vicious-positive:generous/selfish          0.9998481
## negative:virtous/vicious-positive:generous/selfish          0.9994431
## positive:honest/manipulative-negative:generous/selfish       0.0000662
## negative:honest/manipulative-negative:generous/selfish       1.0000000
## positive:virtous/vicious-negative:generous/selfish          0.9991578
## negative:virtous/vicious-negative:generous/selfish          0.9997521
## negative:honest/manipulative-positive:honest/manipulative 0.0000922
## positive:virtous/vicious-positive:honest/manipulative       0.0029164
## negative:virtous/vicious-positive:honest/manipulative       0.0018773
## positive:virtous/vicious-negative:honest/manipulative       0.9996882
## negative:virtous/vicious-negative:honest/manipulative       0.9999244
## negative:virtous/vicious-positive:virtous/vicious           1.0000000
```

```
TukeyHSD(m3, which = "domain")
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = value ~ polarity * domain + item_step, data = h1)
##
## $domain
##                                               diff        lwr        upr
## courageous/reckless-compassionate/cruel -0.440196078 -1.3336507  0.4532586
## friendly/rude-compassionate/cruel        -0.700196078 -1.5936507  0.1932586
## generous/selfish-compassionate/cruel     -0.270196078 -1.1636507  0.6232586
## honest/manipulative-compassionate/cruel -1.019607843 -1.9086285 -0.1305872
## virtous/vicious-compassionate/cruel      -0.278657617 -1.1633938  0.6060785
## friendly/rude-courageous/reckless        -0.260000000 -1.1578668  0.6378668
## generous/selfish-courageous/reckless      0.170000000 -0.7278668  1.0678668
## honest/manipulative-courageous/reckless -0.579411765 -1.4728664  0.3140429
## virtous/vicious-courageous/reckless       0.161538462 -0.7276531  1.0507300
## generous/selfish-friendly/rude            0.430000000 -0.4678668  1.3278668
## honest/manipulative-friendly/rude        -0.319411765 -1.2128664  0.5740429
## virtous/vicious-friendly/rude             0.421538462 -0.4676531  1.3107300
```

```
## honest/manipulative-generous/selfish        -0.749411765 -1.6428664  0.1440429
## virtous/vicious-generous/selfish             -0.008461538 -0.8976531  0.8807300
## virtous/vicious-honest/manipulative           0.740950226 -0.1437859  1.6256864
##                                                            p adj
## courageous/reckless-compassionate/cruel 0.7218459
## friendly/rude-compassionate/cruel       0.2207977
## generous/selfish-compassionate/cruel    0.9547041
## honest/manipulative-compassionate/cruel 0.0139914
## virtous/vicious-compassionate/cruel     0.9463252
## friendly/rude-courageous/reckless       0.9623144
## generous/selfish-courageous/reckless    0.9944324
## honest/manipulative-courageous/reckless 0.4318059
## virtous/vicious-courageous/reckless     0.9954140
## generous/selfish-friendly/rude          0.7455035
## honest/manipulative-friendly/rude       0.9105124
## virtous/vicious-friendly/rude           0.7536344
## honest/manipulative-generous/selfish    0.1584858
## virtous/vicious-generous/selfish        1.0000000
## virtous/vicious-honest/manipulative     0.1597895
```

```r
TukeyHSD(m3, which = "polarity")
```

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = value ~ polarity * domain + item_step, data = h1)
##
## $polarity
##                        diff       lwr      upr     p adj
## negative-positive 0.7039474 0.3502036 1.057691 0.0001036
```