radiosilenceModelConstruction

This is an R Markdown Notebook. When you execute code within the notebook, the results appear beneath the code.

This notebook has been used to create a Linear Mixed Effect Model for the radio silence analysis.

```
# Package names
packages <- c("carData", "car", "Matrix", "lme4", "LMERConvenienceFunctions")

# Install packages not yet installed
installed_packages <- packages %in% rownames(installed.packages())
if (any(installed_packages == FALSE)) {
  install.packages(packages[!installed_packages])
}

# Packages loading
invisible(lapply(packages, library, character.only = TRUE))
```

```
## Warning: il pacchetto 'carData' è stato creato con R versione 4.2.3
```

```
## Warning: il pacchetto 'car' è stato creato con R versione 4.2.3
```

```
## Warning: il pacchetto 'Matrix' è stato creato con R versione 4.2.3
```

```
## Warning: il pacchetto 'lme4' è stato creato con R versione 4.2.3
```

```
## Warning: il pacchetto 'LMERConvenienceFunctions' è stato creato con R versione
## 4.2.3
```

Datasets load

```
# Reading input hofstede data.
data <- read.csv("./radio_silence_metrics_hofstede.csv", sep = ";", header = TRUE, stringsAsFactors=FALS
# Reading input trompenaars data.
dataT <- read.csv("./radio_silence_metrics_trompenaars.csv", sep = ";", header = TRUE, stringsAsFactors=
# Reading input globe data.
dataG <- read.csv("./radio_silence_metrics_globe.csv", sep = ";", header = TRUE, stringsAsFactors=FALSE)

# Excluding some columns from hofstede data
working_data <- na.omit(data)
# Excluding some columns from trompenaars data
working_dataT <- na.omit(dataT)
# Excluding some columns from globe data
working_dataG <- na.omit(dataG)
```

Linear Mixed Model using lmer function on all the variables for Hofstede

```
#----------------------------
#ALL THE VARIABLES

# Applying a Linear Mixed Model using the lmer function
radio <- lmer(working_data$radio~log(working_data$totalCommitters)+log(working_data$totalcommits)
              +working_data$projectAge+working_data$turnover+working_data$blauGender
              +working_data$tenureMedian+working_data$tenureDiversity+log(working_data$teamSize)
              +working_data$stCongruence+working_data$truckFactor+working_data$female
              +working_data$expertise+working_data$centrality+working_data$CV_1
              +working_data$CV_2+working_data$CV_3
              +working_data$CV_4+working_data$CV_5+working_data$CV_6
              +(1 | working_data$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(black, working_data, trim = 2.5)

# Applying vif <5
print(vif(radio))
```

```
## log(working_data$totalCommitters)    log(working_data$totalcommits)
##                             3.343400                             2.988065
##            working_data$projectAge              working_data$turnover
##                             1.433917                             1.074808
##            working_data$blauGender          working_data$tenureMedian
##                             4.908158                             1.130736
##       working_data$tenureDiversity        log(working_data$teamSize)
##                             1.065411                             7.892371
##          working_data$stCongruence           working_data$truckFactor
##                             1.074648                             1.088819
##                working_data$female             working_data$expertise
##                             4.620936                             1.101120
##            working_data$centrality                  working_data$CV_1
##                             1.168651                             5.093144
##                   working_data$CV_2                  working_data$CV_3
##                             6.256541                             3.429683
##                   working_data$CV_4                  working_data$CV_5
##                             8.003308                             3.869264
##                   working_data$CV_6
##                             7.513973
```

```
# Applying a Linear Mixed Model using the lmer function, after vif - NO REMOVAL

# print result
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_data$radio ~ log(working_data$totalCommitters) + log(working_data$totalcommits) +
##     working_data$projectAge + working_data$turnover + working_data$blauGender +
##     working_data$tenureMedian + working_data$tenureDiversity +
```

```
##     log(working_data$teamSize) + working_data$stCongruence +
##     working_data$truckFactor + working_data$female + working_data$expertise +
##     working_data$centrality + working_data$CV_1 + working_data$CV_2 +
##     working_data$CV_3 + working_data$CV_4 + working_data$CV_5 +
##     working_data$CV_6 + (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.6    593.2   -238.8    477.6      170
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4400 -0.7194 -0.1232  0.6820  3.2701
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7044   0.8393
## Number of obs: 192, groups:  working_data$window_idx, 24
##
## Fixed effects:
##                                   Estimate Std. Error t value
## (Intercept)                     -4.7087343  0.9859096  -4.776
## log(working_data$totalCommitters) -0.0515603  0.0944308  -0.546
## log(working_data$totalcommits)     0.0630342  0.0696188   0.905
## working_data$projectAge           -0.0153888  0.0149747  -1.028
## working_data$turnover             10.2055275  0.4514016  22.609
## working_data$blauGender            3.5645268  1.4600028   2.441
## working_data$tenureMedian          0.0553195  0.0356333   1.552
## working_data$tenureDiversity       0.0015467  0.0248089   0.062
## log(working_data$teamSize)         0.3294942  0.1606533   2.051
## working_data$stCongruence         -0.2608575  0.1847352  -1.412
## working_data$truckFactor          -0.0002266  0.0460329  -0.005
## working_data$female               -0.0003984  0.0230506  -0.017
## working_data$expertise             0.0879982  0.2017210   0.436
## working_data$centrality           -0.0776289  0.1467840  -0.529
## working_data$CV_1                  1.8674750  1.3445396   1.389
## working_data$CV_2                 -3.3745807  1.6101074  -2.096
## working_data$CV_3                  0.1379771  1.2034427   0.115
## working_data$CV_4                 -0.7101090  2.0561636  -0.345
## working_data$CV_5                  0.7602673  0.9773745   0.778
## working_data$CV_6                  1.7543906  1.7769908   0.987

##
## Correlation matrix not shown by default, as p = 20 > 12.
## Use print(summary(radio), correlation=TRUE)  or
##     vcov(summary(radio))        if you need it

## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```r
# Applying anova
Anova(radio)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_data$radio
```

```
##                                    Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.2981  1    0.58506
## log(working_data$totalcommits)      0.8198  1    0.36524
## working_data$projectAge             1.0561  1    0.30411
## working_data$turnover             511.1458  1    < 2e-16 ***
## working_data$blauGender             5.9607  1    0.01463 *
## working_data$tenureMedian           2.4102  1    0.12055
## working_data$tenureDiversity        0.0039  1    0.95029
## log(working_data$teamSize)          4.2065  1    0.04027 *
## working_data$stCongruence           1.9939  1    0.15793
## working_data$truckFactor            0.0000  1    0.99607
## working_data$female                 0.0003  1    0.98621
## working_data$expertise              0.1903  1    0.66266
## working_data$centrality             0.2797  1    0.59690
## working_data$CV_1                   1.9291  1    0.16485
## working_data$CV_2                   4.3927  1    0.03609 *
## working_data$CV_3                   0.0131  1    0.90872
## working_data$CV_4                   0.1193  1    0.72983
## working_data$CV_5                   0.6051  1    0.43665
## working_data$CV_6                   0.9747  1    0.32350
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
# Save in a txt file
sink("hofstede/output_radio_hofstede_all_variables.txt")
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_data$radio ~ log(working_data$totalCommitters) + log(working_data$totalcommits) +
##     working_data$projectAge + working_data$turnover + working_data$blauGender +
##     working_data$tenureMedian + working_data$tenureDiversity +
##     log(working_data$teamSize) + working_data$stCongruence +
##     working_data$truckFactor + working_data$female + working_data$expertise +
##     working_data$centrality + working_data$CV_1 + working_data$CV_2 +
##     working_data$CV_3 + working_data$CV_4 + working_data$CV_5 +
##     working_data$CV_6 + (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.6    593.2   -238.8    477.6      170
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.4400 -0.7194 -0.1232  0.6820  3.2701
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.0000   0.0000
##  Residual                            0.7044   0.8393
## Number of obs: 192, groups:  working_data$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                       -4.7087343  0.9859096  -4.776
## log(working_data$totalCommitters) -0.0515603  0.0944308  -0.546
```

```
## log(working_data$totalcommits)     0.0630342  0.0696188   0.905
## working_data$projectAge           -0.0153888  0.0149747  -1.028
## working_data$turnover             10.2055275  0.4514016  22.609
## working_data$blauGender            3.5645268  1.4600028   2.441
## working_data$tenureMedian          0.0553195  0.0356333   1.552
## working_data$tenureDiversity       0.0015467  0.0248089   0.062
## log(working_data$teamSize)         0.3294942  0.1606533   2.051
## working_data$stCongruence         -0.2608575  0.1847352  -1.412
## working_data$truckFactor          -0.0002266  0.0460329  -0.005
## working_data$female               -0.0003984  0.0230506  -0.017
## working_data$expertise             0.0879982  0.2017210   0.436
## working_data$centrality           -0.0776289  0.1467840  -0.529
## working_data$CV_1                  1.8674750  1.3445396   1.389
## working_data$CV_2                 -3.3745807  1.6101074  -2.096
## working_data$CV_3                  0.1379771  1.2034427   0.115
## working_data$CV_4                 -0.7101090  2.0561636  -0.345
## working_data$CV_5                  0.7602673  0.9773745   0.778
## working_data$CV_6                  1.7543906  1.7769908   0.987

##
## Correlation matrix not shown by default, as p = 20 > 12.
## Use print(summary(radio), correlation=TRUE)  or
##     vcov(summary(radio))        if you need it

## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radio)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_data$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.2981  1    0.58506
## log(working_data$totalcommits)      0.8198  1    0.36524
## working_data$projectAge             1.0561  1    0.30411
## working_data$turnover             511.1458  1    < 2e-16 ***
## working_data$blauGender             5.9607  1    0.01463 *
## working_data$tenureMedian           2.4102  1    0.12055
## working_data$tenureDiversity        0.0039  1    0.95029
## log(working_data$teamSize)          4.2065  1    0.04027 *
## working_data$stCongruence           1.9939  1    0.15793
## working_data$truckFactor            0.0000  1    0.99607
## working_data$female                 0.0003  1    0.98621
## working_data$expertise              0.1903  1    0.66266
## working_data$centrality             0.2797  1    0.59690
## working_data$CV_1                   1.9291  1    0.16485
## working_data$CV_2                   4.3927  1    0.03609 *
## working_data$CV_3                   0.0131  1    0.90872
## working_data$CV_4                   0.1193  1    0.72983
## working_data$CV_5                   0.6051  1    0.43665
## working_data$CV_6                   0.9747  1    0.32350
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on all the variables for trompenaars

```
#----------------------------
#ALL THE VARIABLES

# Applying a Linear Mixed Model using the lmer function
radioT <- lmer(working_dataT$radio~log(working_data$totalCommitters)+log(working_dataT$totalcommits)
             +working_data$projectAge+working_dataT$turnover+working_dataT$blauGender
             +working_dataT$tenureMedian+working_dataT$tenureDiversity+log(working_dataT$teamSize)
             +working_dataT$stCongruence+working_dataT$truckFactor+working_dataT$female
             +working_dataT$expertise+working_dataT$centrality+working_dataT$CV_1
             +working_dataT$CV_2+working_dataT$CV_3
             +working_dataT$CV_4+working_dataT$CV_5+working_dataT$CV_6
             +working_dataT$CV_7+working_dataT$CV_8
             +(1 | working_dataT$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(blackT, working_dataT, trim = 2.5)

# Applying vif <5
print(vif(radioT))
```

```
## log(working_data$totalCommitters)   log(working_dataT$totalcommits)
##                          3.107927                           3.030821
##           working_data$projectAge            working_dataT$turnover
##                          1.485908                           1.103035
##          working_dataT$blauGender        working_dataT$tenureMedian
##                          4.882719                           1.111400
##     working_dataT$tenureDiversity       log(working_dataT$teamSize)
##                          1.108156                           7.225722
##        working_dataT$stCongruence         working_dataT$truckFactor
##                          1.065723                           1.092632
##              working_dataT$female           working_dataT$expertise
##                          4.498798                           1.131968
##          working_dataT$centrality                working_dataT$CV_1
##                          1.171604                          14.860738
##                working_dataT$CV_2                working_dataT$CV_3
##                         11.299331                           6.181934
##                working_dataT$CV_4                working_dataT$CV_5
##                         11.074108                          20.972068
##                working_dataT$CV_6                working_dataT$CV_7
##                          2.936502                           6.739256
##                working_dataT$CV_8
##                          4.507286
```

```
# Applying a Linear Mixed Model using the lmer function, after vif - NO REMOVAL

# print result
```

```
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataT$radio ~ log(working_data$totalCommitters) + log(working_dataT$totalcommits) +
##     working_data$projectAge + working_dataT$turnover + working_dataT$blauGender +
##     working_dataT$tenureMedian + working_dataT$tenureDiversity +
##     log(working_dataT$teamSize) + working_dataT$stCongruence +
##     working_dataT$truckFactor + working_dataT$female + working_dataT$expertise +
##     working_dataT$centrality + working_dataT$CV_1 + working_dataT$CV_2 +
##     working_dataT$CV_3 + working_dataT$CV_4 + working_dataT$CV_5 +
##     working_dataT$CV_6 + working_dataT$CV_7 + working_dataT$CV_8 +
##     (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    522.0    600.2   -237.0    474.0      168
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.46105 -0.69672 -0.07956  0.69482  3.11572
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.6914   0.8315
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##                                   Estimate Std. Error t value
## (Intercept)                      -4.564420   1.002534  -4.553
## log(working_data$totalCommitters) -0.046905   0.090202  -0.520
## log(working_dataT$totalcommits)    0.047368   0.069466   0.682
## working_data$projectAge           -0.021381   0.015103  -1.416
## working_dataT$turnover            10.151464   0.453059  22.406
## working_dataT$blauGender           3.670735   1.442741   2.544
## working_dataT$tenureMedian         0.054018   0.035000   1.543
## working_dataT$tenureDiversity      0.006003   0.025068   0.239
## log(working_dataT$teamSize)        0.364748   0.152296   2.395
## working_dataT$stCongruence        -0.278528   0.182264  -1.528
## working_dataT$truckFactor         -0.005453   0.045687  -0.119
## working_dataT$female              -0.001910   0.022533  -0.085
## working_dataT$expertise           -0.012927   0.202635  -0.064
## working_dataT$centrality          -0.092194   0.145609  -0.633
## working_dataT$CV_1                 1.156583   2.185867   0.529
## working_dataT$CV_2                -1.017977   1.569737  -0.649
## working_dataT$CV_3                -2.171341   1.297871  -1.673
## working_dataT$CV_4                 3.712707   1.730648   2.145
## working_dataT$CV_5                -1.612814   2.110333  -0.764
## working_dataT$CV_6                 0.118044   0.561286   0.210
## working_dataT$CV_7                -2.218071   1.457544  -1.522
## working_dataT$CV_8                 2.237561   1.086692   2.059
##
## Correlation matrix not shown by default, as p = 22 > 12.
```

```
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
```

```
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
# Applying anova
Anova(radioT)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataT$radio
##                                  Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.2704  1    0.60306
## log(working_dataT$totalcommits)     0.4650  1    0.49531
## working_data$projectAge             2.0041  1    0.15687
## working_dataT$turnover            502.0501  1    < 2e-16 ***
## working_dataT$blauGender            6.4734  1    0.01095 *
## working_dataT$tenureMedian          2.3819  1    0.12275
## working_dataT$tenureDiversity       0.0573  1    0.81074
## log(working_dataT$teamSize)         5.7360  1    0.01662 *
## working_dataT$stCongruence          2.3353  1    0.12647
## working_dataT$truckFactor           0.0142  1    0.90499
## working_dataT$female                0.0072  1    0.93244
## working_dataT$expertise             0.0041  1    0.94913
## working_dataT$centrality            0.4009  1    0.52663
## working_dataT$CV_1                  0.2800  1    0.59672
## working_dataT$CV_2                  0.4206  1    0.51666
## working_dataT$CV_3                  2.7989  1    0.09433 .
## working_dataT$CV_4                  4.6022  1    0.03193 *
## working_dataT$CV_5                  0.5841  1    0.44472
## working_dataT$CV_6                  0.0442  1    0.83343
## working_dataT$CV_7                  2.3158  1    0.12806
## working_dataT$CV_8                  4.2397  1    0.03949 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Save in a txt file
sink("trompe/output_radio_trompenaars_all_variables.txt")
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataT$radio ~ log(working_data$totalCommitters) + log(working_dataT$totalcommits) +
##     working_data$projectAge + working_dataT$turnover + working_dataT$blauGender +
##     working_dataT$tenureMedian + working_dataT$tenureDiversity +
##     log(working_dataT$teamSize) + working_dataT$stCongruence +
##     working_dataT$truckFactor + working_dataT$female + working_dataT$expertise +
##     working_dataT$centrality + working_dataT$CV_1 + working_dataT$CV_2 +
##     working_dataT$CV_3 + working_dataT$CV_4 + working_dataT$CV_5 +
##     working_dataT$CV_6 + working_dataT$CV_7 + working_dataT$CV_8 +
##     (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    522.0    600.2   -237.0    474.0      168
##
```

```
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.46105 -0.69672 -0.07956  0.69482  3.11572
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.6914   0.8315
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##                                  Estimate Std. Error t value
## (Intercept)                     -4.564420   1.002534  -4.553
## log(working_data$totalCommitters) -0.046905   0.090202  -0.520
## log(working_dataT$totalcommits)    0.047368   0.069466   0.682
## working_data$projectAge           -0.021381   0.015103  -1.416
## working_dataT$turnover            10.151464   0.453059  22.406
## working_dataT$blauGender           3.670735   1.442741   2.544
## working_dataT$tenureMedian         0.054018   0.035000   1.543
## working_dataT$tenureDiversity      0.006003   0.025068   0.239
## log(working_dataT$teamSize)        0.364748   0.152296   2.395
## working_dataT$stCongruence        -0.278528   0.182264  -1.528
## working_dataT$truckFactor         -0.005453   0.045687  -0.119
## working_dataT$female              -0.001910   0.022533  -0.085
## working_dataT$expertise           -0.012927   0.202635  -0.064
## working_dataT$centrality          -0.092194   0.145609  -0.633
## working_dataT$CV_1                 1.156583   2.185867   0.529
## working_dataT$CV_2                -1.017977   1.569737  -0.649
## working_dataT$CV_3                -2.171341   1.297871  -1.673
## working_dataT$CV_4                 3.712707   1.730648   2.145
## working_dataT$CV_5                -1.612814   2.110333  -0.764
## working_dataT$CV_6                 0.118044   0.561286   0.210
## working_dataT$CV_7                -2.218071   1.457544  -1.522
## working_dataT$CV_8                 2.237561   1.086692   2.059
##
## Correlation matrix not shown by default, as p = 22 > 12.
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radioT)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataT$radio
##                                   Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.2704  1    0.60306
## log(working_dataT$totalcommits)     0.4650  1    0.49531
## working_data$projectAge             2.0041  1    0.15687
## working_dataT$turnover            502.0501  1    < 2e-16 ***
## working_dataT$blauGender            6.4734  1    0.01095 *
## working_dataT$tenureMedian          2.3819  1    0.12275
## working_dataT$tenureDiversity       0.0573  1    0.81074
```

```
## log(working_dataT$teamSize)         5.7360  1    0.01662 *
## working_dataT$stCongruence          2.3353  1    0.12647
## working_dataT$truckFactor           0.0142  1    0.90499
## working_dataT$female                0.0072  1    0.93244
## working_dataT$expertise             0.0041  1    0.94913
## working_dataT$centrality            0.4009  1    0.52663
## working_dataT$CV_1                  0.2800  1    0.59672
## working_dataT$CV_2                  0.4206  1    0.51666
## working_dataT$CV_3                  2.7989  1    0.09433 .
## working_dataT$CV_4                  4.6022  1    0.03193 *
## working_dataT$CV_5                  0.5841  1    0.44472
## working_dataT$CV_6                  0.0442  1    0.83343
## working_dataT$CV_7                  2.3158  1    0.12806
## working_dataT$CV_8                  4.2397  1    0.03949 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on all the variables for Globe

```
#----------------------------
#ALL THE VARIABLES

# Applying a Linear Mixed Model using the lmer function
radioG <- lmer(working_dataG$radio~log(working_dataG$totalCommitters)+log(working_dataG$totalcommits)
               +working_dataG$projectAge+working_dataG$turnover+working_dataG$blauGender
               +working_dataG$tenureMedian+working_dataG$tenureDiversity+log(working_dataG$teamSize)
               +working_dataG$stCongruence+working_dataG$truckFactor+working_dataG$female
               +working_dataG$expertise+working_dataG$centrality+working_dataG$CV_1
               +working_dataG$CV_2+working_dataG$CV_3
               +working_dataG$CV_4+working_dataG$CV_5+working_dataG$CV_6+working_dataG$CV_7
               +working_dataG$CV_8+working_dataG$CV_9
               +(1 | working_dataG$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(blackG, working_dataG, trim = 2.5)

# Applying vif <5
print(vif(radioG))
```

```
## log(working_dataG$totalCommitters)    log(working_dataG$totalcommits)
##                           3.196567                           3.105582
##           working_dataG$projectAge           working_dataG$turnover
##                           1.439082                           1.104413
##           working_dataG$blauGender       working_dataG$tenureMedian
##                           4.939124                           1.124956
##      working_dataG$tenureDiversity       log(working_dataG$teamSize)
##                           1.084317                           7.720741
##         working_dataG$stCongruence         working_dataG$truckFactor
##                           1.053882                           1.117571
```

```
##               working_dataG$female            working_dataG$expertise
##                           4.466078                           1.181018
##          working_dataG$centrality                working_dataG$CV_1
##                           1.163912                          16.858534
##                working_dataG$CV_2                working_dataG$CV_3
##                           7.641898                           5.485960
##                working_dataG$CV_4                working_dataG$CV_5
##                          10.358728                           5.068049
##                working_dataG$CV_6                working_dataG$CV_7
##                          15.360268                           6.116881
##                working_dataG$CV_8                working_dataG$CV_9
##                          15.179068                           8.417519
```

```
# Applying a Linear Mixed Model using the lmer function, after vif - NO REMOVAL

# print result
print(summary(radioG))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataG$radio ~ log(working_dataG$totalCommitters) + log(working_dataG$totalcommits) +
##     working_dataG$projectAge + working_dataG$turnover + working_dataG$blauGender +
##     working_dataG$tenureMedian + working_dataG$tenureDiversity +
##     log(working_dataG$teamSize) + working_dataG$stCongruence +
##     working_dataG$truckFactor + working_dataG$female + working_dataG$expertise +
##     working_dataG$centrality + working_dataG$CV_1 + working_dataG$CV_2 +
##     working_dataG$CV_3 + working_dataG$CV_4 + working_dataG$CV_5 +
##     working_dataG$CV_6 + working_dataG$CV_7 + working_dataG$CV_8 +
##     working_dataG$CV_9 + (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    517.7    599.1   -233.8    467.7      167
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.63425 -0.77047 -0.06472  0.61635  2.84952
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.6689   0.8178
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                       -4.784346   0.972422  -4.920
## log(working_dataG$totalCommitters) -0.025435   0.089977  -0.283
## log(working_dataG$totalcommits)     0.085599   0.069163   1.238
## working_dataG$projectAge           -0.022277   0.014619  -1.524
## working_dataG$turnover             10.193689   0.445896  22.861
## working_dataG$blauGender            3.532005   1.427215   2.475
## working_dataG$tenureMedian          0.064317   0.034635   1.857
## working_dataG$tenureDiversity       0.006833   0.024389   0.280
## log(working_dataG$teamSize)         0.222729   0.154841   1.438
## working_dataG$stCongruence         -0.261494   0.178272  -1.467
```

```
## working_dataG$truckFactor           -0.011461   0.045446  -0.252
## working_dataG$female                 0.003486   0.022083   0.158
## working_dataG$expertise              0.200922   0.203579   0.987
## working_dataG$centrality            -0.093947   0.142747  -0.658
## working_dataG$CV_1                  10.536556   6.881153   1.531
## working_dataG$CV_2                  12.934455   5.580179   2.318
## working_dataG$CV_3                   4.434118   6.564351   0.675
## working_dataG$CV_4                 -19.682285   7.505983  -2.622
## working_dataG$CV_5                   4.883141   5.588744   0.874
## working_dataG$CV_6                 -33.283238  11.530327  -2.887
## working_dataG$CV_7                  -6.901852   3.825182  -1.804
## working_dataG$CV_8                  -1.527238  10.081551  -0.151
## working_dataG$CV_9                  30.519367   8.082081   3.776

##
## Correlation matrix not shown by default, as p = 23 > 12.
## Use print(summary(radioG), correlation=TRUE)  or
##     vcov(summary(radioG))        if you need it

## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
# Applying anova
Anova(radioG)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataG$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_dataG$totalCommitters)   0.0799  1  0.7774192
## log(working_dataG$totalcommits)      1.5317  1  0.2158504
## working_dataG$projectAge             2.3221  1  0.1275499
## working_dataG$turnover             522.6322  1  < 2.2e-16 ***
## working_dataG$blauGender             6.1244  1  0.0133328 *
## working_dataG$tenureMedian           3.4484  1  0.0633112 .
## working_dataG$tenureDiversity        0.0785  1  0.7793525
## log(working_dataG$teamSize)          2.0691  1  0.1503095
## working_dataG$stCongruence           2.1516  1  0.1424226
## working_dataG$truckFactor            0.0636  1  0.8008921
## working_dataG$female                 0.0249  1  0.8745541
## working_dataG$expertise              0.9741  1  0.3236660
## working_dataG$centrality             0.4331  1  0.5104499
## working_dataG$CV_1                   2.3446  1  0.1257151
## working_dataG$CV_2                   5.3728  1  0.0204532 *
## working_dataG$CV_3                   0.4563  1  0.4993680
## working_dataG$CV_4                   6.8760  1  0.0087361 **
## working_dataG$CV_5                   0.7634  1  0.3822568
## working_dataG$CV_6                   8.3324  1  0.0038945 **
## working_dataG$CV_7                   3.2556  1  0.0711812 .
## working_dataG$CV_8                   0.0229  1  0.8795905
## working_dataG$CV_9                  14.2595  1  0.0001593 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Save in a txt file
sink("globe/output_radio_globe_all_variables.txt")
```

```
print(summary(radioG))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataG$radio ~ log(working_dataG$totalCommitters) + log(working_dataG$totalcommits) +
##     working_dataG$projectAge + working_dataG$turnover + working_dataG$blauGender +
##     working_dataG$tenureMedian + working_dataG$tenureDiversity +
##     log(working_dataG$teamSize) + working_dataG$stCongruence +
##     working_dataG$truckFactor + working_dataG$female + working_dataG$expertise +
##     working_dataG$centrality + working_dataG$CV_1 + working_dataG$CV_2 +
##     working_dataG$CV_3 + working_dataG$CV_4 + working_dataG$CV_5 +
##     working_dataG$CV_6 + working_dataG$CV_7 + working_dataG$CV_8 +
##     working_dataG$CV_9 + (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    517.7    599.1   -233.8    467.7      167
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.63425 -0.77047 -0.06472  0.61635  2.84952
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.6689   0.8178
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                        -4.784346   0.972422  -4.920
## log(working_dataG$totalCommitters) -0.025435   0.089977  -0.283
## log(working_dataG$totalcommits)     0.085599   0.069163   1.238
## working_dataG$projectAge           -0.022277   0.014619  -1.524
## working_dataG$turnover             10.193689   0.445896  22.861
## working_dataG$blauGender            3.532005   1.427215   2.475
## working_dataG$tenureMedian          0.064317   0.034635   1.857
## working_dataG$tenureDiversity       0.006833   0.024389   0.280
## log(working_dataG$teamSize)         0.222729   0.154841   1.438
## working_dataG$stCongruence         -0.261494   0.178272  -1.467
## working_dataG$truckFactor          -0.011461   0.045446  -0.252
## working_dataG$female                0.003486   0.022083   0.158
## working_dataG$expertise             0.200922   0.203579   0.987
## working_dataG$centrality           -0.093947   0.142747  -0.658
## working_dataG$CV_1                 10.536556   6.881153   1.531
## working_dataG$CV_2                 12.934455   5.580179   2.318
## working_dataG$CV_3                  4.434118   6.564351   0.675
## working_dataG$CV_4                -19.682285   7.505983  -2.622
## working_dataG$CV_5                  4.883141   5.588744   0.874
## working_dataG$CV_6                -33.283238  11.530327  -2.887
## working_dataG$CV_7                 -6.901852   3.825182  -1.804
## working_dataG$CV_8                 -1.527238  10.081551  -0.151
## working_dataG$CV_9                 30.519367   8.082081   3.776
##
```

```
## Correlation matrix not shown by default, as p = 23 > 12.
## Use print(summary(radioG), correlation=TRUE)  or
##     vcov(summary(radioG))        if you need it
```

```
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radioG)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataG$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_dataG$totalCommitters)   0.0799  1  0.7774192
## log(working_dataG$totalcommits)      1.5317  1  0.2158504
## working_dataG$projectAge             2.3221  1  0.1275499
## working_dataG$turnover             522.6322  1  < 2.2e-16 ***
## working_dataG$blauGender             6.1244  1  0.0133328 *
## working_dataG$tenureMedian           3.4484  1  0.0633112 .
## working_dataG$tenureDiversity        0.0785  1  0.7793525
## log(working_dataG$teamSize)          2.0691  1  0.1503095
## working_dataG$stCongruence           2.1516  1  0.1424226
## working_dataG$truckFactor            0.0636  1  0.8008921
## working_dataG$female                 0.0249  1  0.8745541
## working_dataG$expertise              0.9741  1  0.3236660
## working_dataG$centrality             0.4331  1  0.5104499
## working_dataG$CV_1                   2.3446  1  0.1257151
## working_dataG$CV_2                   5.3728  1  0.0204532 *
## working_dataG$CV_3                   0.4563  1  0.4993680
## working_dataG$CV_4                   6.8760  1  0.0087361 **
## working_dataG$CV_5                   0.7634  1  0.3822568
## working_dataG$CV_6                   8.3324  1  0.0038945 **
## working_dataG$CV_7                   3.2556  1  0.0711812 .
## working_dataG$CV_8                   0.0229  1  0.8795905
## working_dataG$CV_9                  14.2595  1  0.0001593 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on all the confounding variables hofstede

```
#----------------------------
#ALL THE CONFOUNDING VARIABLES

# Applying a Linear Mixed Model using the lmer function
radio <- lmer(working_data$radio~log(working_data$totalCommitters)+log(working_data$totalcommits)
              +working_data$projectAge+working_data$turnover
              +working_data$tenureMedian+working_data$tenureDiversity+log(working_data$teamSize)
              +working_data$stCongruence+working_data$centrality+working_data$truckFactor
              +working_data$expertise+working_data$female+working_data$blauGender
              +(1 | working_data$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(radio, working_data, trim = 2.5)

# Applying vif <5
print(vif(radio))
```

```
## log(working_data$totalCommitters)    log(working_data$totalcommits)
##                          2.712847                          2.203568
##           working_data$projectAge             working_data$turnover
##                          1.315538                          1.057103
##         working_data$tenureMedian      working_data$tenureDiversity
##                          1.074375                          1.051809
##        log(working_data$teamSize)         working_data$stCongruence
##                          6.185360                          1.041838
##           working_data$centrality          working_data$truckFactor
##                          1.120423                          1.064048
##            working_data$expertise               working_data$female
##                          1.075291                          4.211488
##           working_data$blauGender
##                          4.198059
```

```
# Applying a Linear Mixed Model using the lmer function, after vif, NO REMOVALS
radio <- lmer(working_data$radio~log(working_data$totalCommitters)+log(working_data$totalcommits)
              +working_data$projectAge+working_data$turnover
              +working_data$tenureMedian+working_data$centrality+working_data$tenureDiversity
              +working_data$stCongruence+working_data$truckFactor
              +working_data$expertise+working_data$female+working_data$blauGender
              +(1 | working_data$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# print result
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_data$radio ~ log(working_data$totalCommitters) + log(working_data$totalcommits) +
##     working_data$projectAge + working_data$turnover + working_data$tenureMedian +
##     working_data$centrality + working_data$tenureDiversity +
##     working_data$stCongruence + working_data$truckFactor + working_data$expertise +
##     working_data$female + working_data$blauGender + (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_data$window_idx, 24
```

```
##
## Fixed effects:
##                                   Estimate Std. Error t value
## (Intercept)                     -2.294259   0.648388  -3.538
## log(working_data$totalCommitters) -0.047530   0.086047  -0.552
## log(working_data$totalcommits)     0.028379   0.061202   0.464
## working_data$projectAge           -0.024382   0.014861  -1.641
## working_data$turnover             10.055517   0.460683  21.827
## working_data$tenureMedian          0.046144   0.035956   1.283
## working_data$centrality           -0.045816   0.148499  -0.309
## working_data$tenureDiversity       0.009707   0.025311   0.383
## working_data$stCongruence         -0.305010   0.188020  -1.622
## working_data$truckFactor          -0.015009   0.047116  -0.319
## working_data$expertise             0.079327   0.206509   0.384
## working_data$female                0.038041   0.012415   3.064
## working_data$blauGender            0.307979   0.836685   0.368

##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radio), correlation=TRUE)  or
##     vcov(summary(radio))        if you need it

## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
# Applying anova
Anova(radio)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_data$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.3051  1   0.580697
## log(working_data$totalcommits)      0.2150  1   0.642865
## working_data$projectAge             2.6917  1   0.100870
## working_data$turnover             476.4351  1  < 2.2e-16 ***
## working_data$tenureMedian           1.6470  1   0.199371
## working_data$centrality             0.0952  1   0.757682
## working_data$tenureDiversity        0.1471  1   0.701351
## working_data$stCongruence           2.6316  1   0.104757
## working_data$truckFactor            0.1015  1   0.750058
## working_data$expertise              0.1476  1   0.700879
## working_data$female                 9.3882  1   0.002184 **
## working_data$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Save in a txt file
sink("hofstede/output_radio_hofstede_confounding_variables.txt")
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_data$radio ~ log(working_data$totalCommitters) + log(working_data$totalcommits) +
##     working_data$projectAge + working_data$turnover + working_data$tenureMedian +
##     working_data$centrality + working_data$tenureDiversity +
##     working_data$stCongruence + working_data$truckFactor + working_data$expertise +
```

```
##     working_data$female + working_data$blauGender + (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_data$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                        -2.294259   0.648388  -3.538
## log(working_data$totalCommitters) -0.047530   0.086047  -0.552
## log(working_data$totalcommits)     0.028379   0.061202   0.464
## working_data$projectAge           -0.024382   0.014861  -1.641
## working_data$turnover             10.055517   0.460683  21.827
## working_data$tenureMedian          0.046144   0.035956   1.283
## working_data$centrality           -0.045816   0.148499  -0.309
## working_data$tenureDiversity       0.009707   0.025311   0.383
## working_data$stCongruence         -0.305010   0.188020  -1.622
## working_data$truckFactor          -0.015009   0.047116  -0.319
## working_data$expertise             0.079327   0.206509   0.384
## working_data$female                0.038041   0.012415   3.064
## working_data$blauGender            0.307979   0.836685   0.368
##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radio), correlation=TRUE)  or
##     vcov(summary(radio))        if you need it
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radio)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_data$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_data$totalCommitters)   0.3051  1   0.580697
## log(working_data$totalcommits)      0.2150  1   0.642865
## working_data$projectAge             2.6917  1   0.100870
## working_data$turnover             476.4351  1  < 2.2e-16 ***
## working_data$tenureMedian           1.6470  1   0.199371
## working_data$centrality             0.0952  1   0.757682
## working_data$tenureDiversity        0.1471  1   0.701351
## working_data$stCongruence           2.6316  1   0.104757
## working_data$truckFactor            0.1015  1   0.750058
## working_data$expertise              0.1476  1   0.700879
## working_data$female                 9.3882  1   0.002184 **
```

```
## working_data$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on all the confounding variables trompenaars

```
#----------------------------
#ALL THE CONFOUNDING VARIABLES

# Applying a Linear Mixed Model using the lmer function
radioT <- lmer(working_dataT$radio~log(working_dataT$totalCommitters)+log(working_dataT$totalcommits)
             +working_dataT$projectAge+working_dataT$turnover
             +working_dataT$tenureMedian+working_dataT$tenureDiversity+log(working_dataT$teamSize)
             +working_dataT$stCongruence+working_dataT$centrality+working_dataT$truckFactor
             +working_dataT$expertise+working_dataT$female+working_dataT$blauGender
             +(1 | working_dataT$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(blackT, working_dataT, trim = 2.5)

# Applying vif <5
print(vif(radioT))
```

```
## log(working_dataT$totalCommitters)    log(working_dataT$totalcommits)
##                           2.712847                           2.203568
##           working_dataT$projectAge            working_dataT$turnover
##                           1.315538                           1.057103
##         working_dataT$tenureMedian      working_dataT$tenureDiversity
##                           1.074375                           1.051809
##        log(working_dataT$teamSize)         working_dataT$stCongruence
##                           6.185360                           1.041838
##           working_dataT$centrality          working_dataT$truckFactor
##                           1.120423                           1.064048
##            working_dataT$expertise               working_dataT$female
##                           1.075291                           4.211488
##           working_dataT$blauGender
##                           4.198059
```

```
# Applying a Linear Mixed Model using the lmer function, after vif, NO REMOVALS
radioT <- lmer(working_dataT$radio~log(working_dataT$totalCommitters)+log(working_dataT$totalcommits)
             +working_dataT$projectAge+working_dataT$turnover
             +working_dataT$tenureMedian+working_dataT$centrality+working_dataT$tenureDiversity
             +working_dataT$stCongruence+working_dataT$truckFactor
             +working_dataT$expertise+working_dataT$female+working_dataT$blauGender
             +(1 | working_dataT$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# print result
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataT$radio ~ log(working_dataT$totalCommitters) + log(working_dataT$totalcommits) +
##     working_dataT$projectAge + working_dataT$turnover + working_dataT$tenureMedian +
##     working_dataT$centrality + working_dataT$tenureDiversity +
##     working_dataT$stCongruence + working_dataT$truckFactor +
##     working_dataT$expertise + working_dataT$female + working_dataT$blauGender +
##     (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                       -2.294259   0.648388  -3.538
## log(working_dataT$totalCommitters) -0.047530   0.086047  -0.552
## log(working_dataT$totalcommits)     0.028379   0.061202   0.464
## working_dataT$projectAge           -0.024382   0.014861  -1.641
## working_dataT$turnover             10.055517   0.460683  21.827
## working_dataT$tenureMedian          0.046144   0.035956   1.283
## working_dataT$centrality           -0.045816   0.148499  -0.309
## working_dataT$tenureDiversity       0.009707   0.025311   0.383
## working_dataT$stCongruence         -0.305010   0.188020  -1.622
## working_dataT$truckFactor          -0.015009   0.047116  -0.319
## working_dataT$expertise             0.079327   0.206509   0.384
## working_dataT$female                0.038041   0.012415   3.064
## working_dataT$blauGender            0.307979   0.836685   0.368
##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
# Applying anova
Anova(radioT)

## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataT$radio
##                                   Chisq Df Pr(>Chisq)
## log(working_dataT$totalCommitters)   0.3051  1   0.580697
## log(working_dataT$totalcommits)      0.2150  1   0.642865
## working_dataT$projectAge             2.6917  1   0.100870
```

```
## working_dataT$turnover             476.4351  1  < 2.2e-16 ***
## working_dataT$tenureMedian           1.6470  1   0.199371
## working_dataT$centrality             0.0952  1   0.757682
## working_dataT$tenureDiversity        0.1471  1   0.701351
## working_dataT$stCongruence           2.6316  1   0.104757
## working_dataT$truckFactor            0.1015  1   0.750058
## working_dataT$expertise              0.1476  1   0.700879
## working_dataT$female                 9.3882  1   0.002184 **
## working_dataT$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Save in a txt file
sink("trompe/output_radio_trompenaars_confounding_variables.txt")
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataT$radio ~ log(working_dataT$totalCommitters) + log(working_dataT$totalcommits) +
##     working_dataT$projectAge + working_dataT$turnover + working_dataT$tenureMedian +
##     working_dataT$centrality + working_dataT$tenureDiversity +
##     working_dataT$stCongruence + working_dataT$truckFactor +
##     working_dataT$expertise + working_dataT$female + working_dataT$blauGender +
##     (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##                                  Estimate Std. Error t value
## (Intercept)                     -2.294259   0.648388  -3.538
## log(working_dataT$totalCommitters) -0.047530   0.086047  -0.552
## log(working_dataT$totalcommits)     0.028379   0.061202   0.464
## working_dataT$projectAge           -0.024382   0.014861  -1.641
## working_dataT$turnover             10.055517   0.460683  21.827
## working_dataT$tenureMedian          0.046144   0.035956   1.283
## working_dataT$centrality           -0.045816   0.148499  -0.309
## working_dataT$tenureDiversity       0.009707   0.025311   0.383
## working_dataT$stCongruence         -0.305010   0.188020  -1.622
## working_dataT$truckFactor          -0.015009   0.047116  -0.319
## working_dataT$expertise             0.079327   0.206509   0.384
## working_dataT$female                0.038041   0.012415   3.064
## working_dataT$blauGender            0.307979   0.836685   0.368

##
```

```
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
```

```
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radioT)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataT$radio
##                                      Chisq Df Pr(>Chisq)
## log(working_dataT$totalCommitters)   0.3051  1   0.580697
## log(working_dataT$totalcommits)      0.2150  1   0.642865
## working_dataT$projectAge             2.6917  1   0.100870
## working_dataT$turnover             476.4351  1  < 2.2e-16 ***
## working_dataT$tenureMedian           1.6470  1   0.199371
## working_dataT$centrality             0.0952  1   0.757682
## working_dataT$tenureDiversity        0.1471  1   0.701351
## working_dataT$stCongruence           2.6316  1   0.104757
## working_dataT$truckFactor            0.1015  1   0.750058
## working_dataT$expertise              0.1476  1   0.700879
## working_dataT$female                 9.3882  1   0.002184 **
## working_dataT$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on all the confounding variables globe

```
#-----------------------------
#ALL THE CONFOUNDING VARIABLES

# Applying a Linear Mixed Model using the lmer function
radioT <- lmer(working_dataG$radio~log(working_dataG$totalCommitters)+log(working_dataG$totalcommits)
             +working_dataG$projectAge+working_dataG$turnover
             +working_dataG$tenureMedian+working_dataG$tenureDiversity+log(working_dataG$teamSize)
             +working_dataG$stCongruence+working_dataG$centrality+working_dataG$truckFactor
             +working_dataG$expertise+working_dataG$female+working_dataG$blauGender
             +(1 | working_dataG$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# Remove outlier
#romr.fnc(blackT, working_dataG, trim = 2.5)

# Applying vif <5
print(vif(radioT))
```

```
## log(working_dataG$totalCommitters)    log(working_dataG$totalcommits)
##                           2.712847                           2.203568
##           working_dataG$projectAge             working_dataG$turnover
```

```
##                            1.315538                            1.057103
##         working_dataG$tenureMedian      working_dataG$tenureDiversity
##                            1.074375                            1.051809
##        log(working_dataG$teamSize)         working_dataG$stCongruence
##                            6.185360                            1.041838
##           working_dataG$centrality          working_dataG$truckFactor
##                            1.120423                            1.064048
##            working_dataG$expertise               working_dataG$female
##                            1.075291                            4.211488
##           working_dataG$blauGender
##                            4.198059
```

```
# Applying a Linear Mixed Model using the lmer function, after vif, NO REMOVALS
radioT <- lmer(working_dataG$radio~log(working_dataG$totalCommitters)+log(working_dataG$totalcommits)
            +working_dataG$projectAge+working_dataG$turnover
            +working_dataG$tenureMedian+working_dataG$centrality+working_dataG$tenureDiversity
            +working_dataG$stCongruence+working_dataG$truckFactor
            +working_dataG$expertise+working_dataG$female+working_dataG$blauGender
            +(1 | working_dataG$window_idx ), REML=FALSE)
```

```
## boundary (singular) fit: see help('isSingular')
```

```
# print result
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataG$radio ~ log(working_dataG$totalCommitters) + log(working_dataG$totalcommits) +
##     working_dataG$projectAge + working_dataG$turnover + working_dataG$tenureMedian +
##     working_dataG$centrality + working_dataG$tenureDiversity +
##     working_dataG$stCongruence + working_dataG$truckFactor +
##     working_dataG$expertise + working_dataG$female + working_dataG$blauGender +
##     (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                       -2.294259   0.648388  -3.538
## log(working_dataG$totalCommitters) -0.047530   0.086047  -0.552
## log(working_dataG$totalcommits)     0.028379   0.061202   0.464
## working_dataG$projectAge           -0.024382   0.014861  -1.641
## working_dataG$turnover             10.055517   0.460683  21.827
## working_dataG$tenureMedian          0.046144   0.035956   1.283
## working_dataG$centrality           -0.045816   0.148499  -0.309
```

```
## working_dataG$tenureDiversity       0.009707   0.025311   0.383
## working_dataG$stCongruence         -0.305010   0.188020  -1.622
## working_dataG$truckFactor          -0.015009   0.047116  -0.319
## working_dataG$expertise             0.079327   0.206509   0.384
## working_dataG$female                0.038041   0.012415   3.064
## working_dataG$blauGender            0.307979   0.836685   0.368
```

```
##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
```

```
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
# Applying anova
Anova(radioT)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataG$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_dataG$totalCommitters)   0.3051  1   0.580697
## log(working_dataG$totalcommits)      0.2150  1   0.642865
## working_dataG$projectAge             2.6917  1   0.100870
## working_dataG$turnover             476.4351  1  < 2.2e-16 ***
## working_dataG$tenureMedian           1.6470  1   0.199371
## working_dataG$centrality             0.0952  1   0.757682
## working_dataG$tenureDiversity        0.1471  1   0.701351
## working_dataG$stCongruence           2.6316  1   0.104757
## working_dataG$truckFactor            0.1015  1   0.750058
## working_dataG$expertise              0.1476  1   0.700879
## working_dataG$female                 9.3882  1   0.002184 **
## working_dataG$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# Save in a txt file
sink("globe/output_radio_globe_confounding_variables.txt")
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula:
## working_dataG$radio ~ log(working_dataG$totalCommitters) + log(working_dataG$totalcommits) +
##     working_dataG$projectAge + working_dataG$turnover + working_dataG$tenureMedian +
##     working_dataG$centrality + working_dataG$tenureDiversity +
##     working_dataG$stCongruence + working_dataG$truckFactor +
##     working_dataG$expertise + working_dataG$female + working_dataG$blauGender +
##     (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    521.2    570.1   -245.6    491.2      177
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.50595 -0.70062 -0.05552  0.70805  2.91045
##
```

```
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.0000   0.0000
##  Residual                             0.7561   0.8696
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##                                    Estimate Std. Error t value
## (Intercept)                       -2.294259   0.648388  -3.538
## log(working_dataG$totalCommitters) -0.047530   0.086047  -0.552
## log(working_dataG$totalcommits)     0.028379   0.061202   0.464
## working_dataG$projectAge           -0.024382   0.014861  -1.641
## working_dataG$turnover             10.055517   0.460683  21.827
## working_dataG$tenureMedian          0.046144   0.035956   1.283
## working_dataG$centrality           -0.045816   0.148499  -0.309
## working_dataG$tenureDiversity       0.009707   0.025311   0.383
## working_dataG$stCongruence         -0.305010   0.188020  -1.622
## working_dataG$truckFactor          -0.015009   0.047116  -0.319
## working_dataG$expertise             0.079327   0.206509   0.384
## working_dataG$female                0.038041   0.012415   3.064
## working_dataG$blauGender            0.307979   0.836685   0.368
##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(summary(radioT), correlation=TRUE)  or
##     vcov(summary(radioT))        if you need it
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
Anova(radioT)
```

```
## Analysis of Deviance Table (Type II Wald chisquare tests)
##
## Response: working_dataG$radio
##                                    Chisq Df Pr(>Chisq)
## log(working_dataG$totalCommitters)   0.3051  1   0.580697
## log(working_dataG$totalcommits)      0.2150  1   0.642865
## working_dataG$projectAge             2.6917  1   0.100870
## working_dataG$turnover             476.4351  1  < 2.2e-16 ***
## working_dataG$tenureMedian           1.6470  1   0.199371
## working_dataG$centrality             0.0952  1   0.757682
## working_dataG$tenureDiversity        0.1471  1   0.701351
## working_dataG$stCongruence           2.6316  1   0.104757
## working_dataG$truckFactor            0.1015  1   0.750058
## working_dataG$expertise              0.1476  1   0.700879
## working_dataG$female                 9.3882  1   0.002184 **
## working_dataG$blauGender             0.1355  1   0.712803
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
sink()
```

Linear Mixed Model using lmer function on only random effect hofsetde

```
#----------------------------
#ONLY RANDOM EFFECT

# Applying a Linear Mixed Model using the lmer function
radio <- lmer(working_data$radio~(1 | working_data$window_idx ), REML=FALSE)

# Remove outlier
#romr.fnc(black, working_data, trim = 2.5)

# print result
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: working_data$radio ~ (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_data$window_idx, 24
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
# Save in a txt file
sink("hofstede/output_radio_hofstede_random.txt")
print(summary(radio))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: working_data$radio ~ (1 | working_data$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_data$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_data$window_idx, 24
```

```
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
sink()
```

Linear Mixed Model using lmer function on only random effect trompenaars

```
#----------------------------
#ONLY RANDOM EFFECT

# Applying a Linear Mixed Model using the lmer function
radioT <- lmer(working_dataT$radio~(1 | working_dataT$window_idx ), REML=FALSE)

# Remove outlier
#romr.fnc(blackT, working_dataT, trim = 2.5)

# print result
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: working_dataT$radio ~ (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                   Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
# Save in a txt file
sink("trompe/output_radio_trompenaars_random.txt")
print(summary(radioT))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: working_dataT$radio ~ (1 | working_dataT$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataT$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_dataT$window_idx, 24
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
sink()
```

Linear Mixed Model using lmer function on only random effect globe

```
#----------------------------
#ONLY RANDOM EFFECT

# Applying a Linear Mixed Model using the lmer function
radioG <- lmer(working_dataG$radio~(1 | working_dataG$window_idx ), REML=FALSE)

# Remove outlier
#romr.fnc(radioG, working_dataG, trim = 2.5)

# print result
print(summary(radioG))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
## Formula: working_dataG$radio ~ (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
# Save in a txt file
sink("globe/output_radio_globe_random.txt")
print(summary(radioG))
```

```
## Linear mixed model fit by maximum likelihood  ['lmerMod']
```

```
## Formula: working_dataG$radio ~ (1 | working_dataG$window_idx)
##
##      AIC      BIC   logLik deviance df.resid
##    745.5    755.3   -369.8    739.5      189
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -1.4701 -0.8250 -0.1817  0.9688  1.6635
##
## Random effects:
##  Groups                    Name        Variance Std.Dev.
##  working_dataG$window_idx (Intercept) 0.04545  0.2132
##  Residual                             2.71321  1.6472
## Number of obs: 192, groups:  working_dataG$window_idx, 24
##
## Fixed effects:
##             Estimate Std. Error t value
## (Intercept)   2.3582     0.1276   18.48
```

```
sink()
```