

High Performance Session (2105)

Session 2103

```
# read excel
dialog_data <- read_excel("data/nek21.xlsx", sheet = "Sheet1_Dialogs")
head(dialog_data)
```

```
## # A tibble: 6 x 8
##   session event_order sender receiver sender_gender receiver_gender
##   <dbl>      <dbl> <chr>  <chr>    <chr>         <chr>
## 1    2102          1 Igor   Ashley  Male         Female
## 2    2102          2 Ashley Will   Female       Male
## 3    2102          3 Will   Igor    Male         Male
## 4    2102          4 Igor   Ashley  Male         Female
## 5    2102          5 Ashley Igor    Female       Male
## 6    2102          6 Igor   Will    Male         Male
## # i 2 more variables: sender_dialog <chr>, receiver_dialog <chr>
```

```
df_high2105 <- dialog_data[dialog_data$session == 2105,]
head(df_high2105)
```

```
## # A tibble: 6 x 8
##   session event_order sender receiver sender_gender receiver_gender
##   <dbl>      <dbl> <chr>  <chr>    <chr>         <chr>
## 1    2105          NA Ashley All     Female       Unspecified
## 2    2105          NA All   Ashley Unspecified Female
## 3    2105          NA Ashley Oleg    Female       Male
## 4    2105          NA Oleg   Vika    Male         Female
## 5    2105          NA Vika   Will    Female       Male
## 6    2105          NA Will   Oleg    Male         Male
## # i 2 more variables: sender_dialog <chr>, receiver_dialog <chr>
```

```
people_list <- unique(df_high2105$sender)
```

```
lookup_table <- setNames(seq_along(people_list), people_list)
print(lookup_table)
```

```
## Ashley   All   Oleg   Vika   Will   Saleh
##       1     2     3     4     5     6
```

```
df_high2105[, 'sender_id'] <- lookup_table[df_high2105$sender]
df_high2105[, 'receiver_id'] <- lookup_table[df_high2105$receiver]
head(df_high2105)
```

```
## # A tibble: 6 x 10
##   session event_order sender receiver sender_gender receiver_gender
##   <dbl>      <dbl> <chr>  <chr>    <chr>         <chr>
## 1    2105         NA Ashley All      Female        Unspecified
## 2    2105         NA All    Ashley Unspecified Female
## 3    2105         NA Ashley Oleg    Female        Male
## 4    2105         NA Oleg   Vika     Male         Female
## 5    2105         NA Vika   Will    Female        Male
## 6    2105         NA Will   Oleg     Male         Male
## # i 4 more variables: sender_dialog <chr>, receiver_dialog <chr>,
## #   sender_id <int>, receiver_id <int>
```

```
# for event order, add 1 to make it start from 1 and icnreasing by 1 (row number)
df_high2105[, 'event_order'] <- seq(1, nrow(df_high2105))
head(df_high2105)
```

```
## # A tibble: 6 x 10
##   session event_order sender receiver sender_gender receiver_gender
##   <dbl>      <int> <chr>  <chr>    <chr>         <chr>
## 1    2105         1 Ashley All      Female        Unspecified
## 2    2105         2 All    Ashley Unspecified Female
## 3    2105         3 Ashley Oleg    Female        Male
## 4    2105         4 Oleg   Vika     Male         Female
## 5    2105         5 Vika   Will    Female        Male
## 6    2105         6 Will   Oleg     Male         Male
## # i 4 more variables: sender_dialog <chr>, receiver_dialog <chr>,
## #   sender_id <int>, receiver_id <int>
```

```
# Load the data
```

```
data <- data.frame(sid = df_high2105$sender_id, rid = df_high2105$receiver_id, time = df_high2105$event_order)
```

```
# Calculate statistics for the REM
```

```
stats.intercept <- Constant(data)
stats.rrecsnd <- RRecSnd(data)
stats.rsndsnd <- RSndSnd(data)
```

```
# Combine statistics
```

```
stats1 <- combine.stats(
  '[Intercept]' = stats.intercept,
  'RRecSnd' = stats.rrecsnd,
  'RSndSnd' = stats.rsndsnd
)
```

```
# Fit the first REM model
```

```
model1 <- FitEventNetworkCore(data, stats1)
summary(model1)
```

```
## Relational Event Model (Interval Likelihood)
```

```
##
```

```
##               MLE      Std.Err Z value Pr(>|z|)
## [Intercept] -2.5995538  0.0393379 -66.083   <2e-16 ***
## RRecSnd      0.0210390  0.0015092  13.940   <2e-16 ***
```

```
## RSndSnd      0.0015905  0.0010710   1.485   0.1375
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 9486.793 on 1172 degrees of freedom
## AIC: 11836.79 BIC: 17792.9
```

```
# Model 2 -----
```

```
data <- data.frame(sid = df_high2105$sender_id, rid = df_high2105$receiver_id, time = df_high2105$event,
```

```
# Adding the second term: the Normalized Total Degree Received (NTDRec)
```

```
stats.ntdegrec <- NTDRec(data)
```

```
stats2 <- combine.stats(
```

```
  '[Intercept]' <- stats.intercept,
```

```
  'RRecSnd' = stats.rrecsnd,
```

```
  'RSndSnd' = stats.rsndsnd,
```

```
  'NTDegRec' = stats.ntdegrec
```

```
)
```

```
# Run the second model and check the transcript_data
```

```
model2 <- FitEventNetworkCore(data, stats2, ordinal = FALSE)
```

```
summary(model2)
```

```
## Relational Event Model (Interval Likelihood)
```

```
##
```

```
##           MLE      Std.Err Z value Pr(>|z|)
```

```
##      -3.1698554  0.0614882 -51.552  <2e-16 ***
```

```
## RRecSnd  0.0162607  0.0014591  11.145  <2e-16 ***
```

```
## RSndSnd -0.0015433  0.0010358  -1.490   0.1362
```

```
## NTDegRec 0.4745048  0.0356615  13.306  <2e-16 ***
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
## Residual deviance: 9304.102 on 1171 degrees of freedom
```

```
## AIC: 11654.1 BIC: 17610.2
```

```
# add a column representing if the sender and receiver are of the same gender
```

```
same_gender <- ifelse(df_high2105$sender_gender == df_high2105$receiver_gender, 1, 0)
```

```
data <- data.frame(sid = df_high2105$sender_id, rid = df_high2105$receiver_id, time = df_high2105$event,
```

```
# Model 3 -----
```

```
stats.sameGender <- SameConstGroup(data, same_gender)
```

```
stats3 <- combine.stats(
```

```
  '[Intercept]' = stats.intercept,
```

```
  'RRecSnd' = stats.rrecsnd,
```

```
  'RSndSnd' = stats.rsndsnd,
```

```
  'NTDegRec' = stats.ntdegrec,
```

```
  'SameConstGroup' = stats.sameGender
```

```
)
```

```
# Run the third model and check the transcript_data
```

```
model3 <- FitEventNetworkCore(data, stats3, ordinal = FALSE)
```

```
summary(model3)
```

```
## Relational Event Model (Interval Likelihood)
##
##
##           MLE      Std.Err  Z value Pr(>|z|)
## [Intercept] -3.1984658  0.0796490 -40.1570 <2e-16 ***
## RRecSnd      0.0163117  0.0014623  11.1550 <2e-16 ***
## RSndSnd     -0.0016062  0.0010435  -1.5392  0.1238
## NTDegRec     0.4663804  0.0383506  12.1610 <2e-16 ***
## SameConstGroup 0.0457715  0.0803114   0.5699  0.5687
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 9303.775 on 1170 degrees of freedom
## AIC: 11653.78 BIC: 17609.88
```

```
# Model 4 -----
#same_gender and sender_dialog
data <- data.frame(sid = df_high2105$sender_id, rid = df_high2105$receiver_id, time = df_high2105$event,
  sender_dialog = df_high2105$sender_dialog, receiver_dialog = df_high2105$receiver_dialog)

stats.SndDialog <- SameConstGroup(data, df_high2105$sender_dialog)
stats.RecDialog <- SameConstGroup(data, df_high2105$receiver_dialog)

stats4 <- combine.stats(
  '[Intercept]' = stats.intercept,
  'RRecSnd' = stats.rrecsnd,
  'RSndSnd' = stats.rsndsnd,
  'NTDegRec' = stats.ntdegrec,
  'SameConstGroup' = stats.sameGender,
  'SndDialog' = stats.SndDialog,
  'RecDialog' = stats.RecDialog
)

model4 <- FitEventNetworkCore(data, stats4, ordinal = FALSE)
summary(model4)
```

```
## Relational Event Model (Interval Likelihood)
##
##
##           MLE      Std.Err  Z value Pr(>|z|)
## [Intercept] -3.1684111  0.0884803 -35.8092 < 2.2e-16 ***
## RRecSnd      0.0154516  0.0014705  10.5075 < 2.2e-16 ***
## RSndSnd     -0.0016806  0.0010354  -1.6231  0.1045637
## NTDegRec     0.4113643  0.0475844   8.6449 < 2.2e-16 ***
## SameConstGroup -2.3055587  0.7278784  -3.1675  0.0015375 **
## SndDialog     2.4165078  0.7271463   3.3233  0.0008897 ***
## RecDialog    -0.1233608  0.0894304  -1.3794  0.1677699
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 9273.141 on 1168 degrees of freedom
## AIC: 11623.14 BIC: 17579.24
```