Low Performance Session (2103)

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_low2103 <- dialog_data[dialog_data$session == 2103,]
head(df_low2103)
```

```
## # A tibble: 6 x 8
##   session event_order sender receiver sender_gender receiver_gender
##     <dbl>       <dbl> <chr>  <chr>    <chr>         <chr>
## 1    2103          NA Oleg   Ashley   Male          Female
## 2    2103          NA Ashley Oleg     Female        Male
## 3    2103          NA Oleg   Ashley   Male          Female
## 4    2103          NA Ashley Katya    Female        Female
## 5    2103          NA Katya  Vika     Female        Female
## 6    2103          NA Vika   Will     Female        Male
## # i 2 more variables: sender_dialog <chr>, receiver_dialog <chr>
```

```
people_list <- unique(df_low2103$sender)

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

```
##   Oleg Ashley  Katya   Vika   Will  Saleh    All
##      1      2      3      4      5      6      7
```

```
df_low2103[,'sender_id'] <- lookup_table[df_low2103$sender]
df_low2103[,'receiver_id'] <- lookup_table[df_low2103$receiver]
head(df_low2103)
```

```
## # A tibble: 6 x 10
##   session event_order sender receiver sender_gender receiver_gender
##     <dbl>       <dbl> <chr>  <chr>    <chr>         <chr>
## 1    2103          NA Oleg   Ashley   Male          Female
## 2    2103          NA Ashley Oleg     Female        Male
## 3    2103          NA Oleg   Ashley   Male          Female
## 4    2103          NA Ashley Katya    Female        Female
## 5    2103          NA Katya  Vika     Female        Female
## 6    2103          NA Vika   Will     Female        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_low2103[,'event_order'] <- seq(1, nrow(df_low2103))
head(df_low2103)
```

```
## # A tibble: 6 x 10
##   session event_order sender receiver sender_gender receiver_gender
##     <dbl>       <int> <chr>  <chr>    <chr>         <chr>
## 1    2103           1 Oleg   Ashley   Male          Female
## 2    2103           2 Ashley Oleg     Female        Male
## 3    2103           3 Oleg   Ashley   Male          Female
## 4    2103           4 Ashley Katya    Female        Female
## 5    2103           5 Katya  Vika     Female        Female
## 6    2103           6 Vika   Will     Female        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_low2103$sender_id, rid = df_low2103$receiver_id, time = df_low2103$event_or


# 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] -3.04240721  0.02258839 -134.6890 < 2.2e-16 ***
## RRecSnd      0.01180861  0.00054958   21.4864 < 2.2e-16 ***
```

```
## RSndSnd      0.00150646  0.00041035    3.6711 0.0002415 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 33758.09 on 3796 degrees of freedom
## AIC: 41356.09 BIC: 65071.32
```

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

data <- data.frame(sid = df_low2103$sender_id, rid = df_low2103$receiver_id, time = df_low2103$event_or

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

```
## Relational Event Model (Interval Likelihood)
##
##                   MLE     Std.Err   Z value Pr(>|z|)
##          -3.42044244  0.03231924 -105.8330   <2e-16 ***
## RRecSnd   0.00987133  0.00054359   18.1596   <2e-16 ***
## RSndSnd   0.00011784  0.00040961    0.2877   0.7736
## NTDegRec  0.37919509  0.02100074   18.0563   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 33436.74 on 3795 degrees of freedom
## AIC: 41034.74 BIC: 64749.97
```

```
# add a column representing if the sender and receiver are of the same gender
same_gender <- ifelse(df_low2103$sender_gender == df_low2103$receiver_gender, 1, 0)
data <- data.frame(sid = df_low2103$sender_id, rid = df_low2103$receiver_id, time = df_low2103$event_or

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

```
## Relational Event Model (Interval Likelihood)
##
##                         MLE     Std.Err  Z value Pr(>|z|)
## [Intercept]    -3.3649e+00  3.8396e-02 -87.6349  < 2e-16 ***
## RRecSnd         9.8471e-03  5.4335e-04  18.1229  < 2e-16 ***
## RSndSnd         9.7206e-05  4.0928e-04   0.2375  0.81227
## NTDegRec        3.5889e-01  2.2380e-02  16.0358  < 2e-16 ***
## SameConstGroup -9.3031e-02  3.5485e-02  -2.6217  0.00875 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 33429.84 on 3794 degrees of freedom
## AIC: 41027.84 BIC: 64743.08
```

```
# Model 4 ------------------------------------------------------------------
#same_gender and sender_dialog
data <- data.frame(sid = df_low2103$sender_id, rid = df_low2103$receiver_id, time = df_low2103$event_or

stats.SndDialog <- SameConstGroup(data, df_low2103$sender_dialog)
stats.RecDialog <- SameConstGroup(data, df_low2103$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]    -3.33093210  0.05447775 -61.1430 < 2.2e-16 ***
## RRecSnd         0.00984156  0.00054319  18.1179 < 2.2e-16 ***
## RSndSnd         0.00010829  0.00041004   0.2641  0.791702
## NTDegRec        0.35704711  0.02253258  15.8458 < 2.2e-16 ***
## SameConstGroup -0.09860256  0.03604051  -2.7359  0.006221 **
## SndDialog      -0.03747896  0.03662124  -1.0234  0.306109
## RecDialog      -0.00902482  0.03419875  -0.2639  0.791862
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## Residual deviance: 33428.8 on 3792 degrees of freedom
## AIC: 41026.8 BIC: 64742.03
```