# The N400 effect when singular gendered antecedents are co-indexed with (a) *himself* or *herself* (b) *themselves*

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2023-02-10

## Overview

This document contains the code to reproduce the statistical analyses described in Prasad and Morris (2019). You can download the data and the original .Rmd file here.

This document has two sections:

2. Analysis 1: The N400 effect when antecedents are co-indexed with *himself* or *herself*
3. Analysis 2: The N400 effect when antecedents are co-indexed with *themselves*

## Define functions, set parameters and load

Define standard error of mean function

```
sem <- function(x) sd(x)/sqrt(length(x))
```

Before we begin, let's set some general parameters for `ggplot2`. We will set a general theme using the `theme_set()` function. We will use the 'classic' theme which gives us clean white background rather than the default grey with white grid lines. And we will position the legend at the top of the graph rather than at the right side which is the default.

Then we re-order factor levels for *Anteriority* & *Referentiality*

```
## [1] "Frontal"        "FrontoCentral"  "Central"        "CentroParietal"
## [5] "Parietal"
```

```
## [1] "Referential"    "NonReferential"
```

```
## [1] "Frontal"        "FrontoCentral"  "Central"        "CentroParietal"
## [5] "Parietal"
```

```
## [1] "Referential"    "NonReferential"
```

## Analysis 1: The N400 effect when antecedents are co-indexed with *himself* or *herself*

```r
ezANOVA(data = prost_2022_singular
        , dv = diff_score
        , wid = SubjID
        , within = .(Referentiality, Gender_Status, Anteriority)
        , between = Group
        , type = 3
        , return_aov = F
        )
```

```
## $ANOVA
##                                                    Effect DFn DFd          F
## 2                                                   Group   1  36  0.9374869
## 3                                          Referentiality   1  36 12.2247770
## 5                                           Gender_Status   1  36  1.2733561
## 7                                             Anteriority   4 144  2.0606903
## 4                                    Group:Referentiality   1  36  0.6762734
## 6                                     Group:Gender_Status   1  36  0.4610781
## 8                                       Group:Anteriority   4 144  5.1495811
## 9                           Referentiality:Gender_Status   1  36  0.2476607
## 11                            Referentiality:Anteriority   4 144  1.3854470
## 13                             Gender_Status:Anteriority   4 144  2.3525738
## 10            Group:Referentiality:Gender_Status   1  36  5.7351452
## 12              Group:Referentiality:Anteriority   4 144  0.7584705
## 14               Group:Gender_Status:Anteriority   4 144  0.9712661
## 15      Referentiality:Gender_Status:Anteriority   4 144  0.2095779
## 16 Group:Referentiality:Gender_Status:Anteriority   4 144  1.4910541
##             p p<.05          ges
## 2  0.3393852751       0.0061153894
## 3  0.0012717043     * 0.0725639615
## 5  0.2666022045       0.0060391927
## 7  0.0890226513       0.0029742361
## 4  0.4162867596       0.0043096566
## 6  0.5014630657       0.0021952289
## 8  0.0006605669     * 0.0073995058
## 9  0.6217533918       0.0012878955
## 11 0.2419070474       0.0016448157
## 13 0.0567931874       0.0032557088
## 10 0.0219567998     * 0.0289966816
## 12 0.5539661827       0.0009011341
## 14 0.4252771122       0.0013467020
## 15 0.9327769406       0.0001698395
## 16 0.2079557263       0.0012070793
##
## $`Mauchly's Test for Sphericity`
##                                            Effect           W            p
## 7                                     Anteriority 0.006548926 2.246469e-32
## 8                               Group:Anteriority 0.006548926 2.246469e-32
## 11                     Referentiality:Anteriority 0.003281484 2.660831e-37
## 12               Group:Referentiality:Anteriority 0.003281484 2.660831e-37
## 13                      Gender_Status:Anteriority 0.004635292 7.771205e-35
## 14                Group:Gender_Status:Anteriority 0.004635292 7.771205e-35
## 15      Referentiality:Gender_Status:Anteriority 0.021467327 5.607135e-24
## 16 Group:Referentiality:Gender_Status:Anteriority 0.021467327 5.607135e-24
```

```
##     p<.05
## 7       *
## 8       *
## 11      *
## 12      *
## 13      *
## 14      *
## 15      *
## 16      *
##
## $'Sphericity Corrections'
##                                                    Effect       GGe        p[GG]
## 7                                            Anteriority 0.3117498 0.15462251
## 8                                      Group:Anteriority 0.3117498 0.02136772
## 11                         Referentiality:Anteriority 0.3014694 0.25188259
## 12                   Group:Referentiality:Anteriority 0.3014694 0.41205819
## 13                       Gender_Status:Anteriority 0.3071411 0.12683261
## 14                 Group:Gender_Status:Anteriority 0.3071411 0.34769438
## 15       Referentiality:Gender_Status:Anteriority 0.3635434 0.73986510
## 16 Group:Referentiality:Gender_Status:Anteriority 0.3635434 0.23423883
##    p[GG]<.05       HFe       p[HF] p[HF]<.05
## 7            0.3175191 0.15407353
## 8          * 0.3175191 0.02074207         *
## 11           0.3062118 0.25222426
## 12           0.3062118 0.41392595
## 13           0.3124468 0.12615449
## 14           0.3124468 0.34904640
## 15           0.3748964 0.74703892
## 16           0.3748964 0.23426338
```

**Condition Means for Analysis 1**

The N400 effect when antecedents are co-indexed with *himself* or *herself*.

Significant Effects: **Referentiality; Group X Anteriority; Group x Referentiality x Gender Status**

| Referentiality | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|
| Referential | -0.66 | 0.10 | 1.99 | 6.30 | -5.21 |
| NonReferential | 0.36 | 0.09 | 1.74 | 4.79 | -5.06 |

| Anteriority | Group | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|---|
| Frontal | Binary | -0.12 | 0.27 | 2.43 | 6.30 | -5.05 |
| Frontal | NonBinary | -0.31 | 0.25 | 2.15 | 3.88 | -5.21 |
| FrontoCentral | Binary | -0.25 | 0.23 | 2.04 | 4.41 | -4.97 |
| FrontoCentral | NonBinary | -0.21 | 0.22 | 1.87 | 3.47 | -5.13 |
| Central | Binary | -0.39 | 0.21 | 1.87 | 4.39 | -5.12 |
| Central | NonBinary | 0.01 | 0.21 | 1.77 | 4.27 | -4.49 |
| CentroParietal | Binary | -0.38 | 0.21 | 1.84 | 3.93 | -4.73 |
| CentroParietal | NonBinary | 0.15 | 0.21 | 1.74 | 4.44 | -4.67 |
| Parietal | Binary | -0.28 | 0.20 | 1.79 | 4.11 | -5.06 |
| Parietal | NonBinary | 0.36 | 0.20 | 1.72 | 3.76 | -4.75 |

3

| Referentiality | Gender_Status | Group | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|---|---|
| Referential | Gendered | Binary | -1.51 | 0.19 | 1.90 | 4.41 | -5.12 |
| Referential | Gendered | NonBinary | -0.20 | 0.21 | 2.03 | 4.44 | -5.21 |
| Referential | NonGendered | Binary | -0.31 | 0.21 | 2.11 | 6.30 | -5.05 |
| Referential | NonGendered | NonBinary | -0.58 | 0.17 | 1.63 | 3.22 | -4.75 |
| NonReferential | Gendered | Binary | 0.49 | 0.16 | 1.64 | 3.90 | -4.58 |
| NonReferential | Gendered | NonBinary | 0.08 | 0.18 | 1.71 | 3.76 | -3.19 |
| NonReferential | NonGendered | Binary | 0.19 | 0.17 | 1.73 | 4.79 | -5.06 |
| NonReferential | NonGendered | NonBinary | 0.69 | 0.20 | 1.85 | 3.88 | -4.12 |

**Post-hoc tests for Analysis 1: Group x Gender Status x Referentiality**

The following chunk runs post-hoc tests for the 3-way ***"Group x Gender Status x Referentiality"*** Interaction

**Binary Group.** "*Some woman. . . himself*" vs. "*Mary. . . himself*" Binary

```
pander(t.test(diff_score ~ Referentiality
      , filter(prost_2022_singular, (Gender_Status == "Gendered" & Group == "Binary"))
      , paired=TRUE))
```

Table 4: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -7.66 | 99 | 1.275e-11 * * * | two.sided | -2.007 |

"*Someone. . . himself*" vs. "*The participant. . . himself*" Binary

```
pander(t.test(diff_score ~ Referentiality
      , filter(prost_2022_singular, (Gender_Status == "NonGendered" & Group == "Binary"))
      , paired=TRUE))
```

Table 5: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -1.722 | 99 | 0.08825 | two.sided | -0.4954 |

"*The participant. . . himself*" vs. "*Mary. . . himself*" Binary

```
pander(t.test(diff_score ~ Gender_Status
      , filter(prost_2022_singular, (Referentiality == "Referential" & Group == "Binary"))
      , paired=TRUE))
```

Table 6: Paired t-test: `diff_score` by `Gender_Status`

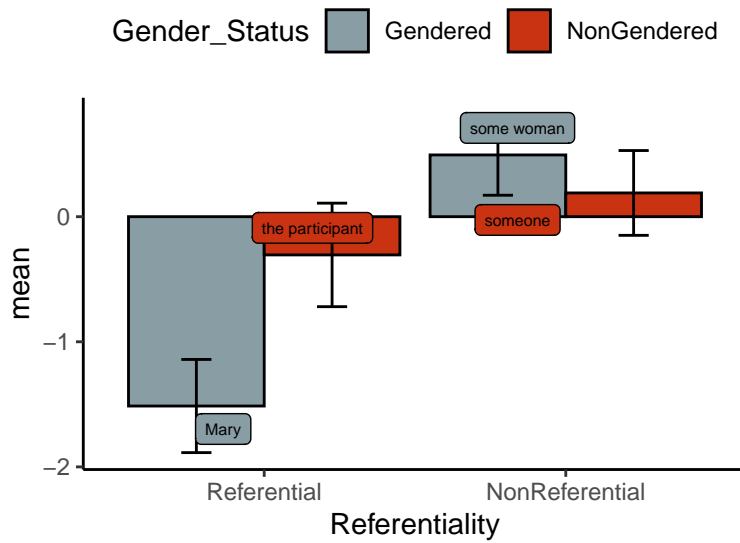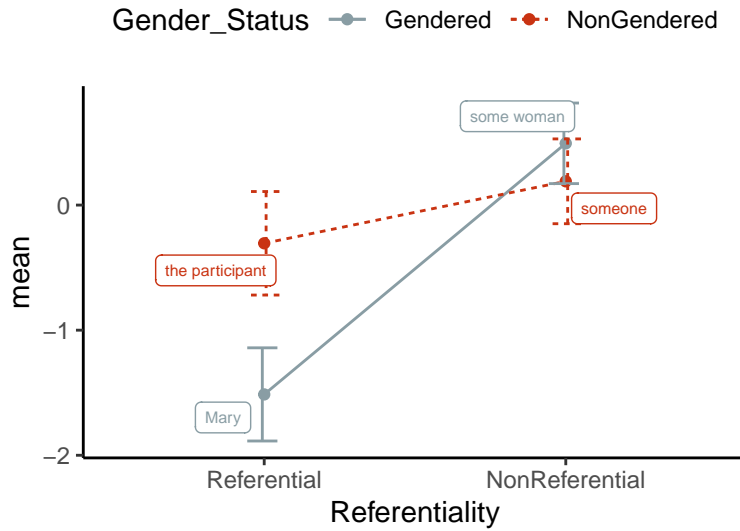| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -4.909 | 99 | 3.612e-06 * * * | two.sided | -1.208 |

*"Someone...himself"* vs. *"Some woman...himself"* Binary

```
pander(t.test(diff_score ~ Gender_Status
    , filter(prost_2022_singular, (Referentiality == "NonReferential" & Group == "Binary"))
    , paired=TRUE))
```

Table 7: Paired t-test: `diff_score` by `Gender_Status`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| 1.248 | 99 | 0.2148 | two.sided | 0.3037 |

**Interaction Plots: Group x Gender Status x Referentiality Binary**

**NonBinary Group.** *"Some woman. . . himself"* vs. *"Mary. . . himself"* NonBinary

```
pander(t.test(diff_score ~ Referentiality
      ,filter(prost_2022_singular, (Gender_Status == "Gendered" & Group == "NonBinary"))
      ,paired=TRUE))
```

Table 8: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|:---:|:---:|:---:|:---:|:---:|
| -1.143 | 89 | 0.2562 | two.sided | -0.279 |

*"Someone. . . himself"* vs. *"The participant. . . himself"* NonBinary

```
pander(t.test(diff_score ~ Referentiality
      , filter(prost_2022_singular, (Gender_Status == "NonGendered" & Group == "NonBinary"))
      , paired=TRUE))
```

Table 9: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|:---:|:---:|:---:|:---:|:---:|
| -5.202 | 89 | 1.251e-06 * * * | two.sided | -1.271 |

*"The participant. . . himself"* vs. *"Mary. . . himself"* NonBinary

```
pander(t.test(diff_score ~ Gender_Status
      , filter(prost_2022_singular, (Referentiality == "Referential" & Group == "NonBinary"))
      , paired=TRUE))
```

Table 10: Paired t-test: `diff_score` by `Gender_Status`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|:---:|:---:|:---:|:---:|:---:|
| 1.354 | 89 | 0.1791 | two.sided | 0.3834 |

"*Someone. . . himself*" vs. "*Some woman. . . himself*" NonBinary

```
pander(t.test(diff_score ~ Gender_Status
      , filter(prost_2022_singular, (Referentiality == "NonReferential" & Group == "NonBinary"))
      , paired=TRUE))
```

Table 11: Paired t-test: `diff_score` by `Gender_Status`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|:---:|:---:|:---:|:---:|:---:|
| -2.792 | 89 | 0.006407 * * | two.sided | -0.6082 |

**Interaction Plots: Group x Gender Status x Referentiality NonBinary**
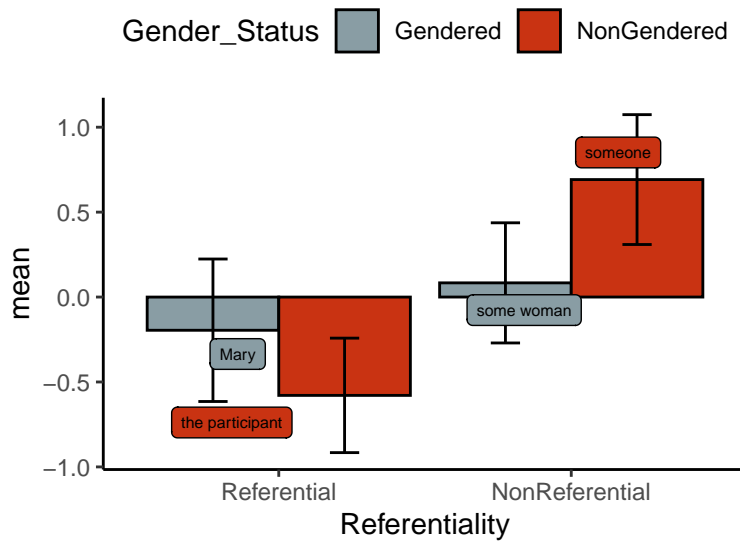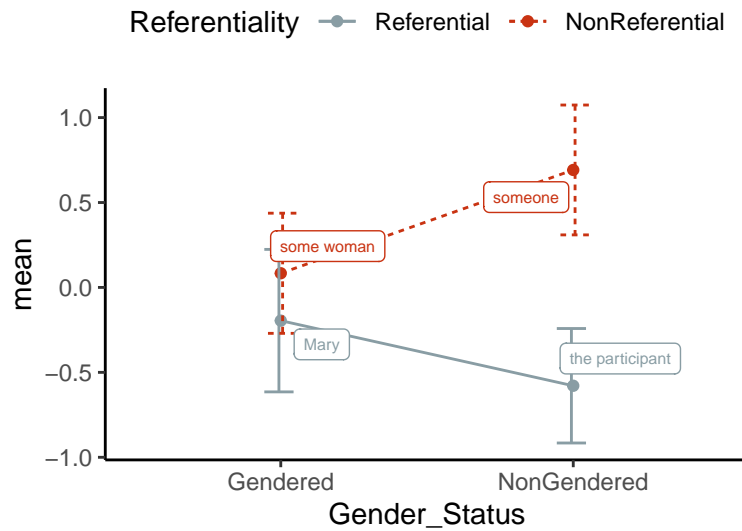
**Post-hoc tests for Analysis 1: Group x Anteriority**

The following chunk runs post-hoc tests for the 2-way *"Group x Anteriority"* Interaction

```
# Binary vs Non-Binary Frontal

pander(t.test(diff_score ~ Group
       ,dplyr::filter(prost_2022_singular, (Anteriority == "Frontal"))
       ,paired=FALSE))
```

Table 12: Welch Two Sample t-test: `diff_score` by `Group` (continued below)

| Test statistic | df | P value | Alternative hypothesis | mean in group Binary |
|:---:|:---:|:---:|:---:|:---:|
| 0.5115 | 150 | 0.6097 | two.sided | -0.12 |

| mean in group NonBinary |
|:---:|
| -0.3102 |

```
# Binary vs Non-Binary FrontoCentral

pander(t.test(diff_score ~ Group
       ,dplyr::filter(prost_2022_singular, (Anteriority == "FrontoCentral"))
       ,paired=FALSE))
```

Table 14: Welch Two Sample t-test: `diff_score` by `Group` (continued below)

| Test statistic | df | P value | Alternative hypothesis |
|---|---|---|---|
| -0.1109 | 149.9 | 0.9119 | two.sided |

| mean in group Binary | mean in group NonBinary |
|---|---|
| -0.2496 | -0.2145 |

```
# Binary vs Non-Binary Central

pander(t.test(diff_score ~ Group
       ,dplyr::filter(prost_2022_singular, (Anteriority == "Central"))
       ,paired=FALSE))
```

Table 16: Welch Two Sample t-test: `diff_score` by `Group` (continued below)

| Test statistic | df | P value | Alternative hypothesis |
|---|---|---|---|
| -1.359 | 149.7 | 0.1761 | two.sided |

| mean in group Binary | mean in group NonBinary |
|---|---|
| -0.3873 | 0.01419 |

```
# Binary vs Non-Binary CentroParietal

pander(t.test(diff_score ~ Group
       ,dplyr::filter(prost_2022_singular, (Anteriority == "CentroParietal"))
       ,paired=FALSE))
```

Table 18: Welch Two Sample t-test: `diff_score` by `Group` (continued below)

| Test statistic | df | P value | Alternative hypothesis |
|---|---|---|---|
| -1.853 | 149.6 | 0.06587 | two.sided |

| mean in group Binary | mean in group NonBinary |
|---|---|
| -0.3836 | 0.1546 |

```
# Binary vs Non-Binary Parietal

pander(t.test(diff_score ~ Group
       ,dplyr::filter(prost_2022_singular, (Anteriority == "Parietal"))
       ,paired=FALSE))
```

| Test statistic | df | P value | Alternative hypothesis |
|---|---|---|---|
| -2.229 | 149.3 | 0.02728 * | two.sided |

| mean in group Binary | mean in group NonBinary |
|---|---|
| -0.279 | 0.3568 |

**Interaction Plot: Group x Anteriority**
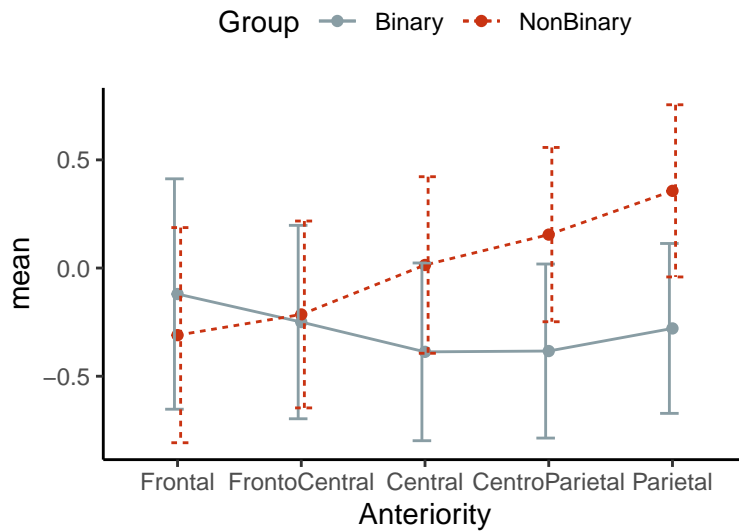


**Analysis 2: The N400 effect when antecedents are co-indexed with *themselves***

```r
ezANOVA(data = prost_2022_plural
        , dv = diff_score
        , wid = SubjID
        , within = .(Referentiality, Gender_Status, Anteriority)
        , between = Group
        , type = 3
        , return_aov = F
        )
```

```
## $ANOVA
##                        Effect DFn DFd          F         p
## 2                       Group   1  36 0.238003158 0.6286102
## 3              Referentiality   1  36 0.006154688 0.9379031
## 5                Gender_Status   1  36 0.097418428 0.7567506
```

```
## 7                                           Anteriority 4 144 1.400145919 0.2369032
## 4                               Group:Referentiality 1  36 0.007236331 0.9326798
## 6                                Group:Gender_Status 1  36 0.007002636 0.9337731
## 8                                   Group:Anteriority 4 144 0.052760330 0.9947472
## 9                        Referentiality:Gender_Status 1  36 2.379600770 0.1316746
## 11                          Referentiality:Anteriority 4 144 1.192347966 0.3167516
## 13                              Gender_Status:Anteriority 4 144 0.867672469 0.4850282
## 10           Group:Referentiality:Gender_Status 1  36 0.046873525 0.8298179
## 12              Group:Referentiality:Anteriority 4 144 0.043204326 0.9964316
## 14               Group:Gender_Status:Anteriority 4 144 1.904147481 0.1128999
## 15      Referentiality:Gender_Status:Anteriority 4 144 0.632964163 0.6397719
## 16 Group:Referentiality:Gender_Status:Anteriority 4 144 0.102769696 0.9813708
##    p<.05          ges
## 2          1.997832e-03
## 3          3.485373e-05
## 5          4.305791e-04
## 7          9.550056e-04
## 4          4.097878e-05
## 6          3.096328e-05
## 8          3.601964e-05
## 9          1.303825e-02
## 11         1.299619e-03
## 13         8.881270e-04
## 10         2.601535e-04
## 12         4.715031e-05
## 14         1.946970e-03
## 15         5.894000e-04
## 16         9.574378e-05
##
## $`Mauchly's Test for Sphericity`
##                                           Effect           W            p
## 7                                     Anteriority 0.016789812 1.045004e-25
## 8                               Group:Anteriority 0.016789812 1.045004e-25
## 11                      Referentiality:Anteriority 0.003911051 4.769720e-36
## 12           Group:Referentiality:Anteriority 0.003911051 4.769720e-36
## 13                          Gender_Status:Anteriority 0.003122257 1.173632e-37
## 14               Group:Gender_Status:Anteriority 0.003122257 1.173632e-37
## 15      Referentiality:Gender_Status:Anteriority 0.019213046 9.302422e-25
## 16 Group:Referentiality:Gender_Status:Anteriority 0.019213046 9.302422e-25
##    p<.05
## 7      *
## 8      *
## 11     *
## 12     *
## 13     *
## 14     *
## 15     *
## 16     *
##
## $`Sphericity Corrections`
##                                           Effect      GGe      p[GG] p[GG]<.05
## 7                                     Anteriority 0.3526937 0.2517930
## 8                               Group:Anteriority 0.3526937 0.8942407
## 11                      Referentiality:Anteriority 0.3044471 0.2917829
```

```
## 12                Group:Referentiality:Anteriority 0.3044471 0.8798835
## 13                    Gender_Status:Anteriority 0.3064638 0.3780187
## 14              Group:Gender_Status:Anteriority 0.3064638 0.1731027
## 15        Referentiality:Gender_Status:Anteriority 0.3644889 0.4868838
## 16 Group:Referentiality:Gender_Status:Anteriority 0.3644889 0.8404737
##        HFe     p[HF] p[HF]<.05
## 7  0.3628201 0.2521395
## 8  0.3628201 0.8995014
## 11 0.3094842 0.2925234
## 12 0.3094842 0.8832019
## 13 0.3117017 0.3796759
## 14 0.3117017 0.1727463
## 15 0.3759502 0.4914678
## 16 0.3759502 0.8471746
```

**Interaction Plots for Analysis 2 Gender Status by Referentiality Interaction**

**Binary Group**
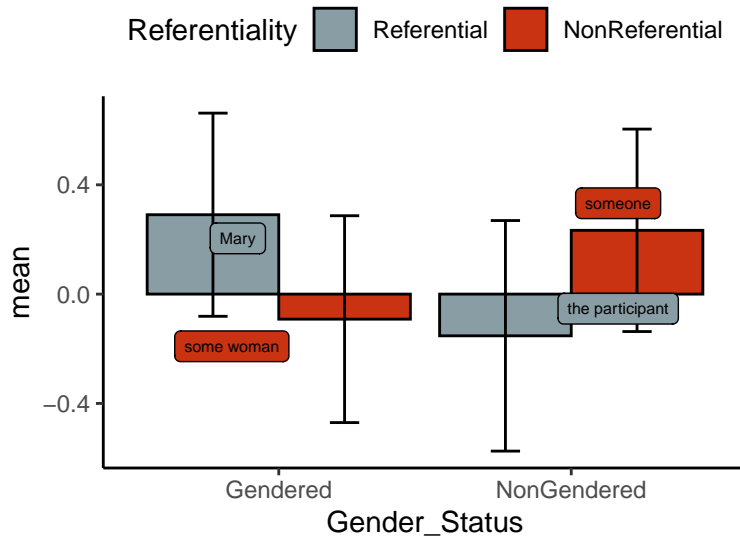
# The P600 effect when singular gendered antecedents are co-indexed with (a) *himself* or *herself* (b) *themselves*

Joanna Morris

2023-02-02

## Define functions, set parameters and load

Define standard error of mean function

```
sem <- function(x) sd(x)/sqrt(length(x))
```

Before we begin, let's set some general parameters for `ggplot2`. We will set a general theme using the `theme_set()` function. We will use the 'classic' theme which gives us clean white background rather than the default grey with white grid lines. And we will position the legend at the top of the graph rather than at the right side which is the default.

Then we re-order factor levels for *Referentiality*

```
## [1] "Referential"    "NonReferential"
```

```
## [1] "Referential"    "NonReferential"
```

## Analysis 1: The P600 effect when antecedents are co-indexed with *himself* or *herself*

```
ezANOVA(data = prost_2022_singular
         , dv = diff_score
         , wid = SubjID
         , within = .(Referentiality, Gender_Status)
         , between = Group
         , type = 3
         , return_aov = F
         )
```

```
## $ANOVA
##                         Effect DFn DFd          F            p p<.05
## 2                        Group   1  36  2.6476957 1.124226e-01
## 3               Referentiality   1  36 24.2580517 1.887572e-05     *
## 5                Gender_Status   1  36  2.1030534 1.556627e-01
## 4         Group:Referentiality   1  36  0.2741019 6.038016e-01
## 6        Group:Gender_Status   1  36  0.2164015 6.445974e-01
```

```
## 7        Referentiality:Gender_Status    1  36  5.1551114 2.926166e-02     *
## 8 Group:Referentiality:Gender_Status    1  36  2.0276871 1.630661e-01
##           ges
## 2 0.016408837
## 3 0.165071951
## 5 0.016550569
## 4 0.002229006
## 6 0.001728699
## 7 0.026715413
## 8 0.010681228
```

**Condition Means for Analysis 1**

The N400 effect when antecedents are co-indexed with *himself* or *herself*.

Significant Effects: **Referentiality; Group x Referentiality x Gender Status**

| Referentiality | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|
| Referential | -0.34 | 0.16 | 1.42 | 4.15 | -4.41 |
| NonReferential | 1.03 | 0.20 | 1.78 | 6.52 | -3.33 |

| Group | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|
| Binary | 0.16 | 0.2 | 1.75 | 5.10 | -4.41 |
| NonBinary | 0.56 | 0.2 | 1.73 | 6.52 | -2.63 |

| Referentiality | Gender_Status | Group | Mean | SE | SD | Max | Min |
|---|---|---|---|---|---|---|---|
| Referential | Gendered | Binary | -0.74 | 0.41 | 1.85 | 4.15 | -4.41 |
| Referential | Gendered | NonBinary | -0.04 | 0.31 | 1.31 | 2.48 | -2.04 |
| Referential | NonGendered | Binary | -0.18 | 0.27 | 1.19 | 2.54 | -2.15 |
| Referential | NonGendered | NonBinary | -0.37 | 0.28 | 1.21 | 1.73 | -2.50 |
| NonReferential | Gendered | Binary | 1.32 | 0.40 | 1.77 | 5.10 | -1.66 |
| NonReferential | Gendered | NonBinary | 1.67 | 0.46 | 1.94 | 6.52 | -0.59 |
| NonReferential | NonGendered | Binary | 0.22 | 0.34 | 1.54 | 4.02 | -3.33 |
| NonReferential | NonGendered | NonBinary | 0.95 | 0.39 | 1.66 | 3.40 | -2.63 |

**Post-hoc tests for Analysis 1: Group x Gender Status x Referentiality**

The following chunk runs post-hoc tests for the 3-way ***"Group x Gender Status x Referentiality"*** Interaction

"Some woman. . . himself" vs. "Mary. . . himself"

Table 4: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -4.833 | 37 | 2.36e-05 * * * | two.sided | -1.893 |

"Someone. . . himself" vs. "The participant. . . himself"

Table 5: Paired t-test: `diff_score` by `Referentiality`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -2.614 | 37 | 0.01286 * | two.sided | -0.8365 |

"The participant...himself" vs. "Mary...himself"

Table 6: Paired t-test: `diff_score` by `Gender_Status`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| -0.3661 | 37 | 0.7164 | two.sided | -0.1346 |

"Someone...himself" vs. "Some woman...himself"

Table 7: Paired t-test: `diff_score` by `Gender_Status`

| Test statistic | df | P value | Alternative hypothesis | mean difference |
|---|---|---|---|---|
| 2.688 | 37 | 0.01071 * | two.sided | 0.9219 |

**Interaction Plots: Gender Status x Referentiality *himself***
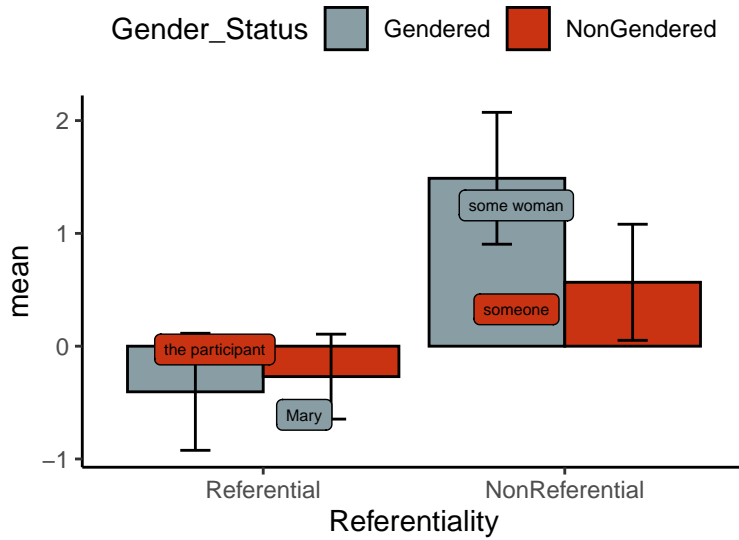


Interaction broken down by Group *Binary* vs *Non-Binary*
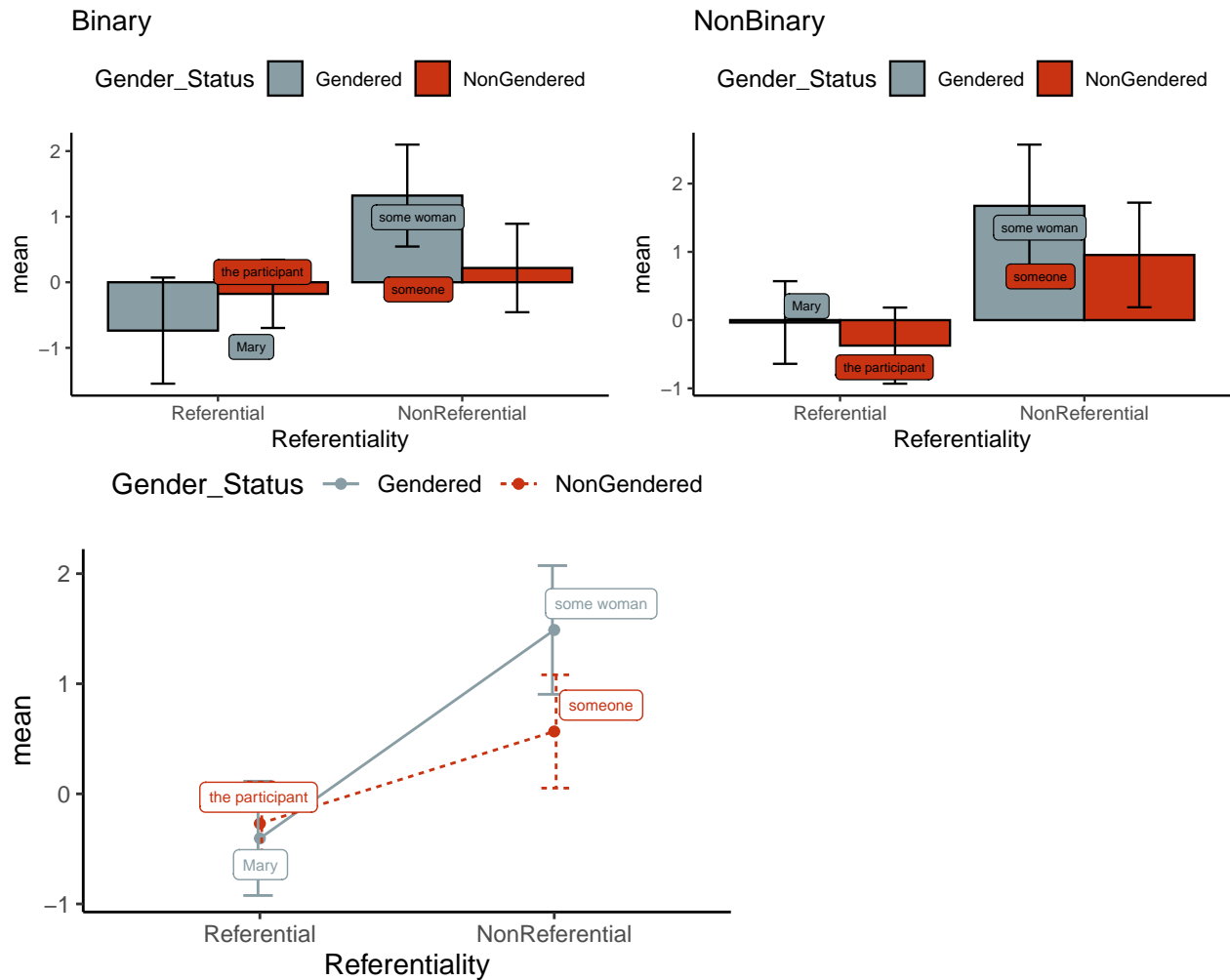
## Analysis 2: The P600 effect when antecedents are co-indexed with *themselves*

```
ezANOVA(data = prost_2022_plural
        , dv = diff_score
        , wid = SubjID
        , within = .(Referentiality, Gender_Status)
        , between = Group
        , type = 3
        , return_aov = F
        )
```

```
## $ANOVA
##                              Effect DFn DFd            F          p p<.05
## 2                             Group   1  36 0.0053411590 0.94214444
## 3                    Referentiality   1  36 5.2198710296 0.02832801     *
## 5                     Gender_Status   1  36 0.5605028582 0.45892150
## 4              Group:Referentiality   1  36 0.0000511147 0.99433508
## 6              Group:Gender_Status   1  36 0.0456034989 0.83210302
## 7     Referentiality:Gender_Status   1  36 5.0012917068 0.03161659     *
```
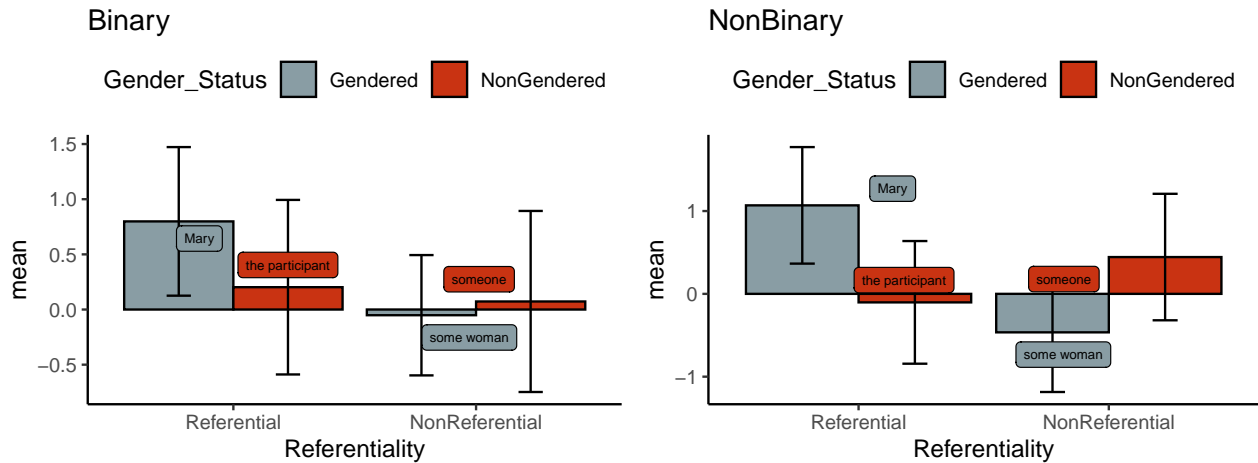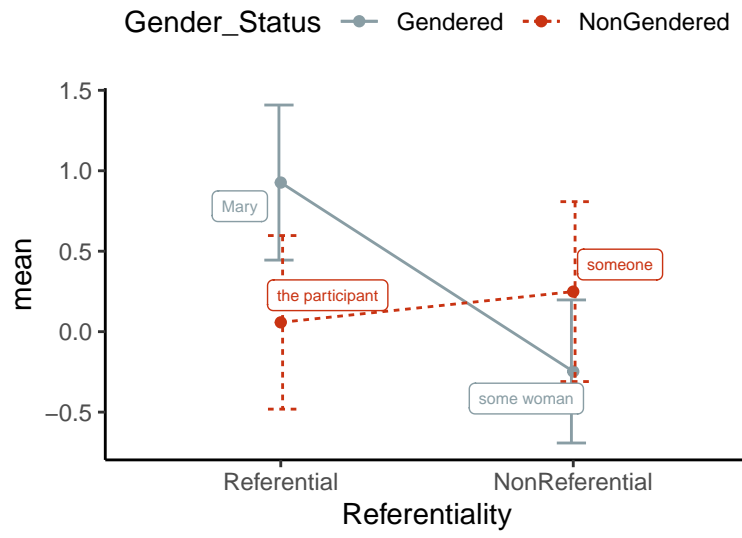
```
## 8 Group:Referentiality:Gender_Status   1  36 1.1780250752 0.28497330
##             ges
## 2 3.760513e-05
## 3 2.392545e-02
## 5 3.402687e-03
## 4 2.400287e-07
## 6 2.777167e-04
## 7 4.740160e-02
## 8 1.158497e-02
```
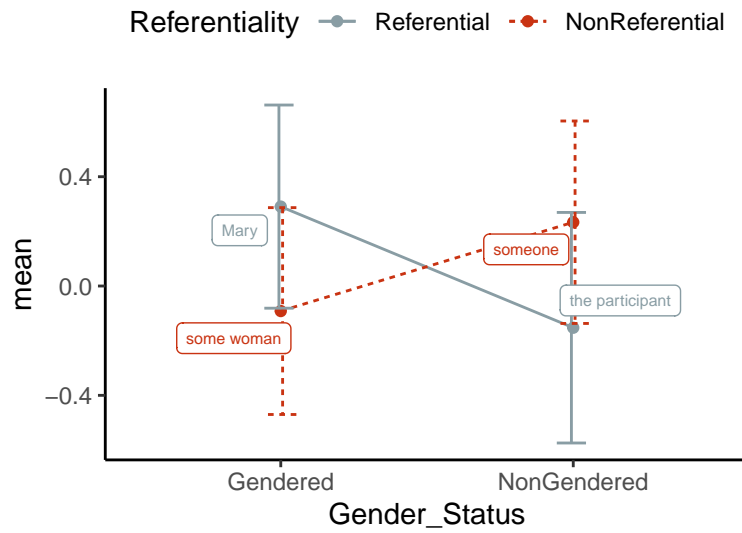
**Interaction Plots: Gender Status by Referentiality** *themselves*
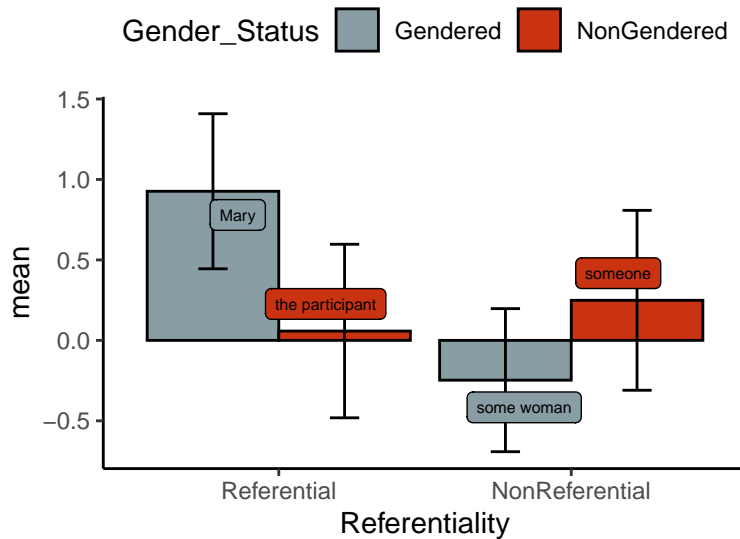


Interaction broken down by Group *Binary* vs *Non-Binary*

**NonBinary Group.**