coling2024_loess_curves

Amber Converse

2024-09-11

```
## # A tibble: 5 x 5
##   lang                               mean    sd median   IQR
##   <ord>                             <dbl> <dbl>  <dbl> <dbl>
## 1 en_general_rarity                 0.304 0.161  0.273 0.167
## 2 es_en_DEEP_general_rarity         0.289 0.160  0.258 0.156
## 3 es_en_DEEPL_general_rarity        0.293 0.161  0.269 0.161
## 4 es_en_GOOGLE_general_rarity       0.292 0.159  0.261 0.156
## 5 es_en_TRANSFORMERS_general_rarity 0.294 0.161  0.267 0.165
```

```
## # A tibble: 5 x 5
##   lang                               mean    sd median   IQR
##   <ord>                             <dbl> <dbl>  <dbl> <dbl>
## 1 en_general_rarity                 0.304 0.161  0.273 0.167
## 2 ar_en_DEEP_general_rarity         0.296 0.163  0.264 0.171
## 3 ar_en_DEEPL_general_rarity        0.300 0.164  0.273 0.164
## 4 ar_en_GOOGLE_general_rarity       0.299 0.163  0.267 0.168
## 5 ar_en_TRANSFORMERS_general_rarity 0.292 0.160  0.267 0.161
```

```
## # A tibble: 5 x 5
##   lang                              mean    sd median    IQR
##   <ord>                            <dbl> <dbl>  <dbl>  <dbl>
## 1 en_genre_rarity                 0.0806 0.113 0.0462 0.111
## 2 es_en_DEEP_genre_rarity         0.0709 0.109 0.0357 0.0952
## 3 es_en_DEEPL_genre_rarity        0.0726 0.108 0.0377 0.1
## 4 es_en_GOOGLE_genre_rarity       0.0737 0.110 0.0392 0.1
## 5 es_en_TRANSFORMERS_genre_rarity 0.0700 0.109 0.0345 0.0909
```

```
## # A tibble: 5 x 5
##   lang                              mean    sd median    IQR
##   <ord>                            <dbl> <dbl>  <dbl>  <dbl>
## 1 en_genre_rarity                 0.0806 0.113 0.0462 0.111
## 2 ar_en_DEEP_genre_rarity         0.0685 0.107 0.0345 0.0909
## 3 ar_en_DEEPL_genre_rarity        0.0764 0.119 0.04   0.1
## 4 ar_en_GOOGLE_genre_rarity       0.0700 0.108 0.0357 0.0952
## 5 ar_en_TRANSFORMERS_genre_rarity 0.0655 0.106 0.0294 0.0909
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  general_es_df$rarity and general_es_df$lang
##
##                                 en_general_rarity es_en_DEEP_general_rarity
## es_en_DEEP_general_rarity       < 2e-16           -
## es_en_DEEPL_general_rarity      1.4e-09           0.0096
## es_en_GOOGLE_general_rarity     8.5e-13           0.1246
```

```
## es_en_TRANSFORMERS_general_rarity 1.2e-09           0.0111
##                                   es_en_DEEPL_general_rarity
## es_en_DEEP_general_rarity         -
## es_en_DEEPL_general_rarity        -
## es_en_GOOGLE_general_rarity       0.3216
## es_en_TRANSFORMERS_general_rarity 0.9326
##                                   es_en_GOOGLE_general_rarity
## es_en_DEEP_general_rarity         -
## es_en_DEEPL_general_rarity        -
## es_en_GOOGLE_general_rarity       -
## es_en_TRANSFORMERS_general_rarity 0.3372
##
## P value adjustment method: BH
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  general_ar_df$rarity and general_ar_df$lang
##
##                                   en_general_rarity ar_en_DEEP_general_rarity
## ar_en_DEEP_general_rarity         1.4e-06           -
## ar_en_DEEPL_general_rarity        0.02199           0.01092
## ar_en_GOOGLE_general_rarity       0.00047           0.18930
## ar_en_TRANSFORMERS_general_rarity 5.3e-10           0.20094
##                                   ar_en_DEEPL_general_rarity
## ar_en_DEEP_general_rarity         -
## ar_en_DEEPL_general_rarity        -
## ar_en_GOOGLE_general_rarity       0.18930
## ar_en_TRANSFORMERS_general_rarity 0.00012
##                                   ar_en_GOOGLE_general_rarity
## ar_en_DEEP_general_rarity         -
## ar_en_DEEPL_general_rarity        -
## ar_en_GOOGLE_general_rarity       -
## ar_en_TRANSFORMERS_general_rarity 0.01174
##
## P value adjustment method: BH
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  genre_es_df$rarity and genre_es_df$lang
##
##                                  en_genre_rarity es_en_DEEP_genre_rarity
## es_en_DEEP_genre_rarity          < 2e-16         -
## es_en_DEEPL_genre_rarity         9.1e-13         0.1260
## es_en_GOOGLE_genre_rarity        5.3e-10         0.0115
## es_en_TRANSFORMERS_genre_rarity < 2e-16          0.1331
##                                  es_en_DEEPL_genre_rarity
## es_en_DEEP_genre_rarity          -
## es_en_DEEPL_genre_rarity         -
## es_en_GOOGLE_genre_rarity        0.3198
## es_en_TRANSFORMERS_genre_rarity 0.0025
##                                  es_en_GOOGLE_genre_rarity
## es_en_DEEP_genre_rarity          -
## es_en_DEEPL_genre_rarity         -
```

```
## es_en_GOOGLE_genre_rarity       -
## es_en_TRANSFORMERS_genre_rarity 5.6e-05
##
## P value adjustment method: BH
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  genre_ar_df$rarity and genre_ar_df$lang
##
##                                 en_genre_rarity ar_en_DEEP_genre_rarity
## ar_en_DEEP_genre_rarity         < 2e-16         -
## ar_en_DEEPL_genre_rarity        3.7e-09         2.2e-06
## ar_en_GOOGLE_genre_rarity       < 2e-16         0.0922
## ar_en_TRANSFORMERS_genre_rarity < 2e-16         2.4e-05
##                                 ar_en_DEEPL_genre_rarity
## ar_en_DEEP_genre_rarity         -
## ar_en_DEEPL_genre_rarity        -
## ar_en_GOOGLE_genre_rarity       0.0017
## ar_en_TRANSFORMERS_genre_rarity < 2e-16
##                                 ar_en_GOOGLE_genre_rarity
## ar_en_DEEP_genre_rarity         -
## ar_en_DEEPL_genre_rarity        -
## ar_en_GOOGLE_genre_rarity       -
## ar_en_TRANSFORMERS_genre_rarity 4.9e-09
##
## P value adjustment method: BH
```

Summary of Significance Wilcox Pairwise Test on Rarity:\ General: es->en Deep < en ($p < 0.0001$) es->en DeepL < en ($p < 0.0001$) es->en GT < en ($p < 0.0001$) es->en OPUS < en ($p < 0.00001$)

ar->en Deep < en ($p < 0.0001$) ar->en DeepL < en ($p < 0.03$) ar->en GT < en ($p < 0.001$) ar->en OPUS < en ($p < 0.0001$)

Genre: es->en Deep < en ($p < 0.0001$) es->en DeepL < en ($p < 0.0001$) es->en GT < en ($p < 0.0001$) es->en OPUS < en ($p < 0.00001$)

ar->en Deep < en ($p < 0.0001$) ar->en DeepL < en ($p < 0.0001$) ar->en GT < en ($p < 0.0001$) ar->en OPUS < en ($p < 0.0001$)

```
## # A tibble: 5 x 5
##   lang                              mean    sd median   IQR
##   <ord>                            <dbl> <dbl>  <dbl> <dbl>
## 1 es_general_rarity                0.316 0.144  0.288 0.133
## 2 en_es_DEEP_general_rarity        0.323 0.147  0.3   0.139
## 3 en_es_DEEPL_general_rarity       0.325 0.149  0.303 0.138
## 4 en_es_GOOGLE_general_rarity      0.324 0.146  0.3   0.137
## 5 en_es_TRANSFORMERS_general_rarity 0.316 0.146  0.289 0.133
```

```
## # A tibble: 5 x 5
##   lang                              mean    sd median   IQR
##   <ord>                            <dbl> <dbl>  <dbl> <dbl>
## 1 es_genre_rarity                 0.0974 0.117 0.0698 0.108
## 2 en_es_DEEP_genre_rarity         0.0966 0.118 0.0667 0.111
## 3 en_es_DEEPL_genre_rarity        0.100  0.120 0.0704 0.113
## 4 en_es_GOOGLE_genre_rarity       0.0977 0.118 0.0682 0.113
## 5 en_es_TRANSFORMERS_genre_rarity 0.0910 0.116 0.0606 0.122
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  general_df$rarity and general_df$lang
##
##                                  es_general_rarity en_es_DEEP_general_rarity
## en_es_DEEP_general_rarity        1.3e-06           -
## en_es_DEEPL_general_rarity       1.6e-08           0.48
## en_es_GOOGLE_general_rarity      1.6e-08           0.46
## en_es_TRANSFORMERS_general_rarity 0.97             1.9e-06
##                                  en_es_DEEPL_general_rarity
## en_es_DEEP_general_rarity        -
## en_es_DEEPL_general_rarity       -
## en_es_GOOGLE_general_rarity      0.97
## en_es_TRANSFORMERS_general_rarity 2.2e-08
##                                  en_es_GOOGLE_general_rarity
## en_es_DEEP_general_rarity        -
## en_es_DEEPL_general_rarity       -
## en_es_GOOGLE_general_rarity      -
## en_es_TRANSFORMERS_general_rarity 1.6e-08
##
## P value adjustment method: BH
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  genre_df$rarity and genre_df$lang
##
##                                 es_genre_rarity en_es_DEEP_genre_rarity
## en_es_DEEP_genre_rarity         0.067           -
## en_es_DEEPL_genre_rarity        0.582           0.021
## en_es_GOOGLE_genre_rarity       0.274           0.474
## en_es_TRANSFORMERS_genre_rarity 4.1e-12         1.5e-06
##                                 en_es_DEEPL_genre_rarity
## en_es_DEEP_genre_rarity         -
## en_es_DEEPL_genre_rarity        -
## en_es_GOOGLE_genre_rarity       0.114
## en_es_TRANSFORMERS_genre_rarity 4.9e-13
##                                 en_es_GOOGLE_genre_rarity
## en_es_DEEP_genre_rarity         -
## en_es_DEEPL_genre_rarity        -
## en_es_GOOGLE_genre_rarity       -
## en_es_TRANSFORMERS_genre_rarity 2.6e-08
##
## P value adjustment method: BH
```

General: en->es Deep > es ($p < 0.0001$) en->es DeepL > es ($p < 0.0001$) en->es GT > es ($p < 0.0001$) en->es OPUS > es NOT SIGNIFICANT ($p>0.9$!!!)

Genre: en->es Deep > es NOT SIGNIFICANT en->es DeepL > es NOT SIGNIFICANT en->es GT > es NOT SIGNIFICANT en->es OPUS < es ($p < 0.0001$)

```
## # A tibble: 5 x 5
##   lang                              mean    sd median   IQR
##   <ord>                            <dbl> <dbl>  <dbl> <dbl>
## 1 ar_general_rarity                0.594 0.155  0.585 0.184
```

```
## 2 en_ar_DEEP_general_rarity         0.579 0.159  0.571 0.188
## 3 en_ar_DEEPL_general_rarity        0.575 0.161  0.571 0.196
## 4 en_ar_GOOGLE_general_rarity       0.579 0.158  0.571 0.185
## 5 en_ar_TRANSFORMERS_general_rarity 0.586 0.159  0.581 0.188
```

```
## # A tibble: 5 x 5
##   lang                            mean    sd median   IQR
##   <ord>                          <dbl> <dbl>  <dbl> <dbl>
## 1 ar_genre_rarity                0.249 0.166  0.222 0.196
## 2 en_ar_DEEP_genre_rarity        0.221 0.164  0.2   0.189
## 3 en_ar_DEEPL_genre_rarity       0.223 0.164  0.2   0.189
## 4 en_ar_GOOGLE_genre_rarity      0.220 0.163  0.194 0.186
## 5 en_ar_TRANSFORMERS_genre_rarity 0.224 0.164  0.2   0.193
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  general_df$rarity and general_df$lang
##
##                                  ar_general_rarity en_ar_DEEP_general_rarity
## en_ar_DEEP_general_rarity        2.6e-12           -
## en_ar_DEEPL_general_rarity       3.6e-16           0.2035
## en_ar_GOOGLE_general_rarity      2.6e-12           0.9568
## en_ar_TRANSFORMERS_general_rarity 0.0016           0.0002
##                                  en_ar_DEEPL_general_rarity
## en_ar_DEEP_general_rarity        -
## en_ar_DEEPL_general_rarity       -
## en_ar_GOOGLE_general_rarity      0.2035
## en_ar_TRANSFORMERS_general_rarity 6.7e-07
##                                  en_ar_GOOGLE_general_rarity
## en_ar_DEEP_general_rarity        -
## en_ar_DEEPL_general_rarity       -
## en_ar_GOOGLE_general_rarity      -
## en_ar_TRANSFORMERS_general_rarity 0.0002
##
## P value adjustment method: BH
```

```
##
##  Pairwise comparisons using Wilcoxon rank sum test with continuity correction
##
## data:  genre_df$rarity and genre_df$lang
##
##                                 ar_genre_rarity en_ar_DEEP_genre_rarity
## en_ar_DEEP_genre_rarity         <2e-16          -
## en_ar_DEEPL_genre_rarity        <2e-16          0.52
## en_ar_GOOGLE_genre_rarity       <2e-16          0.55
## en_ar_TRANSFORMERS_genre_rarity <2e-16          0.30
##                                 en_ar_DEEPL_genre_rarity
## en_ar_DEEP_genre_rarity         -
## en_ar_DEEPL_genre_rarity        -
## en_ar_GOOGLE_genre_rarity       0.23
## en_ar_TRANSFORMERS_genre_rarity 0.67
##                                 en_ar_GOOGLE_genre_rarity
## en_ar_DEEP_genre_rarity         -
## en_ar_DEEPL_genre_rarity        -
```

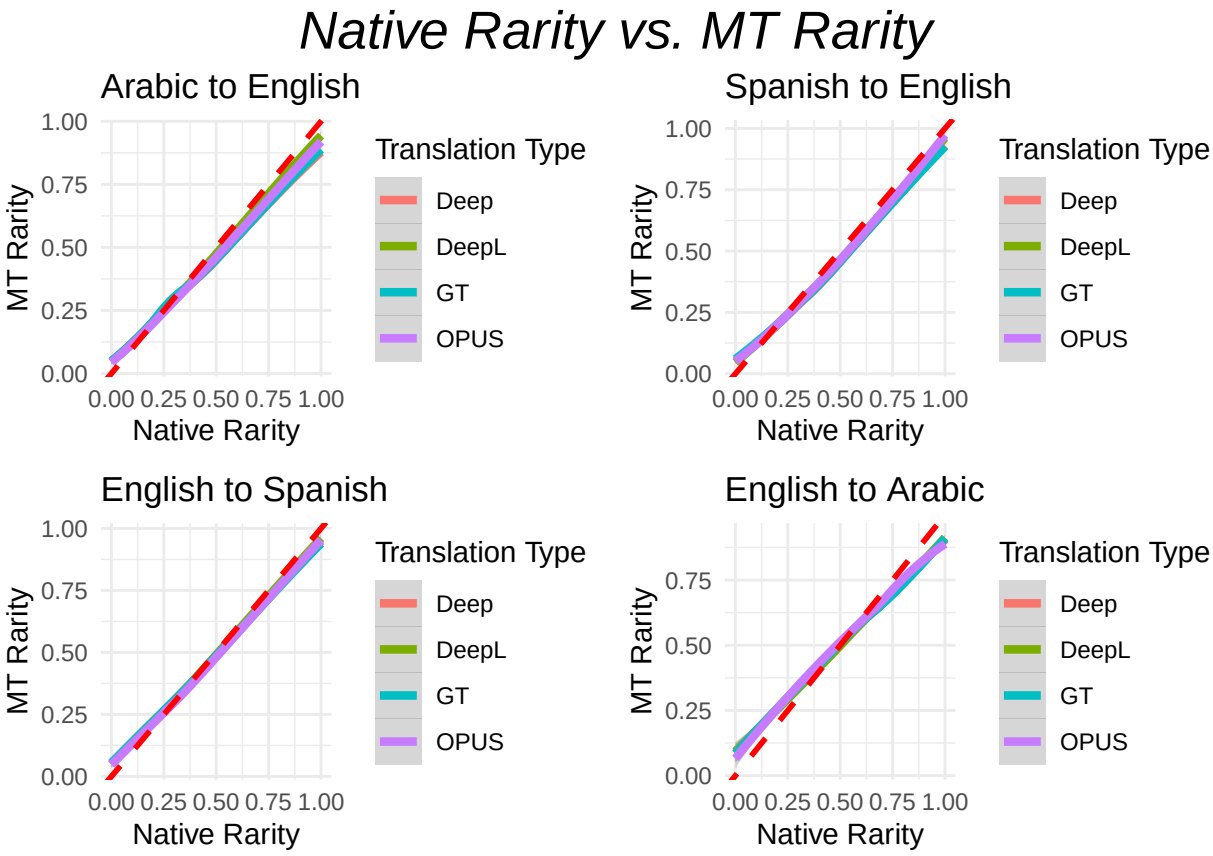
```
## en_ar_GOOGLE_genre_rarity       -
## en_ar_TRANSFORMERS_genre_rarity 0.11
##
## P value adjustment method: BH
```

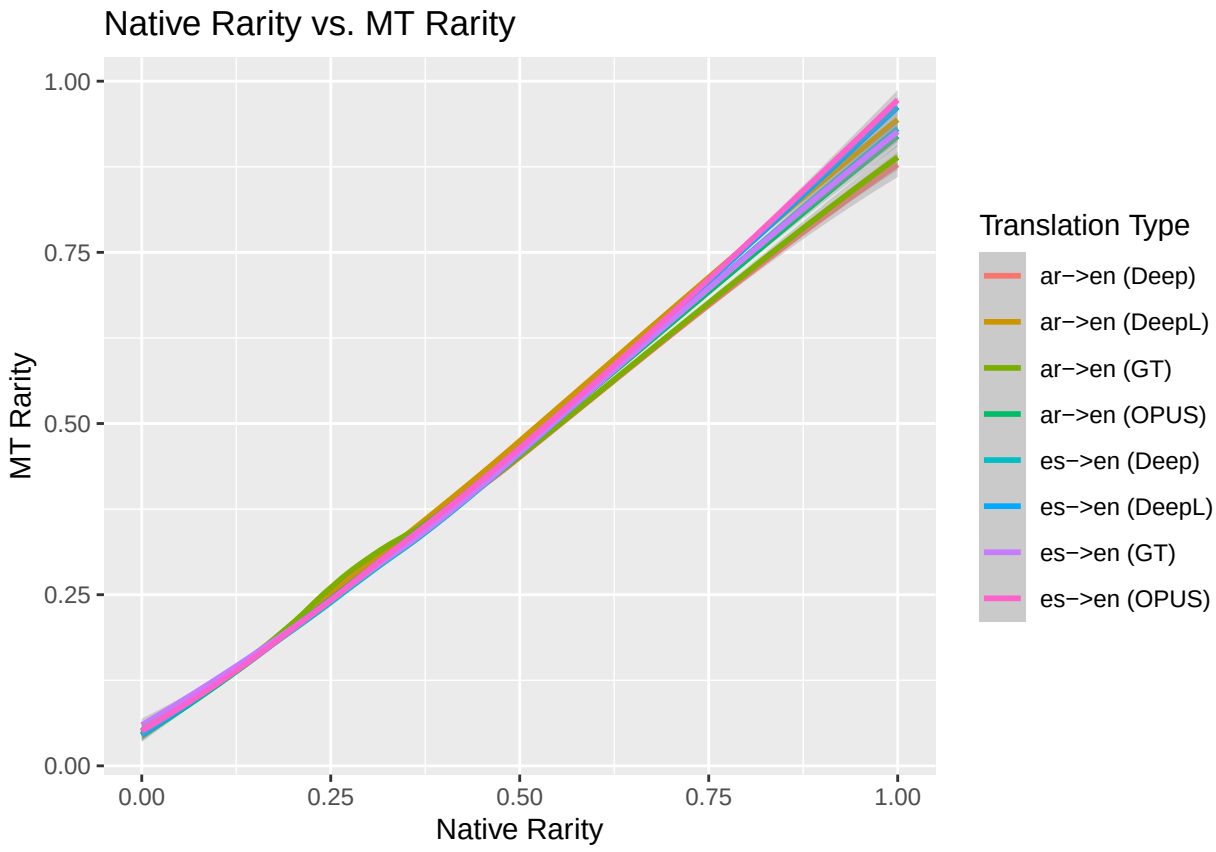
General: en->ar Deep < ar ($p < 0.0001$) en->ar DeepL < ar ($p < 0.0001$) en->ar GT < ar ($p < 0.0001$) en->ar OPUS < ar ($p < 0.002$)

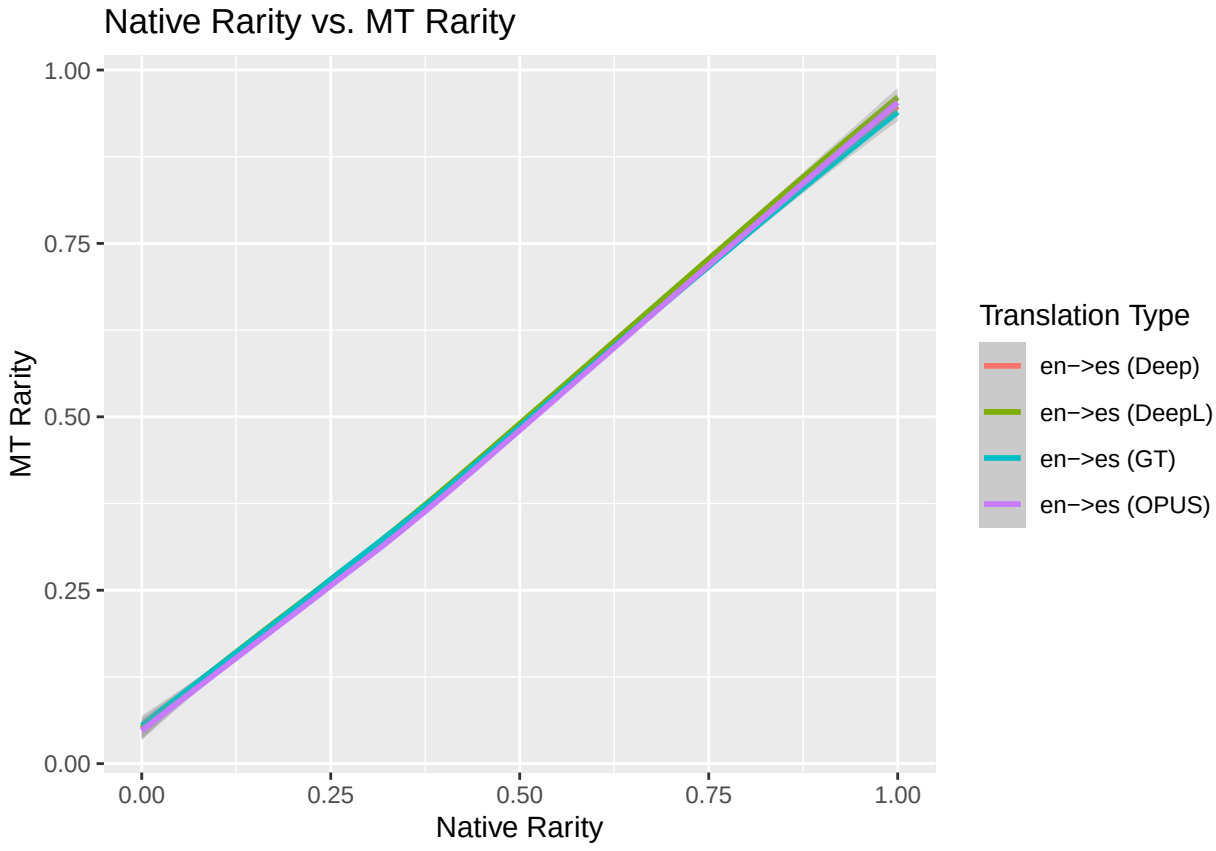
Genre: en->ar Deep < ar ($p < 0.0001$) en->ar DeepL < ar ($p < 0.0001$) en->ar GT < ar ($p < 0.0001$) en->ar OPUS < ar ($p < 0.0001$)

```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

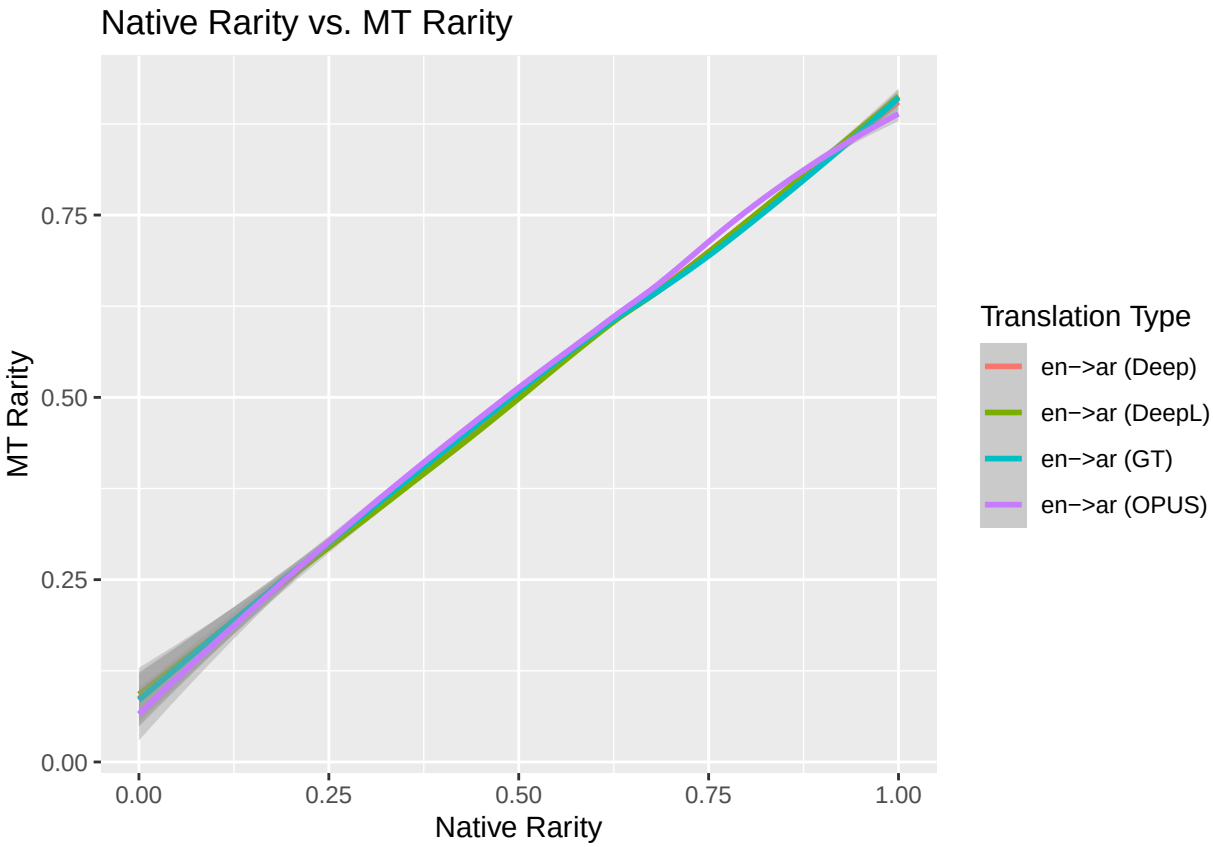
```
## Warning: Removed 6 rows containing non-finite outside the scale range
## (`stat_smooth()`).
```

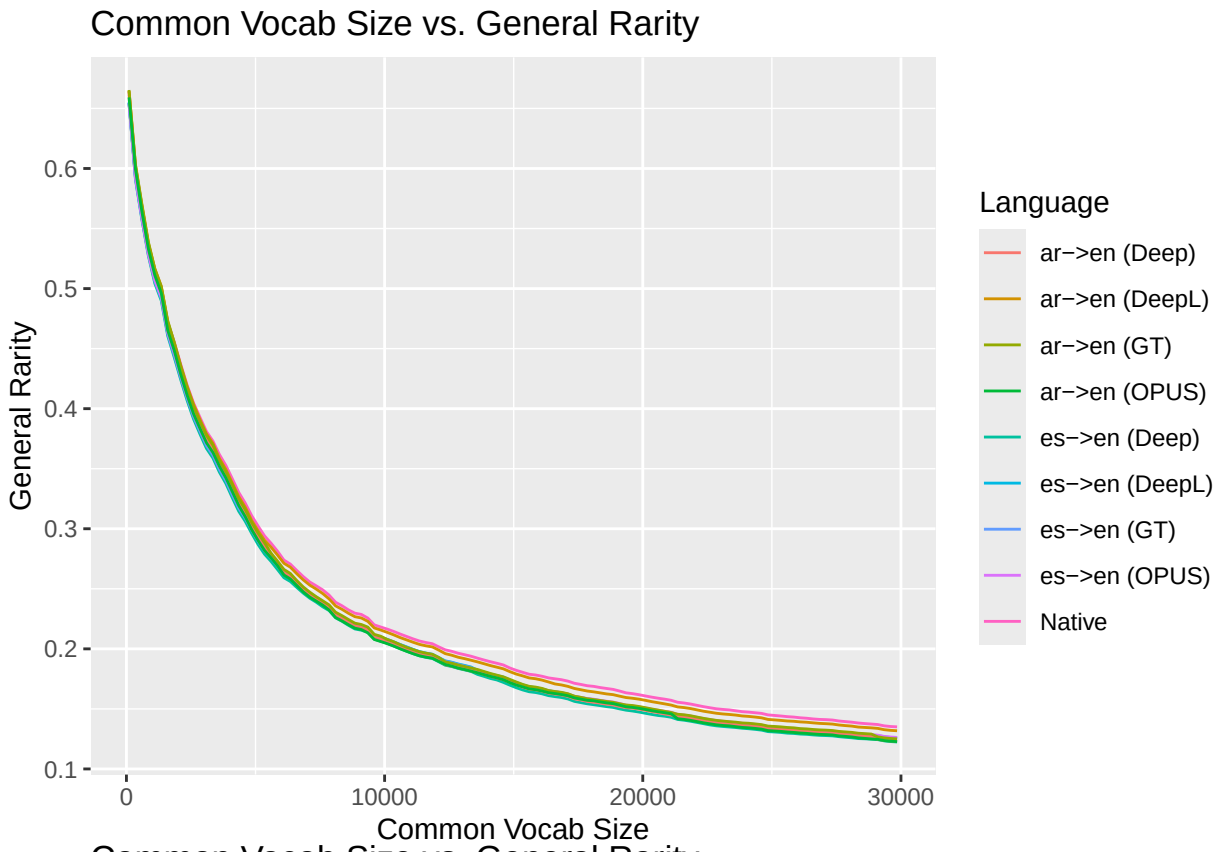


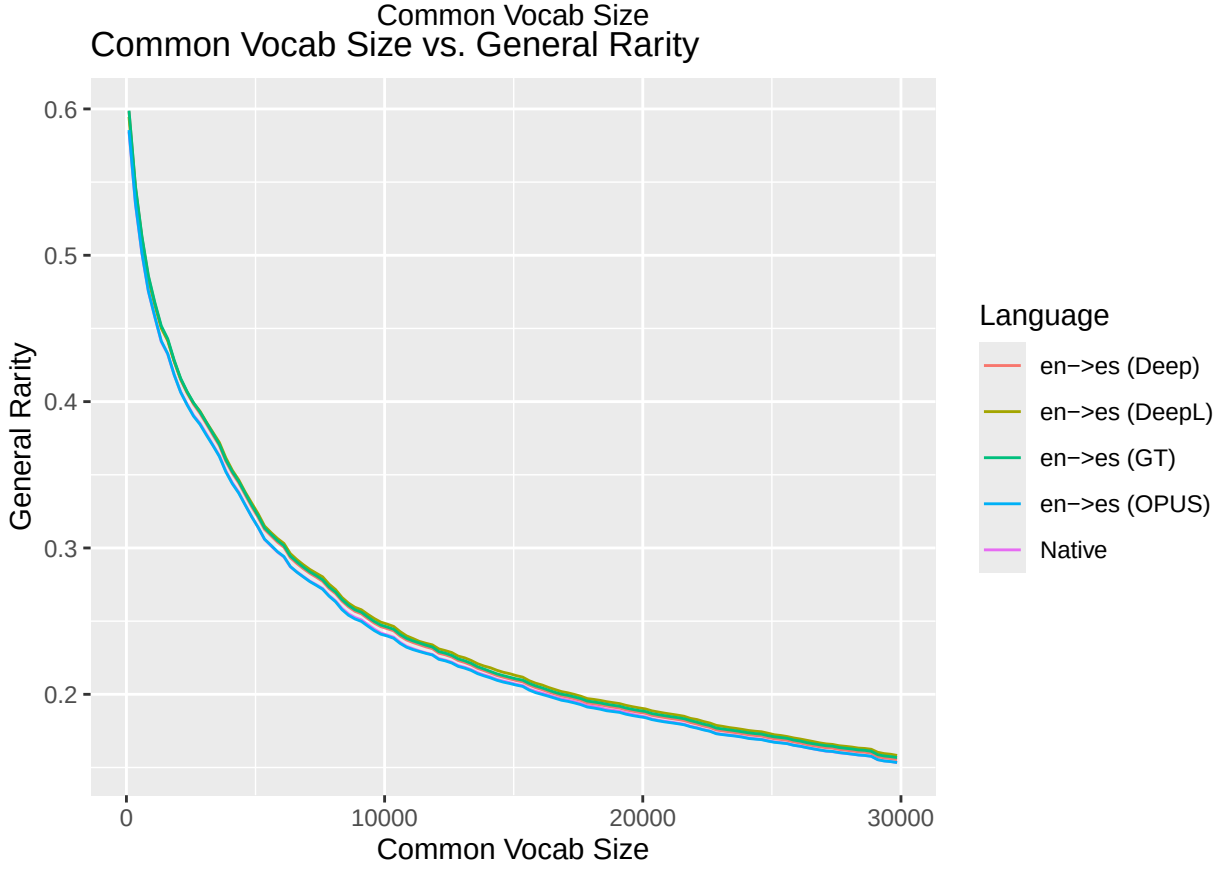

Native Rarity vs. MT Rarity
MT Rarity
Native Rarity
0.00
0.25
0.50
0.75
1.00
Translation Type
ar−>en (Deep)
ar−>en (DeepL)
ar−>en (GT)
ar−>en (OPUS)
es−>en (Deep)
es−>en (DeepL)
es−>en (GT)
es−>en (OPUS)

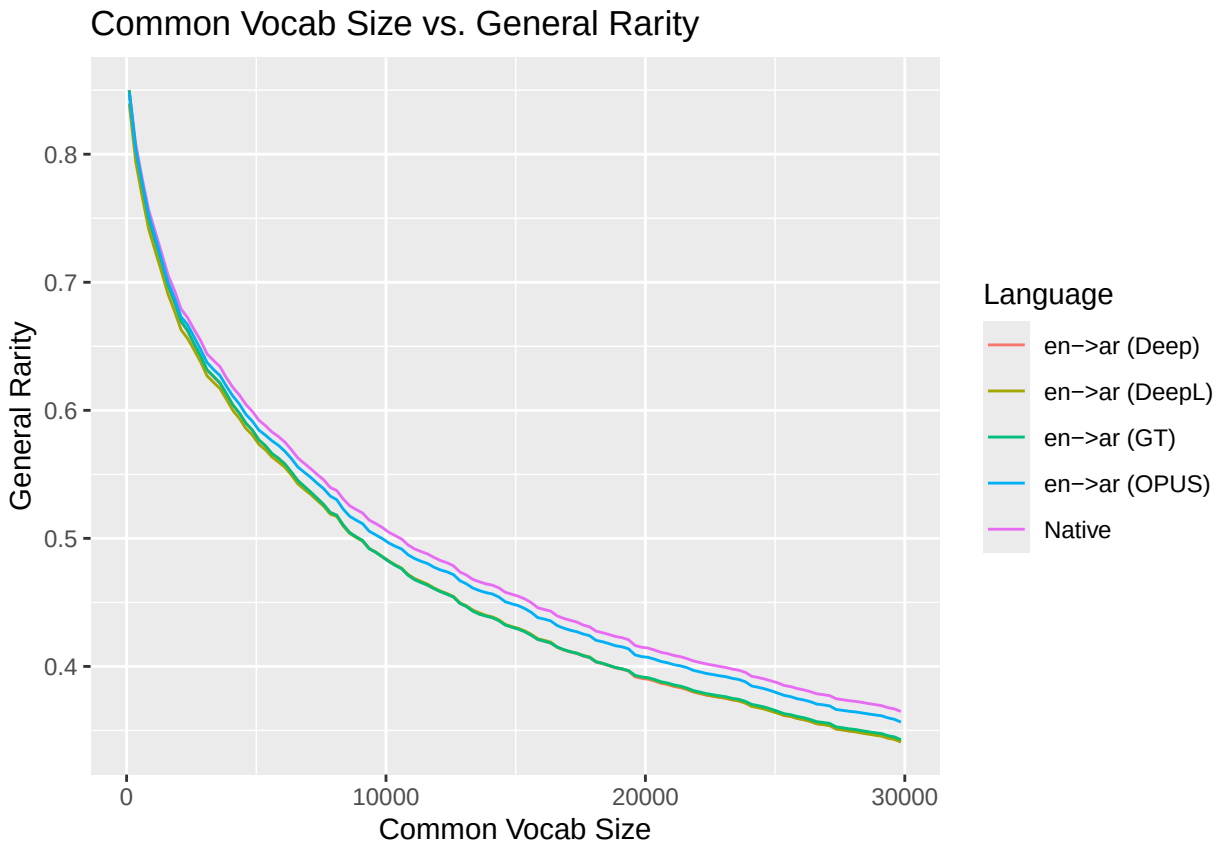

Native Rarity vs. MT Rarity
MT Rarity
Native Rarity
0.00
0.25
0.50
0.75
1.00
Translation Type
en−>es (Deep)
en−>es (DeepL)
en−>es (GT)
en−>es (OPUS)

```
## Warning: Removed 6 rows containing non-finite outside the scale range
## (`stat_smooth()`).
```




Common Vocab Size vs. General Rarity
General Rarity
0.6
0.5
0.4
0.3
0.2
0.1
0
10000
20000
30000
Common Vocab Size
Language
ar−>en (Deep)
ar−>en (DeepL)
ar−>en (GT)
ar−>en (OPUS)
es−>en (Deep)
es−>en (DeepL)
es−>en (GT)
es−>en (OPUS)
Native


Common Vocab Size vs. General Rarity
General Rarity
0.6
0.5
0.4
0.3
0.2
0
10000
20000
30000
Common Vocab Size
Language
en−>es (Deep)
en−>es (DeepL)
en−>es (GT)
en−>es (OPUS)
Native


Common Vocab Size vs. General Rarity
General Rarity
0.8
0.7
0.6
0.5
0.4
0
10000
20000
30000
Common Vocab Size
Language
en−>ar (Deep)
en−>ar (DeepL)
en−>ar (GT)
en−>ar (OPUS)
Native