CLASS, GENDER, AND SUBSTRATE ERASURE IN SOCIOLINGUISTIC CHANGE: A SOCIOPHONETIC STUDY OF SCHWA IN DERACIALIZING SOUTH AFRICAN ENGLISH:

ONLINE SUPPLEMENTARY MATERIALS 3a: MEDIAL 'A-SCHWA'

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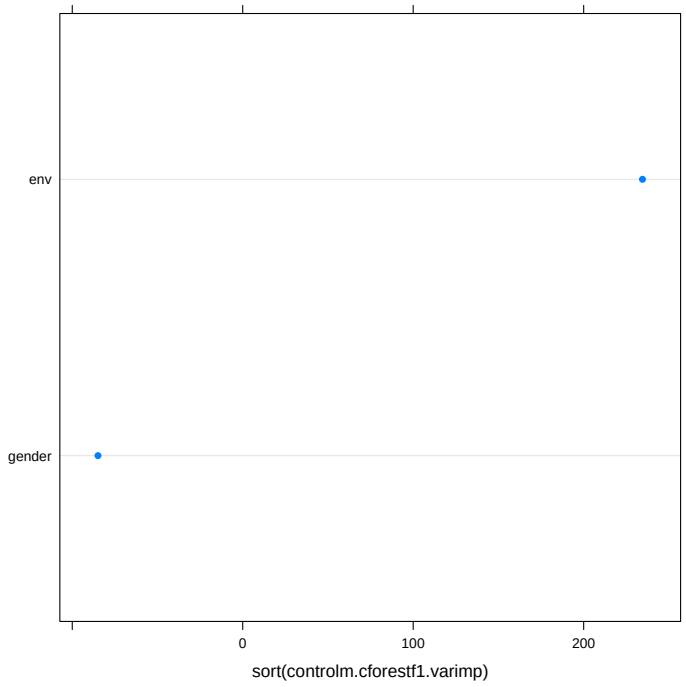
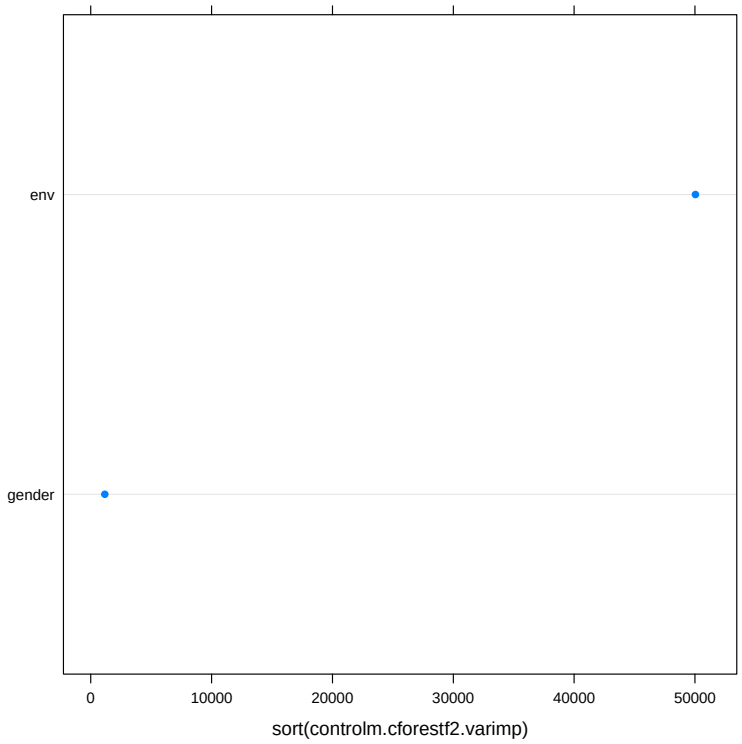
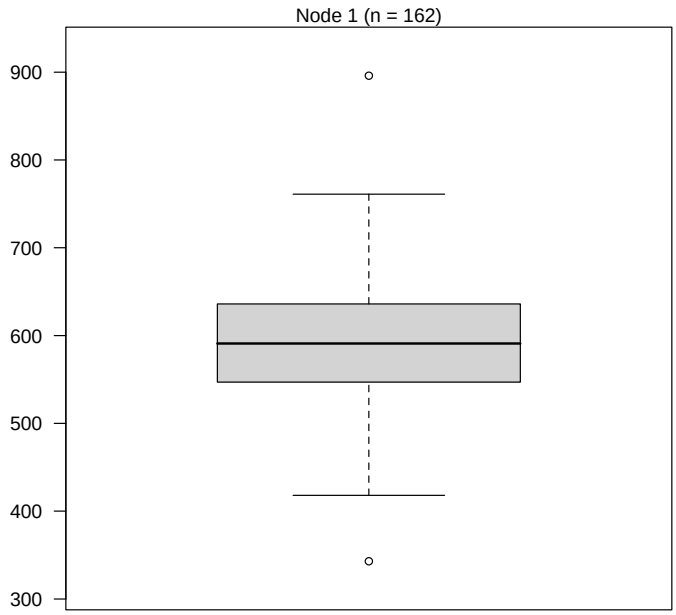
m ENVIRONMENT = medial schwa; first subtype: medial 'a-schwa'

1A. CONTROL GROUP (WHITES): AMPLIFICATION OF DETAILS IN §4.4 OF THE MAIN TEXT. Medial environment, for 'a'. The medial environment has **162 'a'**, 163 'e', seventy-three 'i', thirty 'o', forty-five 'u'. C-forest diagrams given below, followed by conditional inference trees and results of linear mixed-effects regression model.

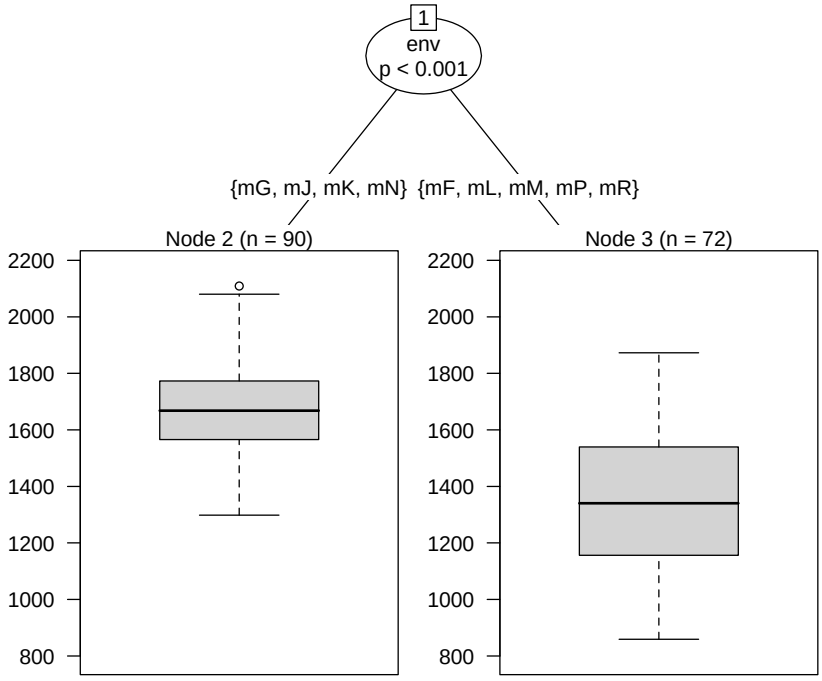



env
gender
0
10000
20000
30000
40000
50000
sort(controlm.cforestf2.varimp)

F1 controlm for 'a' vowel by gender, env



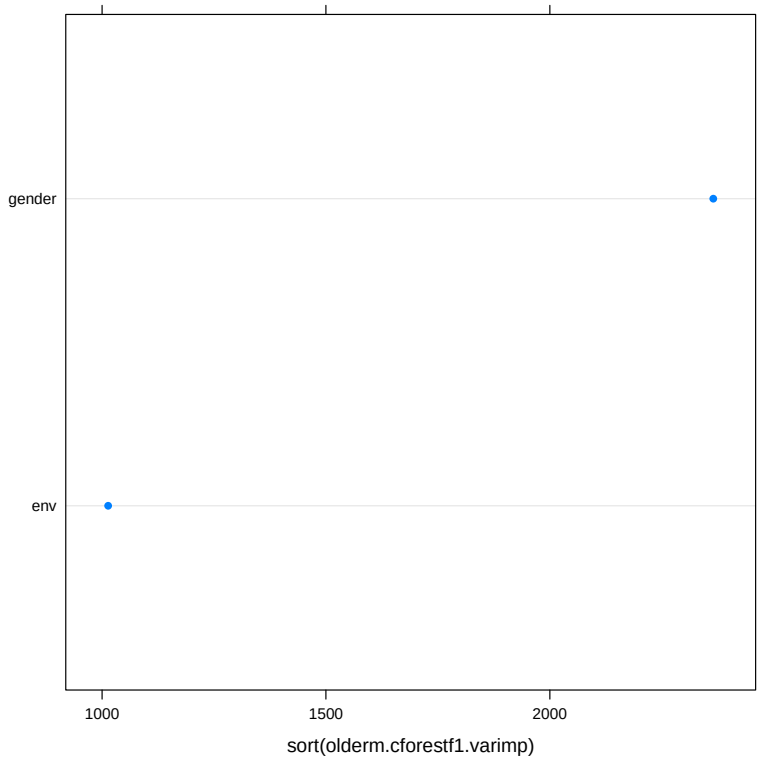
F2 controlm for 'a' vowel by gender, env

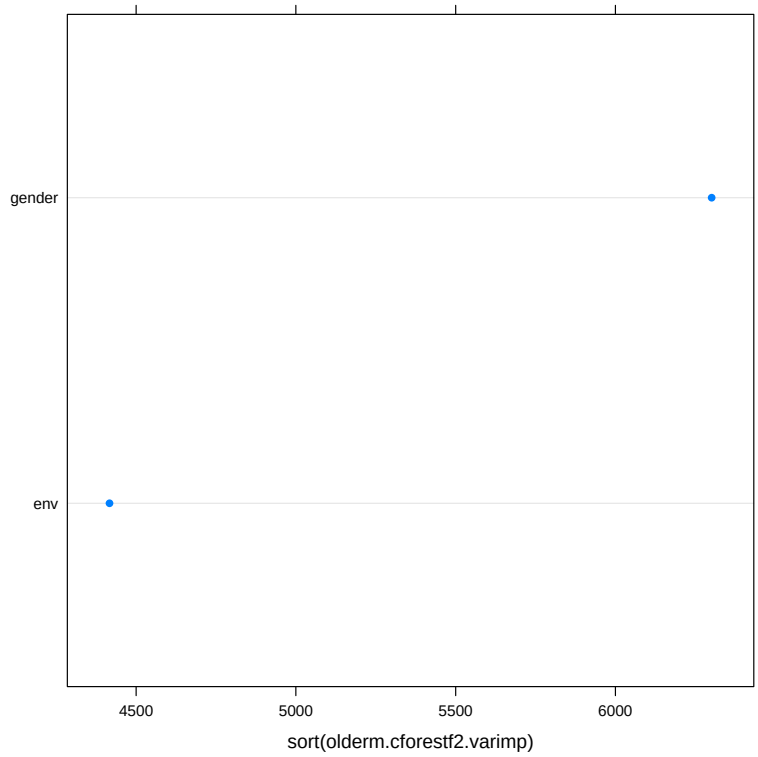


```
> controlm$env <- relevel(controlm $env, ref="mG")
> lmer=lmer(f1 ~ gender + env + (1|speaker) + (1|word), data= cor
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f1 ~ gender + env + (1 | speaker) + (1 | word)
   Data: controlm[controlm$vowel == "a", ]

REML criterion at convergence: 1734.4

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.58112 -0.37513 -0.05889  0.45406  2.90163

Random effects:
 Groups   Name        Variance Std.Dev.
 word     (Intercept) 2248     47.41
 speaker  (Intercept)    0      0.00
 Residual             2836     53.25
Number of obs: 162, groups:  word, 107; speaker, 12

Fixed effects:
            Estimate Std. Error      df t value Pr(>|t|)
(Intercept)  588.040     11.886 131.360  49.472   <2e-16 ***
genderM      -16.514     12.188 149.420  -1.355    0.177
envmF         32.960     72.283 132.010   0.456    0.649
envmJ         56.602     27.147 133.980   2.085    0.039 *
envmK         96.475     72.205 131.840   1.336    0.184
envmL          7.679     16.012 120.030   0.480    0.632
envmM         73.464     45.730  83.790   1.606    0.112
envmN        -17.048     25.601 119.050  -0.666    0.507
envmP         11.317     21.810 149.990   0.519    0.605
envmR         30.962     22.932 130.500   1.350    0.179
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

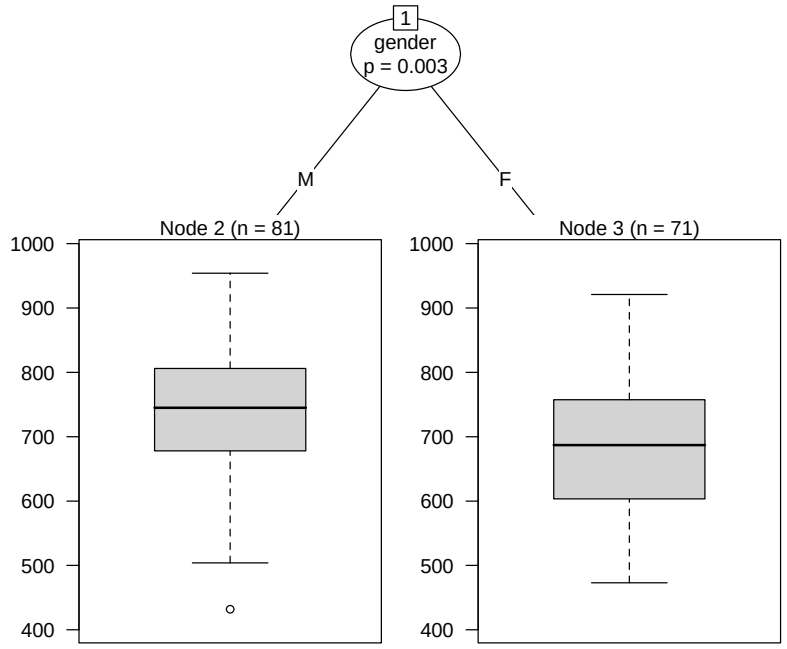
```
> controlm$env <- relevel(controlm $env, ref="mG")
> lmer=lmer(f2 ~ gender + env + (1|speaker) + (1|word), data= cont
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f2 ~ gender + env + (1 | speaker) + (1 | word)
   Data: controlm[controlm$vowel == "a", ]

REML criterion at convergence: 2046.3

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.52924 -0.47766 -0.07927  0.46011  2.38799

Random effects:
 Groups   Name        Variance Std.Dev.
 word     (Intercept) 23961.3  154.79
 speaker  (Intercept)   850.1   29.16
 Residual             17981.1  134.09
Number of obs: 162, groups:  word, 107; speaker, 12

Fixed effects:
            Estimate Std. Error       df t value Pr(>|t|)
(Intercept) 1580.495     36.429   20.860  43.386  < 2e-16 ***
genderM      105.649     38.695    8.120   2.730  0.02549 *
envmF       -249.181    209.291  105.430  -1.191  0.23649
envmJ        203.061     77.787  137.550   2.610  0.01004 *
envmK         74.431    209.215  104.390   0.356  0.72274
envmL       -319.324     46.510  108.100  -6.866 4.36e-10 ***
envmM       -267.619    136.990   66.120  -1.954  0.05499 .
envmN         -0.212     74.711  102.580  -0.003  0.99774
envmP       -299.973     60.937  149.480  -4.923 2.23e-06 ***
envmR       -191.701     65.825  127.810  -2.912  0.00424 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

OLDER CONTROL GROUP (BLACK SPEAKERS; §4.4). Medial environment, for ‘a’. The medial environment has **152 ‘a’**, 137 ‘e’, fifty-seven ‘i’, twenty-five ‘o’, fifty-nine ‘u’. C-forest diagrams given below, followed by conditional inference trees and results of linear mixed-effects regression model.

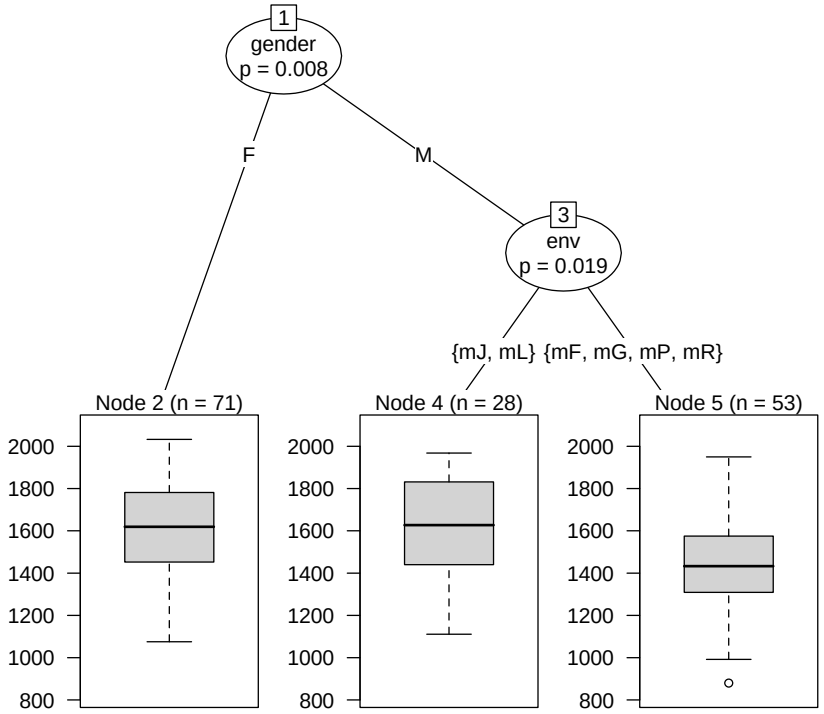




F1 olderm for 'a' vowel by gender, env



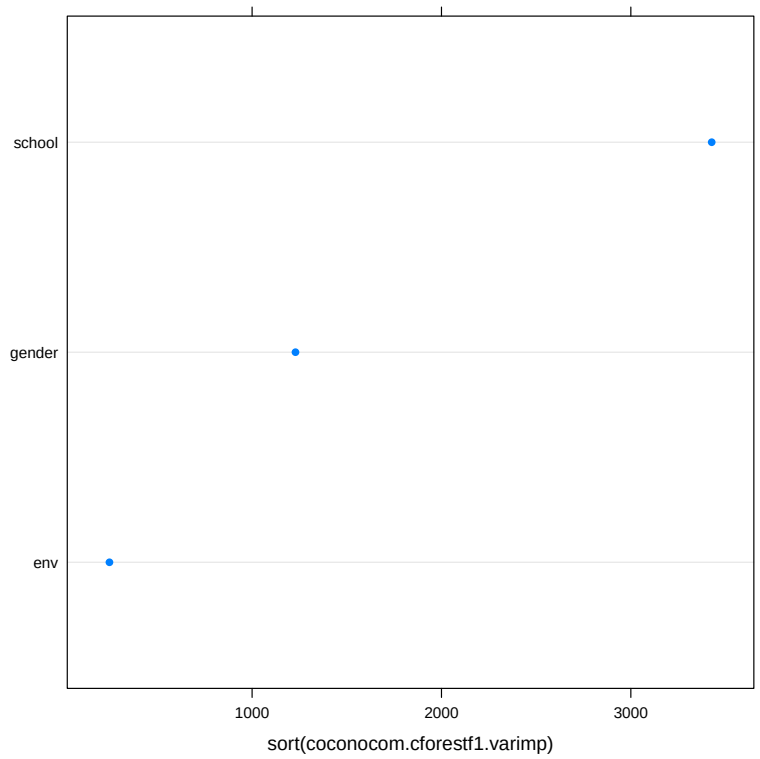
F2 olderm for 'a' vowel by gender, env

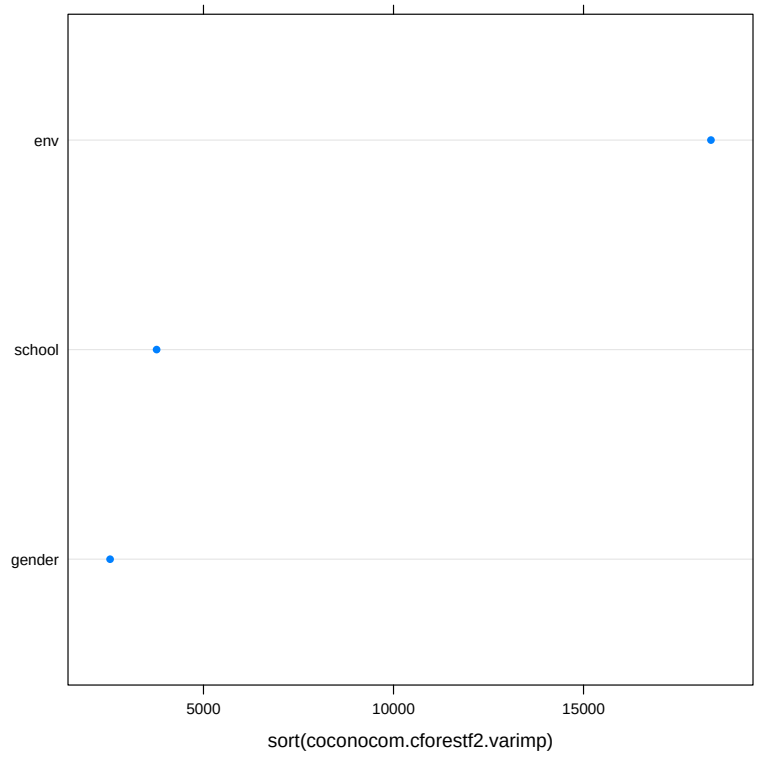


```
> olderm$env <- relevel(olderm$env, ref="mG")
> lmer=lmer(f1 ~ gender + env + (1|speaker) + (1|word), data= ol
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f1 ~ gender + env + (1 | speaker) + (1 | word)
   Data: olderm[olderm$vowel == "a", ]

REML criterion at convergence: 1774.8

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.36645 -0.51568  0.05478  0.66575  1.91031

Random effects:
 Groups   Name        Variance Std.Dev.
 word     (Intercept) 2695.0   51.91
 speaker  (Intercept)  212.9   14.59
 Residual             9209.7   95.97
Number of obs: 152, groups:  word, 77; speaker, 12

Fixed effects:
            Estimate Std. Error     df t value Pr(>|t|)
(Intercept)   680.35      18.41  18.40  36.950   <2e-16 ***
genderM        52.93      21.19   9.93   2.498   0.0317 *
envmF         -18.22      69.58  72.17  -0.262   0.7942
envmJ         -10.40      32.79  53.23  -0.317   0.7524
envmL          43.70      29.57  58.73   1.478   0.1447
envmN          65.54      65.56 116.42   1.000   0.3195
envmP          34.36      44.72  31.86   0.768   0.4479
envmR         -27.12      36.97  72.55  -0.734   0.4656
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

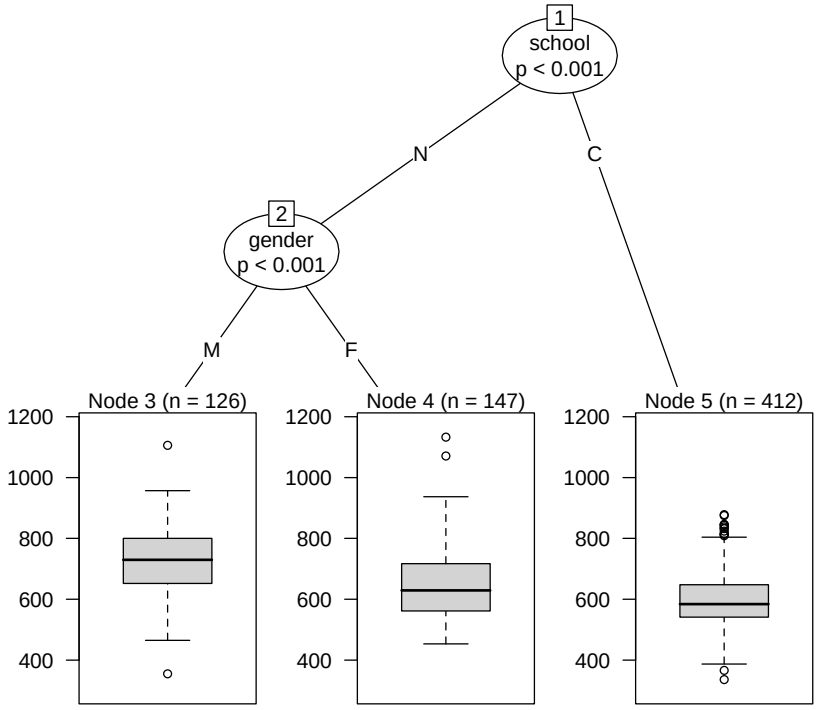
```
> olderm$env <- relevel(olderm$env, ref="mG")
> lmer=lmer(f2 ~ gender + env + (1|speaker) + (1|word), data= olc
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f2 ~ gender + env + (1 | speaker) + (1 | word)
   Data: olderm[olderm$vowel == "a", ]

REML criterion at convergence: 1971.8

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.26043 -0.57972 -0.07964  0.65041  2.01868

Random effects:
 Groups   Name        Variance  Std.Dev.
 word     (Intercept) 2.556e+04 1.599e+02
 speaker  (Intercept) 6.425e-12 2.535e-06
 Residual             2.879e+04 1.697e+02
Number of obs: 152, groups:  word, 77; speaker, 12

Fixed effects:
            Estimate Std. Error      df t value Pr(>|t|)
(Intercept)  1577.98      38.59   77.95  40.890   <2e-16 ***
genderM       -92.43      38.72  143.83  -2.387   0.0183 *
envmF         -77.94     155.42   65.51  -0.501   0.6177
envmJ         127.20      74.23   71.49   1.713   0.0910 .
envmL          16.34      66.79   72.03   0.245   0.8074
envmN          98.02     140.02   93.35   0.700   0.4856
envmP          26.14     105.62   62.33   0.248   0.8053
envmR         -62.99      82.42   73.80  -0.764   0.4471
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

CORE GROUP OF YOUNG BLACK SPEAKERS (§4.5). Medial environment, for 'a'. The medial environment has **682 'a'**, 820 'e', 376 'i', ninety-six 'o', 183 'u'. C-forest diagrams given below, followed by conditional inference trees and results of linear mixed-effects regression model.

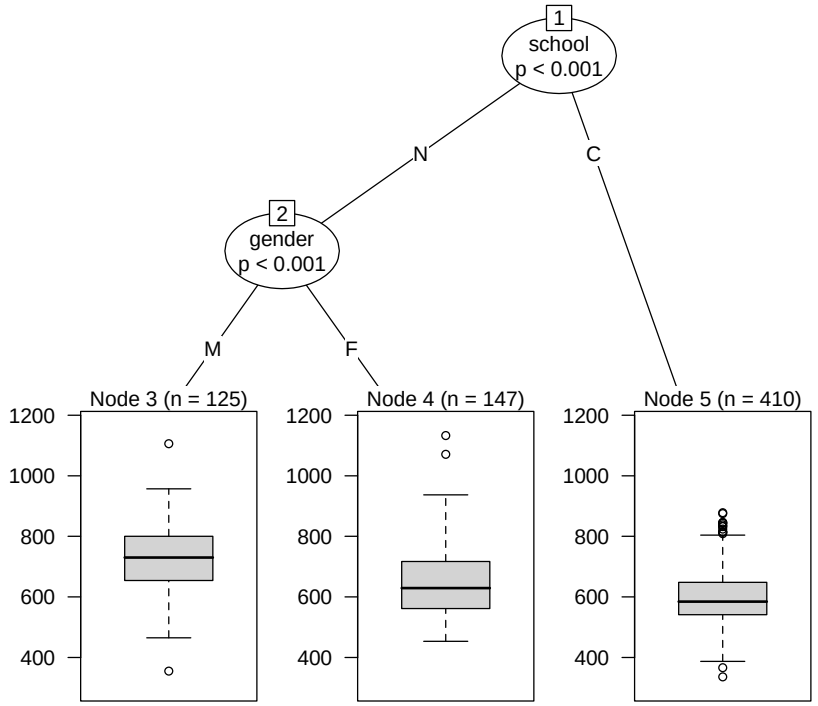




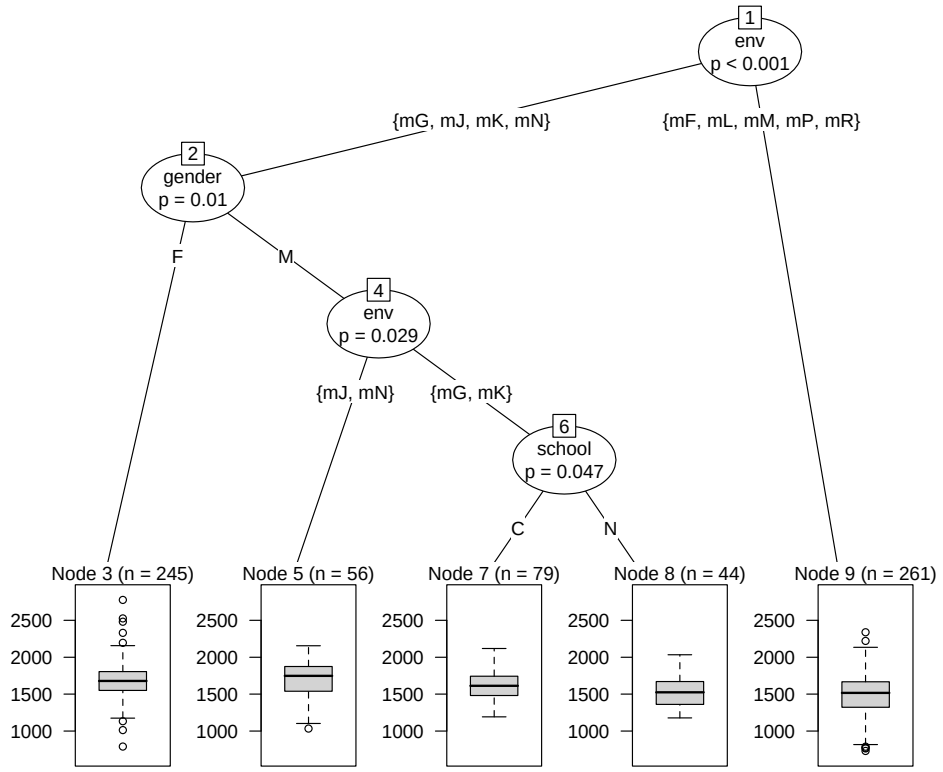
F1 COCONOCO m env 'a'



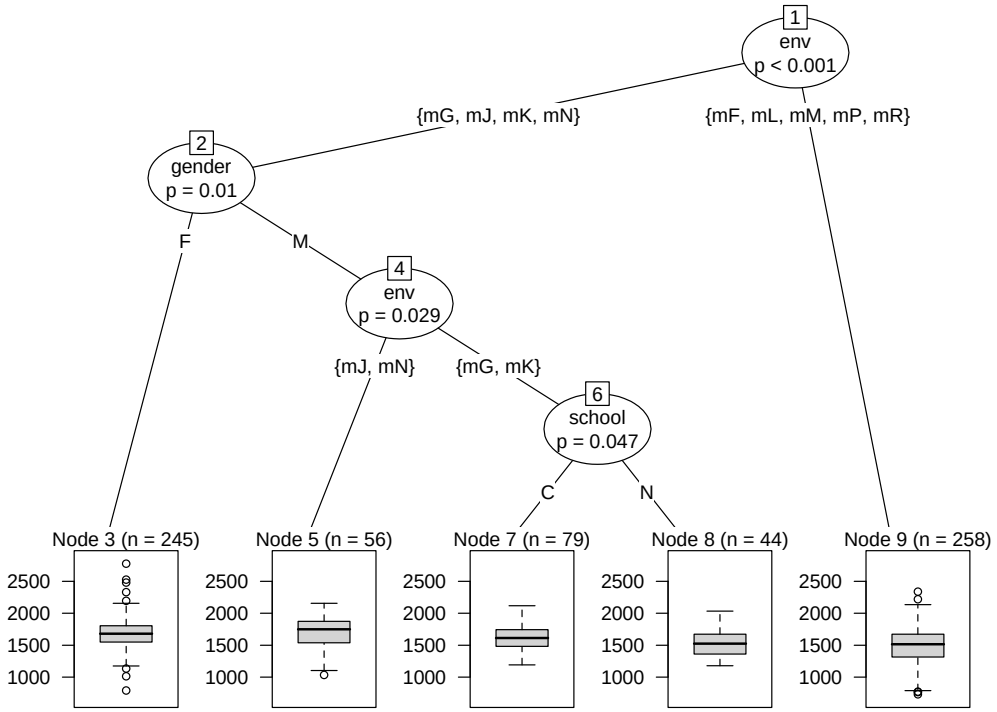
F1 coconocom for 'a' vowel by gender, env



F2 COCONOCO m env 'a'



F2 coconocom for 'a' vowel by gender, env



```
> lmer<-lmer(f1 ~ school + gender + env + (1|speaker) + (1|word),
> anova(lmer)
Analysis of Variance Table of type 3  with  Satterthwaite
approximation for degrees of freedom
       Sum Sq Mean Sq NumDF   DenDF F.value    Pr(>F)
school 264337  264337     1  53.035  31.745 6.858e-07 ***
gender  45359   45359     1  48.367   5.602   0.02199 *
env     42702    5338     8 266.627   0.714   0.67909
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f1 ~ school + gender + env + (1 | speaker) + (1 | word)
   Data: coconocom[coconocom$vowel == "a", ]

REML criterion at convergence: 8108.1

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.2004 -0.5847 -0.0470  0.5023  4.7034

Random effects:
 Groups   Name        Variance Std.Dev.
 word     (Intercept) 1327     36.43
 speaker  (Intercept) 1656     40.69
 Residual             7475     86.46
Number of obs: 685, groups:  word, 279; speaker, 53

Fixed effects:
            Estimate Std. Error      df t value Pr(>|t|)
(Intercept)  607.373     39.741 224.300  15.283  < 2e-16 ***
schoolN       77.381     13.734  53.000   5.634 6.86e-07 ***
genderM       32.953     13.923  48.400   2.367    0.022 *
envmG        -20.985     39.434 200.900  -0.532    0.595
envmJ         -9.409     40.617 205.300  -0.232    0.817
envmK         27.011     60.128 272.700   0.449    0.654
envmL        -25.179     39.796 208.800  -0.633    0.528
envmM        -97.905     78.495 457.400  -1.247    0.213
envmN        -14.748     43.207 224.300  -0.341    0.733
envmP        -37.488     41.893 210.600  -0.895    0.372
envmR         -6.964     41.586 204.100  -0.167    0.867
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> lmer<-lmer(f2 ~ school + gender + env + (1|speaker) + (1|word)
> anova(lmer)
Analysis of Variance Table of type 3  with  Satterthwaite
approximation for degrees of freedom
        Sum Sq Mean Sq NumDF  DenDF F.value    Pr(>F)
school  146958  146958     1  46.48  3.3727   0.07268 .
gender   32923   32923     1  47.98  1.2093   0.27697
env    2329670  291209     8 350.62  7.2052 7.496e-09 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> summary(lmer)
Linear mixed model fit by REML ['merModLmerTest']
Formula: f2 ~ school + gender + env + (1 | speaker) + (1 | word)
   Data: coconocom[coconocom$vowel == "a", ]

REML criterion at convergence: 9297.7

Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.7517 -0.4844  0.0000  0.4707  3.9584

Random effects:
 Groups   Name        Variance Std.Dev.
 word     (Intercept) 19053    138.03
 speaker  (Intercept)  2111     45.95
 Residual             40417    201.04
Number of obs: 685, groups:  word, 279; speaker, 53

Fixed effects:
            Estimate Std. Error      df t value Pr(>|t|)
(Intercept)  1432.69     107.39  309.80  13.341  < 2e-16 ***
schoolN       -42.28      23.02   46.50  -1.837  0.07268 .
genderM       -25.53      23.21   48.00  -1.100  0.27697
envmG         220.71     108.70  300.20   2.031  0.04318 *
envmJ         321.78     111.81  304.60   2.878  0.00429 **
envmK         171.85     163.02  306.10   1.054  0.29261
envmL          54.99     109.40  310.70   0.503  0.61559
envmM         118.99     204.63  439.20   0.581  0.56123
envmN         229.72     118.09  312.20   1.945  0.05263 .
envmP          98.69     114.89  313.50   0.859  0.39098
envmR         215.85     114.20  308.40   1.890  0.05967 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```