

f0Gamms

```
#setwd(choose.dir())
```

```
require(tidyverse)
require(mgcv)
require(mgcViz)
require(itsadug)
```

Load prepared f0 data

```
f0Data = read.csv("f0_ready_for_gamms.csv")
bf0 = filter(f0Data, f0Data$speaker=="b")
gf0 = filter(f0Data, f0Data$speaker=="g")
pf0 = filter(f0Data, f0Data$speaker=="p")
rf0 = filter(f0Data, f0Data$speaker=="r")
yf0 = filter(f0Data, f0Data$speaker=="y")

f0Data$speaker = as.factor(f0Data$speaker)
f0Data$label = as.factor(f0Data$label)

bf0$speaker = as.factor(bf0$speaker)
bf0$label = as.factor(bf0$label)
gf0$speaker = as.factor(gf0$speaker)
gf0$label = as.factor(gf0$label)
pf0$speaker = as.factor(pf0$speaker)
pf0$label = as.factor(pf0$label)
rf0$speaker = as.factor(rf0$speaker)
rf0$label = as.factor(rf0$label)
yf0$speaker = as.factor(yf0$speaker)
yf0$label = as.factor(yf0$label)
```

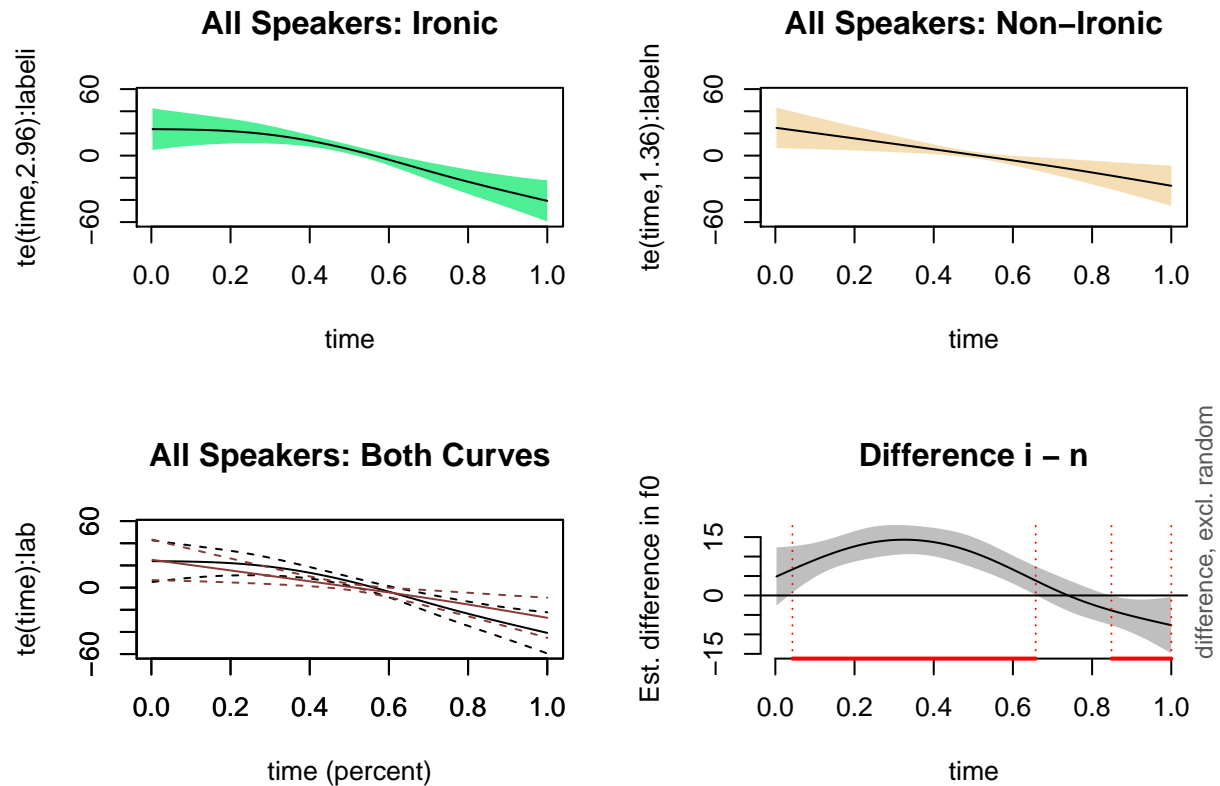
GAM for f0

```
m1F0=bam(f0 ~ label + te(time, by=label) + s(speaker, bs="re")
        + s(time, speaker, bs="fs", m=1), data=f0Data)
```

summary and plots

```
par(mfrow=c(2,2))
plot(m1F0, select=1, main = "All Speakers: Ironic", shade=TRUE,
     shade.col = "seagreen2")
plot(m1F0, select=2, main = "All Speakers: Non-Ironic", shade=TRUE,
     shade.col = "wheat")
plot(m1F0, select=1, ylab="te(time):lab", xlab="time (percent)",
     main = "All Speakers: Both Curves");
```

```
par(new=TRUE);
plot(m1F0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(m1F0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(m1F0)
```

```
##
## Family: gaussian
## Link function: identity
##
## Formula:
## f0 ~ label + te(time, by = label) + s(speaker, bs = "re") + s(time,
##   speaker, bs = "fs", m = 1)
##
## Parametric coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  160.983    20.633    7.802 6.63e-15 ***
## labeln       -6.017     1.112   -5.409 6.46e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##               edf Ref.df      F  p-value
## te(time):labeli 2.957  3.374   8.195 1.07e-05 ***
## te(time):labeln 1.360  1.443   5.292 0.00855 **
```

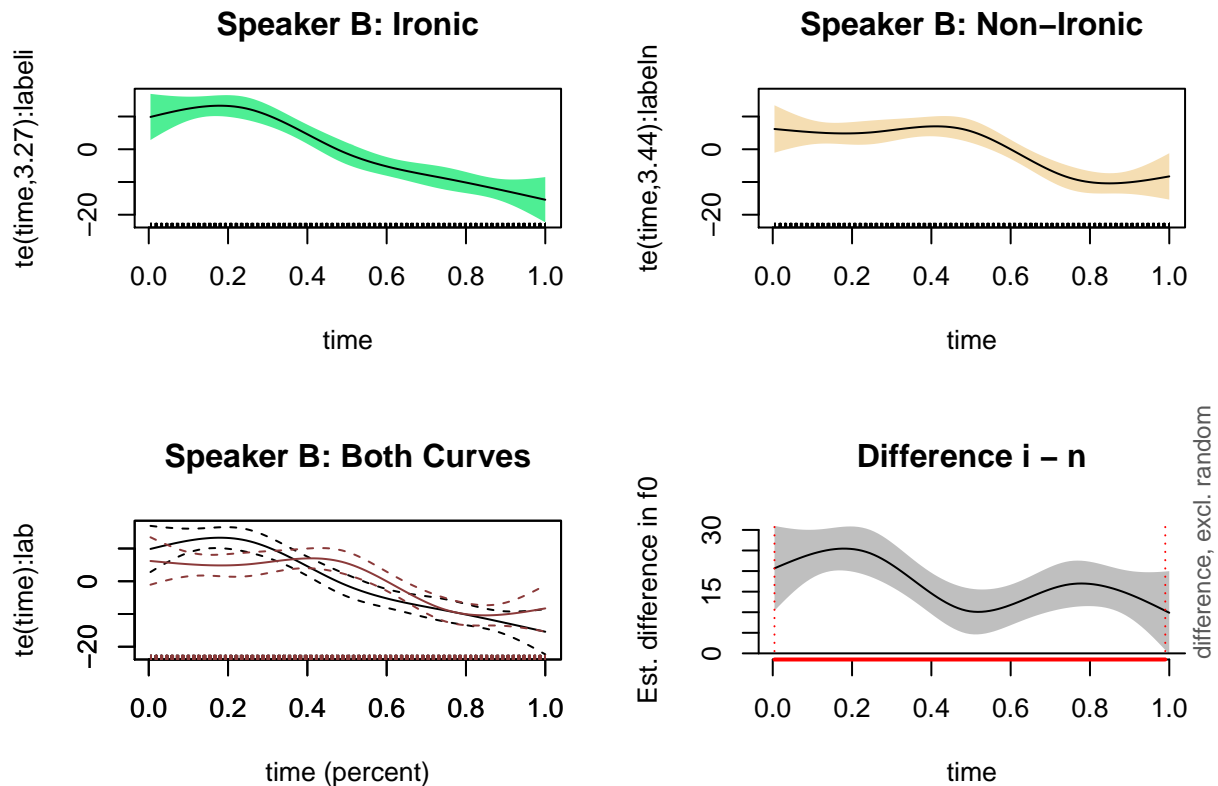
```
## s(speaker)      1.990  4.000    0.990 < 2e-16 ***
## s(time,speaker) 33.284 44.000 40920.479 0.00393 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.453   Deviance explained = 45.5%
## fREML = 61883   Scale est. = 3479.8    n = 11250
```

Individual Speakers Speaker B

```
mBF0=bam(f0 ~ label + te(time, by=label), data=bf0)
```

summary and plots

```
par(mfrow=c(2,2))
plot(mBF0, select=1, main = "Speaker B: IroniC", shade=TRUE,
     shade.col = "seagreen2")
plot(mBF0, select=2, main = "Speaker B: Non-IroniC", shade=TRUE,
     shade.col = "wheat")
plot(mBF0, select=1, ylab="te(time):lab", xlab="time (percent)",
     main = "Speaker B: Both Curves");
par(new=TRUE);
plot(mBF0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(mBF0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(mBF0)
```

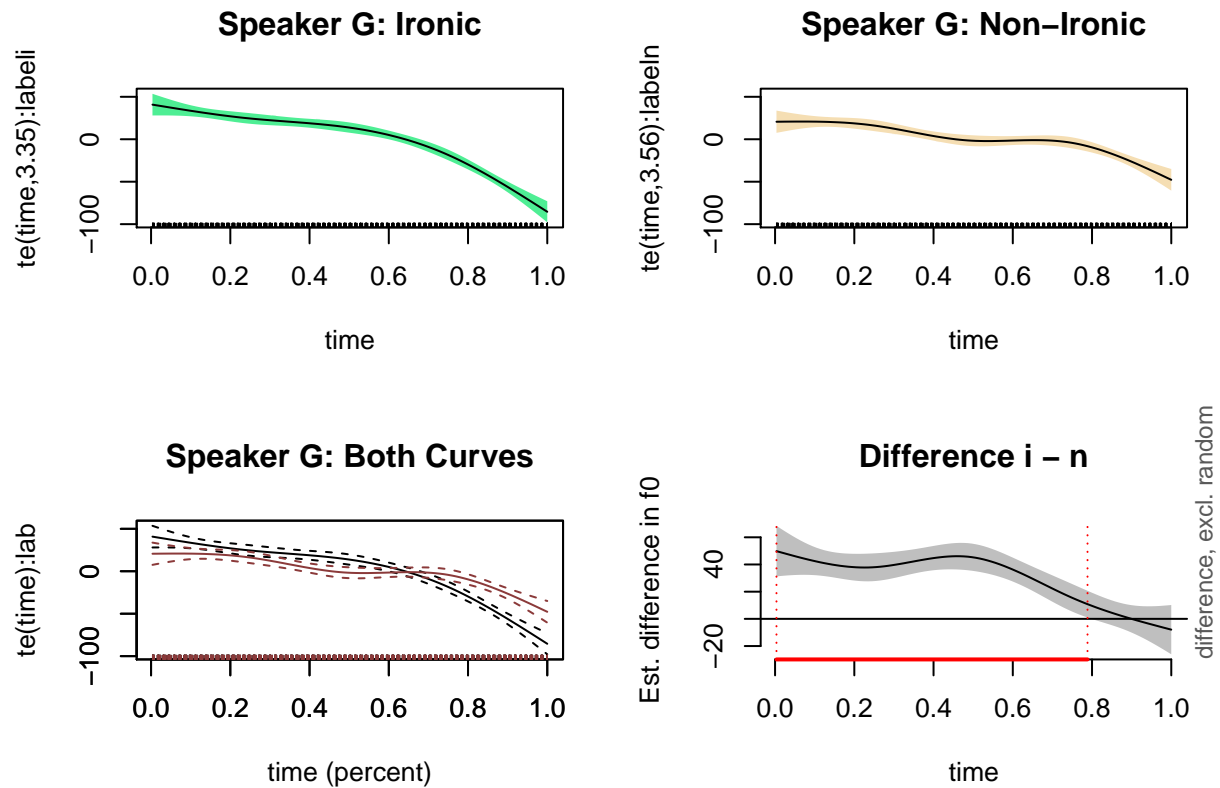
```
##
## Family: gaussian
## Link function: identity
##
## Formula:
## f0 ~ label + te(time, by = label)
##
## Parametric coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  101.692      1.032   98.51  <2e-16 ***
## labeln       -16.993      1.460  -11.64  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##              edf Ref.df      F p-value
## te(time):labeli 3.266  3.710 25.94  <2e-16 ***
## te(time):labeln 3.442  3.825 11.29  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.108   Deviance explained = 11.1%
## fREML = 11165   Scale est. = 1198.8      n = 2250
```

Speaker G

```
mGF0=bam(f0 ~ label + te(time, by=label), data=gf0)
```

summary and plots

```
par(mfrow=c(2,2))
plot(mGF0, select=1, main = "Speaker G: IroniC", shade=TRUE,
     shade.col = "seagreen2")
plot(mGF0, select=2, main = "Speaker G: Non-IroniC", shade=TRUE,
     shade.col = "wheat")
plot(mGF0, select=1, ylab="te(time):lab", xlab="time (percent)",
     main = "Speaker G: Both Curves");
par(new=TRUE);
plot(mGF0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(mGF0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(mGF0)
```

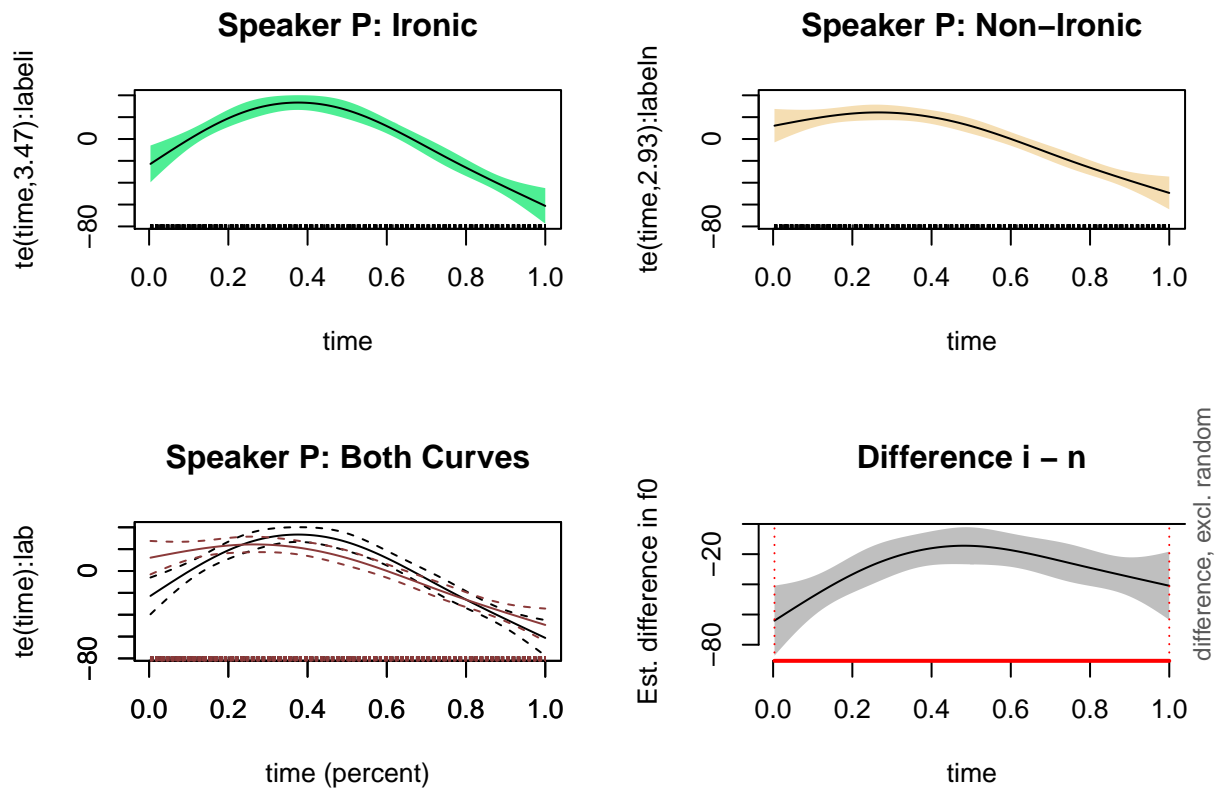
```
##
## Family: gaussian
## Link function: identity
##
## Formula:
## f0 ~ label + te(time, by = label)
##
## Parametric coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  239.636    1.825    131.3  <2e-16 ***
## labeln       -29.690    2.581    -11.5  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##              edf Ref.df    F p-value
## te(time):labeli 3.347  3.766 92.00  <2e-16 ***
## te(time):labeln 3.562  3.889 23.58  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.202   Deviance explained = 20.5%
## fREML = 12446   Scale est. = 3746.8    n = 2250
```

Speaker P

```
mPF0=bam(f0 ~ label + te(time, by=label), data=pf0)
```

summary and plots

```
par(mfrow=c(2,2))
plot(mPF0, select=1, main = "Speaker P: IroniC", shade=TRUE,
     shade.col = "seagreen2")
plot(mPF0, select=2, main = "Speaker P: Non-IroniC", shade=TRUE,
     shade.col = "wheat")
plot(mPF0, select=1, ylab="te(time,3.47):lab", xlab="time (percent)",
     main = "Speaker P: Both Curves");
par(new=TRUE);
plot(mPF0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(mPF0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(mPF0)
```

```
##
## Family: gaussian
## Link function: identity
##
## Formula:
```

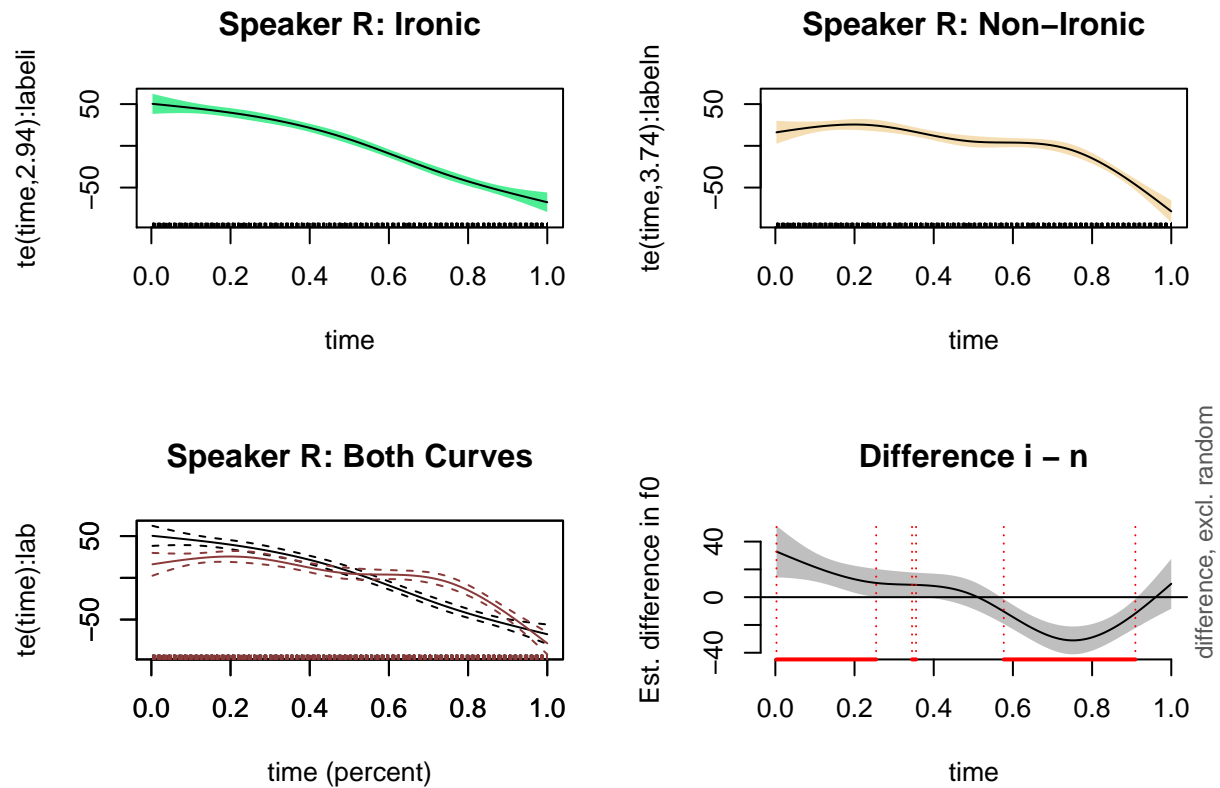
```
## f0 ~ label + te(time, by = label)
##
## Parametric coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  167.931      2.353  71.375  <2e-16 ***
## labeln      29.061       3.327   8.734  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##             edf Ref.df      F p-value
## te(time):labeli 3.470  3.841 38.23  <2e-16 ***
## te(time):labeln 2.933  3.439 30.31  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.126   Deviance explained = 12.9%
## fREML = 13015   Scale est. = 6227.6      n = 2250
```

Speaker R

```
mRF0=bam(f0 ~ label + te(time, by=label), data=rf0)
```

summary and plots

```
par(mfrow=c(2,2))
plot(mRF0, select=1, main = "Speaker R: IroniC", shade=TRUE,
     shade.col = "seagreen2")
plot(mRF0, select=2, main = "Speaker R: Non-IroniC", shade=TRUE,
     shade.col = "wheat")
plot(mRF0, select=1, ylab="te(time):lab", xlab="time (percent)",
     main = "Speaker R: Both Curves");
par(new=TRUE);
plot(mRF0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(mRF0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(mRF0)
```

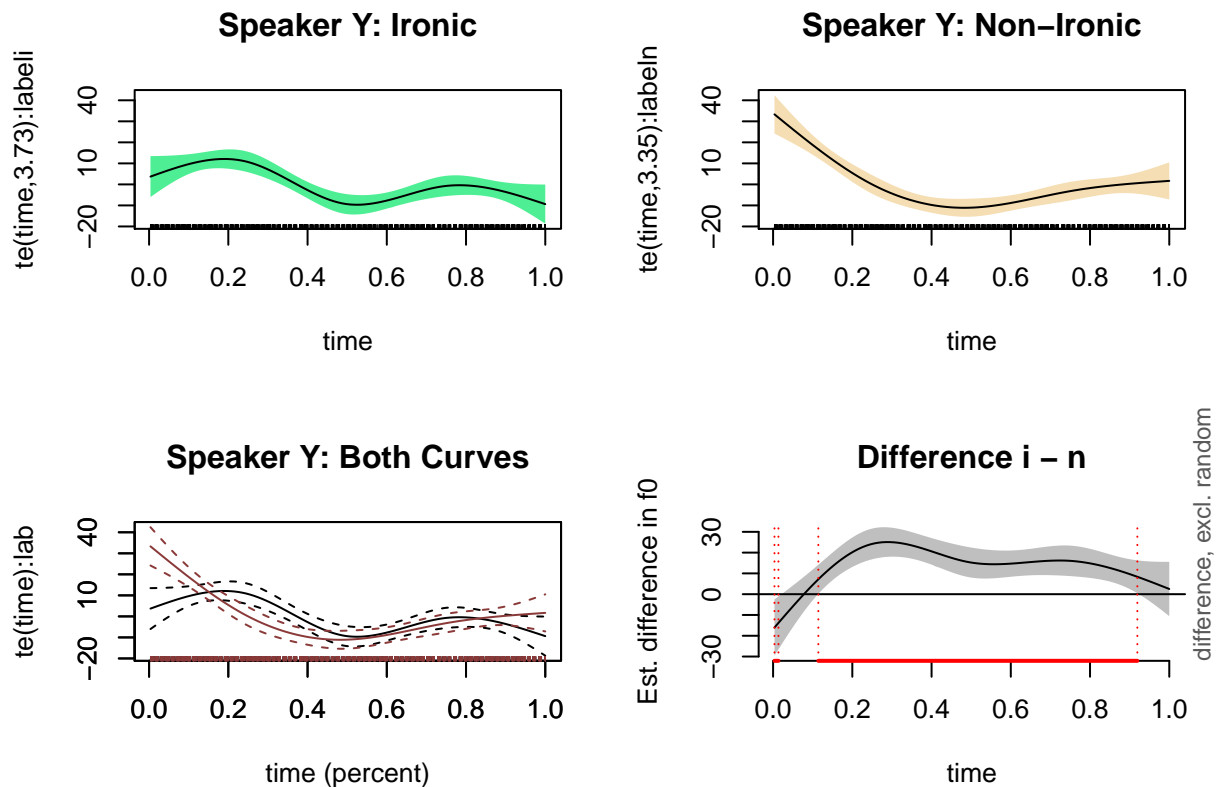
```
##
## Family: gaussian
## Link function: identity
##
## Formula:
## f0 ~ label + te(time, by = label)
##
## Parametric coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  196.494    1.837  106.967  <2e-16 ***
## labeln       1.278     2.598   0.492   0.623
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##             edf Ref.df    F p-value
## te(time):labeli 2.942  3.447 125.21 <2e-16 ***
## te(time):labeln 3.738  3.959  52.73 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) = 0.222  Deviance explained = 22.5%
## fREML = 12460  Scale est. = 3796.2    n = 2250
```


Speaker B

```
mYF0=bam(f0 ~ label + te(time, by=label), data=yf0)
```

summary and plots

```
par(mfrow=c(2,2))
plot(mYF0, select=1, main = "Speaker Y: IroniC", shade=TRUE,
     shade.col = "seagreen2")
plot(mYF0, select=2, main = "Speaker Y: Non-IroniC", shade=TRUE,
     shade.col = "wheat")
plot(mYF0, select=1, ylab="te(time):lab", xlab="time (percent)",
     main = "Speaker Y: Both Curves");
par(new=TRUE);
plot(mYF0, select=2, ylab="", xlab="", main="", col="indianred4")
plot_diff(mYF0, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



```
summary(mYF0)
```

```
##
## Family: gaussian
## Link function: identity
##
## Formula:
```

```

## f0 ~ label + te(time, by = label)
##
## Parametric coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept)  131.004      1.299  100.88 < 2e-16 ***
## labeln      -13.553      1.837   -7.38 2.22e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##           edf Ref.df      F  p-value
## te(time):labeli 3.731  3.956  8.372 2.49e-06 ***
## te(time):labeln 3.350  3.768 19.543 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.0657   Deviance explained =  6.9%
## fREML = 11682   Scale est. = 1897.1    n = 2250

```