plpGamms

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

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

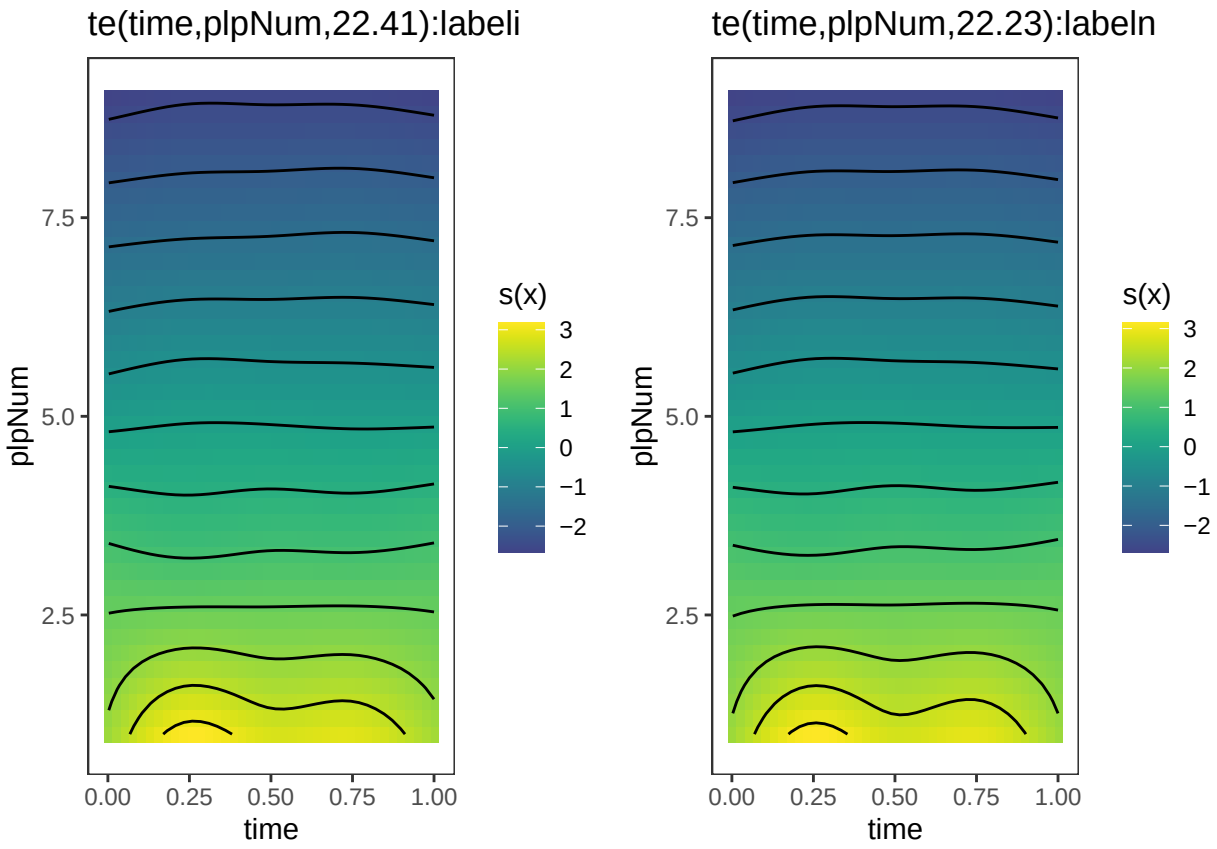
Load prepared plp data

```
plpData = read.csv("plp_ready_for_gamms.csv")
bplp = filter(plpData, plpData$speaker=="b")
gplp = filter(plpData, plpData$speaker=="g")
pplp = filter(plpData, plpData$speaker=="p")
rplp = filter(plpData, plpData$speaker=="r")
yplp = filter(plpData, plpData$speaker=="y")

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

bplp$speaker = as.factor(bplp$speaker)
bplp$label = as.factor(bplp$label)
gplp$speaker = as.factor(gplp$speaker)
gplp$label = as.factor(gplp$label)
pplp$speaker = as.factor(pplp$speaker)
pplp$label = as.factor(pplp$label)
rplp$speaker = as.factor(rplp$speaker)
rplp$label = as.factor(rplp$label)
yplp$speaker = as.factor(yplp$speaker)
yplp$label = as.factor(yplp$label)
```

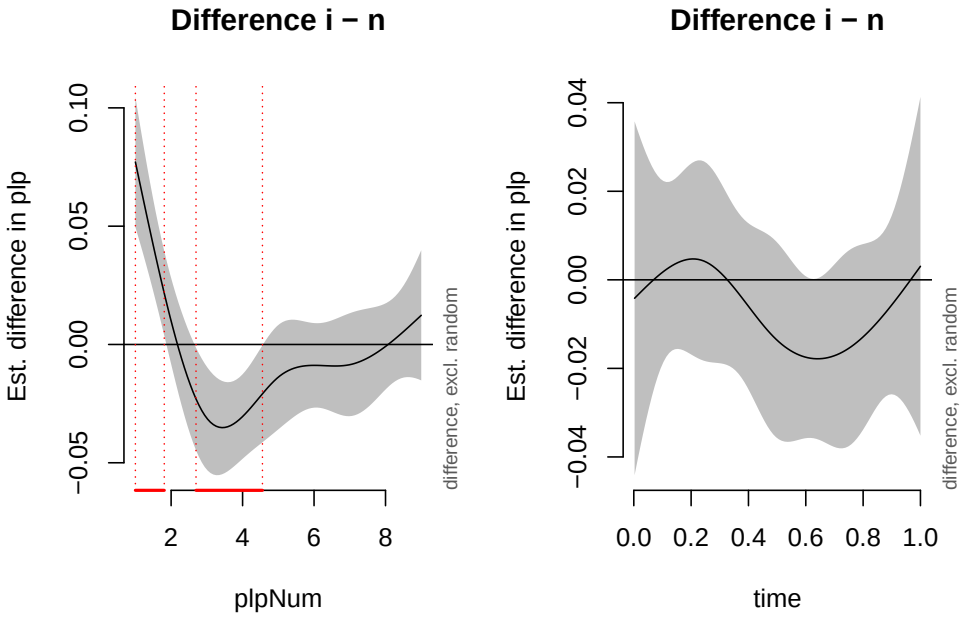
GAM with tensor product interaction for plp

```
m1plp=bam(plp ~ label + te(time, plpNum, by=label) + s(time, speaker, bs="fs", m=1)
          + s(plpNum, speaker, bs="fs", m=1), data=plpData)
m1plpViz = getViz(m1plp)
```

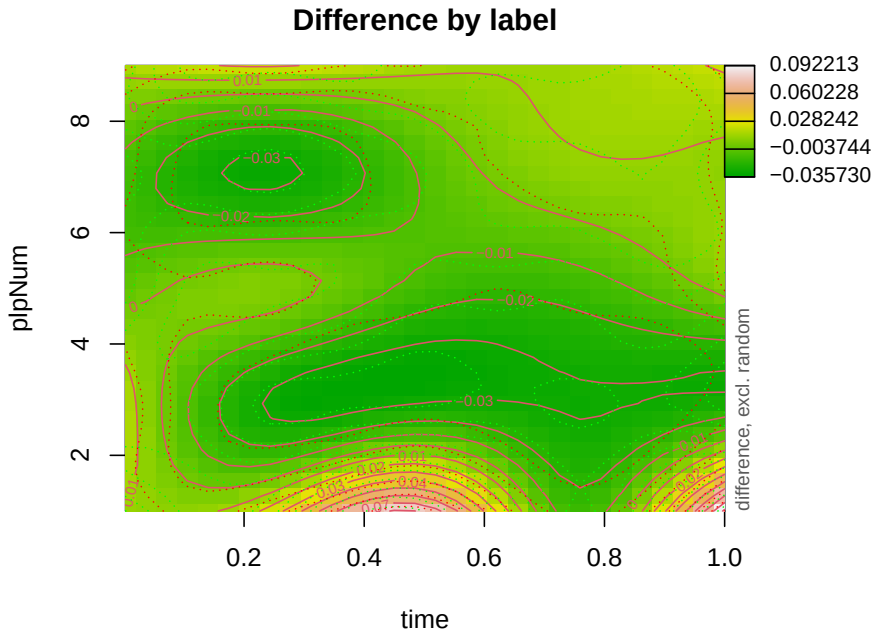
```
print(plot(m1plpViz, allTerms=T), pages=3)
```



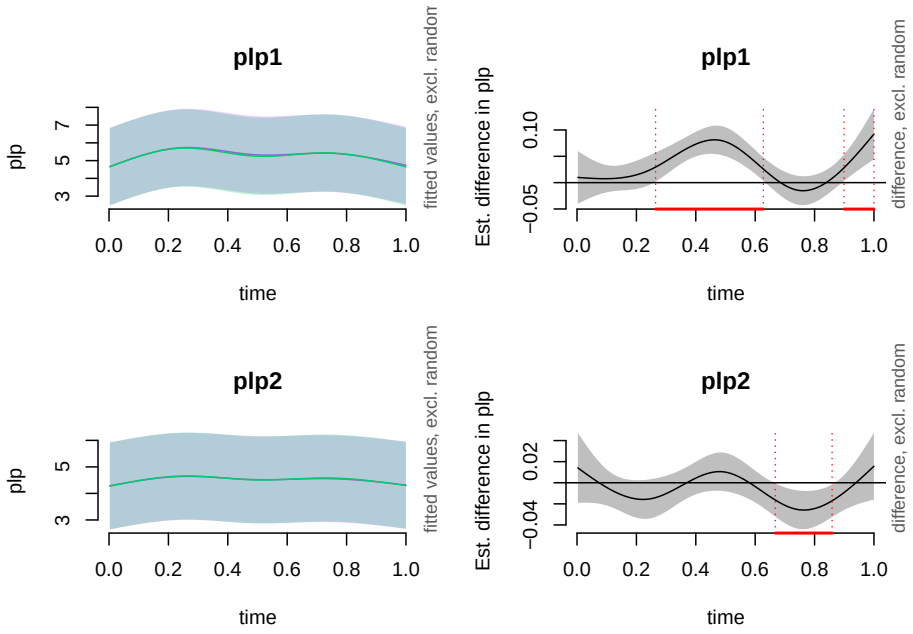

```
par(mfrow=c(1, 2))
plot_diff(m1plp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



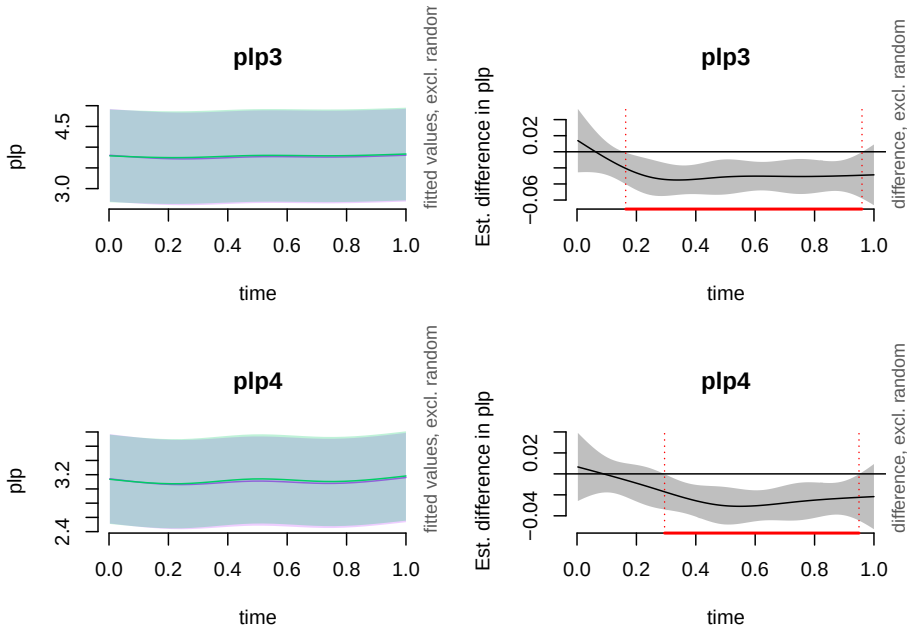
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(m1plp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



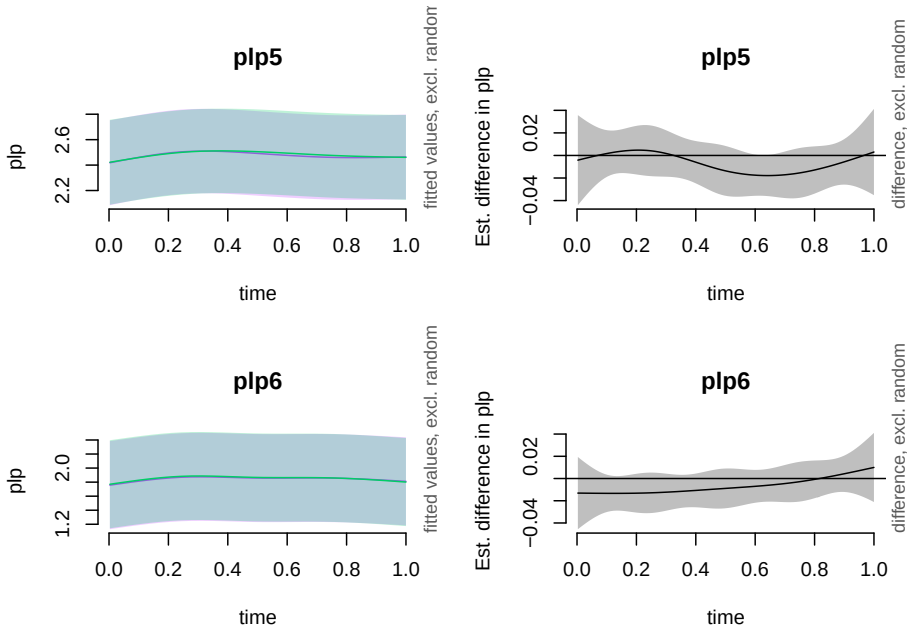

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



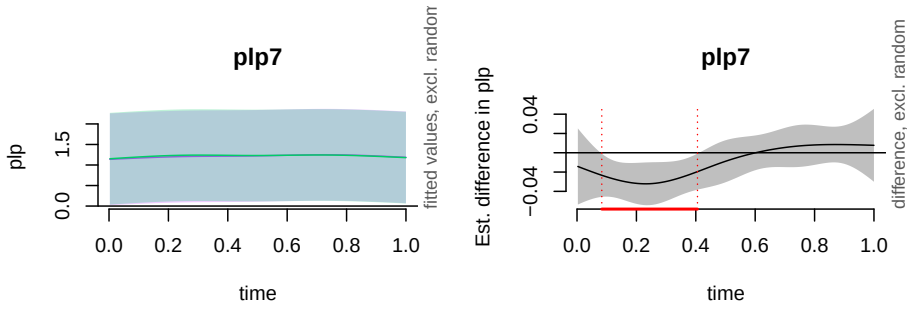

```
plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```

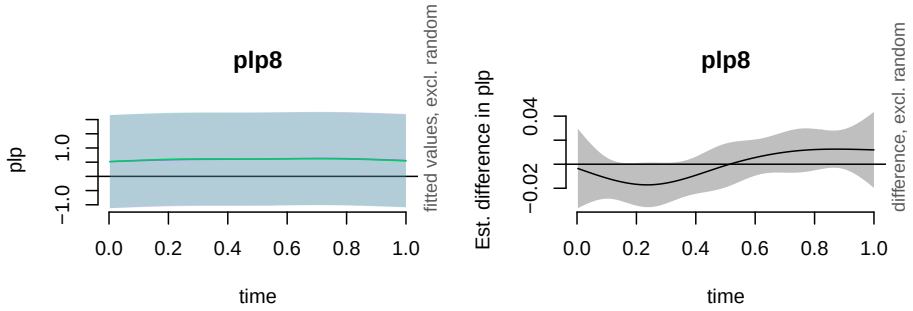



```
plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```

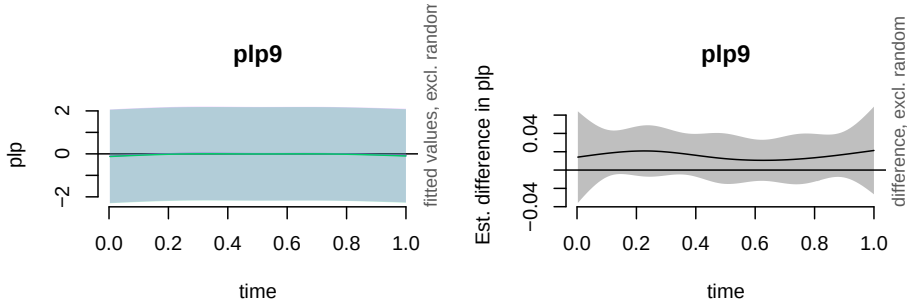



```
plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```






```
plot_smooth(m1plp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(m1plp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(m1plp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```



summary and plots

```
summary(m1plp)
```

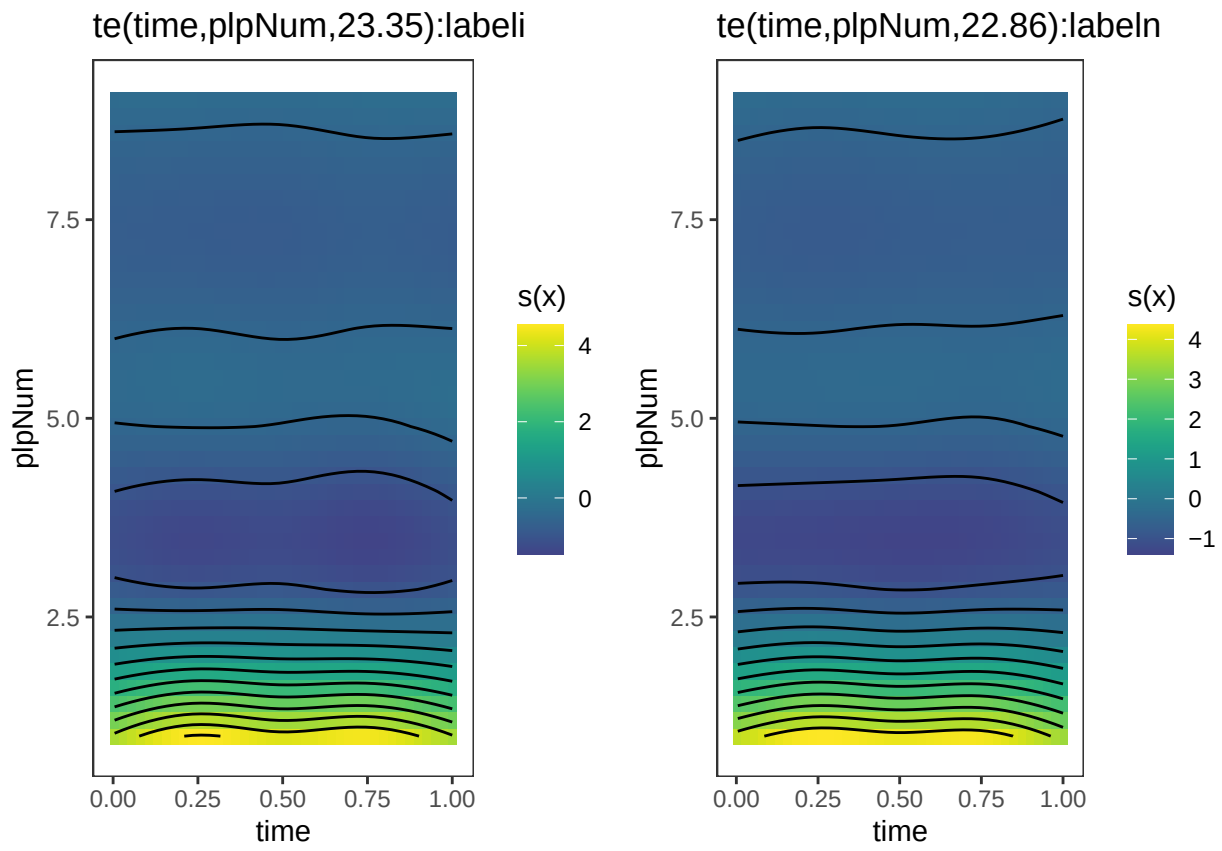
```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label) + s(time, speaker,
##     bs = "fs", m = 1) + s(plpNum, speaker, bs = "fs", m = 1)
##
## Parametric coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 2.556538   0.098236  26.024   <2e-16 ***
## labeln      0.002932   0.002274   1.289    0.197
## ---
## 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,plpNum):labeli 22.41  22.56  116.013  <2e-16 ***
## te(time,plpNum):labeln 22.23  22.38  118.451  <2e-16 ***
## s(time,speaker)        35.48  44.00    7.124  <2e-16 ***
## s(plpNum,speaker)      40.94  43.00 6426.418  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.958   Deviance explained = 95.8%
## fREML =  41051  Scale est. = 0.13066   n = 101250
```

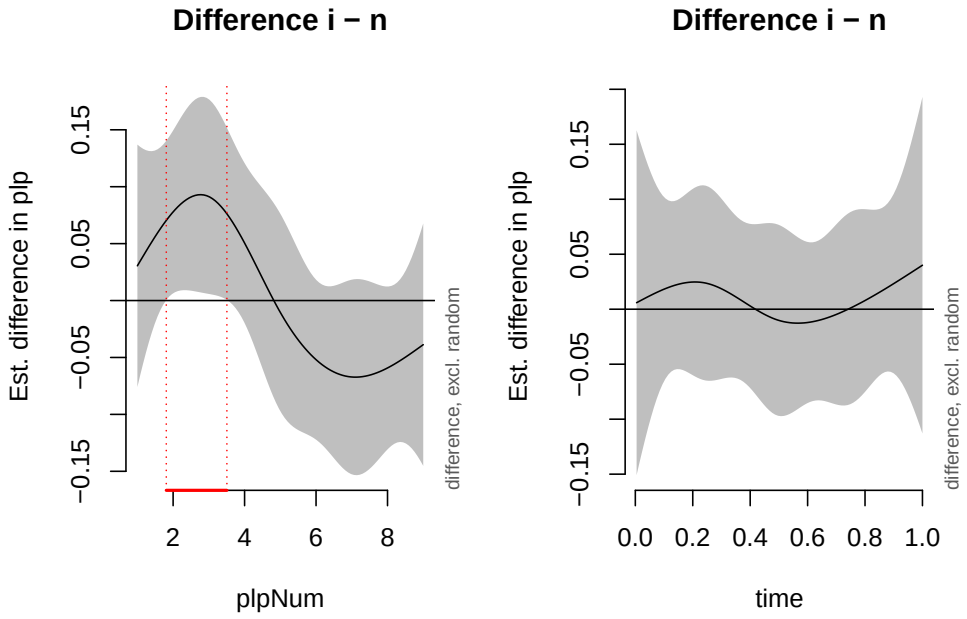
Individual Speaker Models Speaker B

```
mBplp=bam(plp ~ label + te(time, plpNum, by=label), data=bplp)
mBplpViz = getViz(mBplp)
```

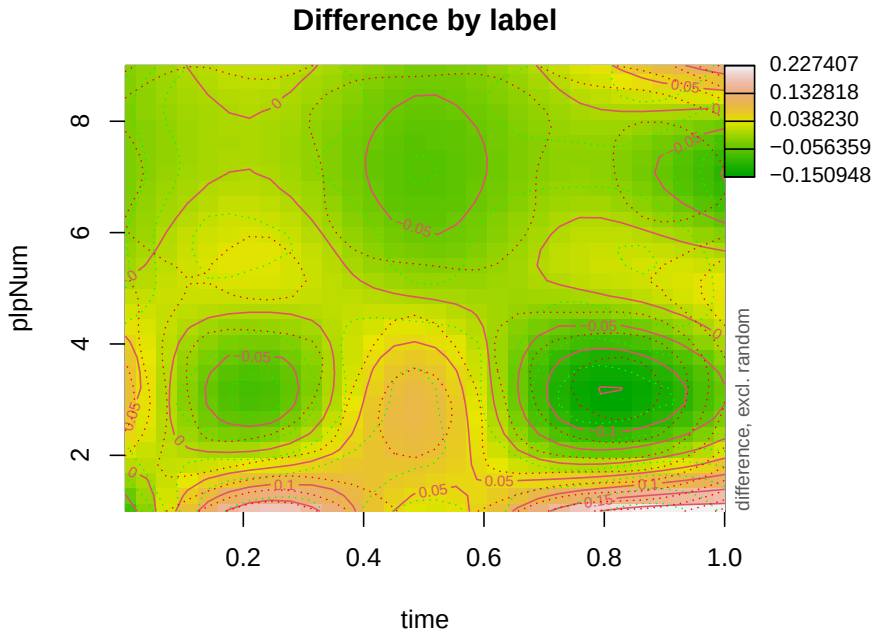
```
print(plot(mBplpViz, allTerms=T), pages=2)
```



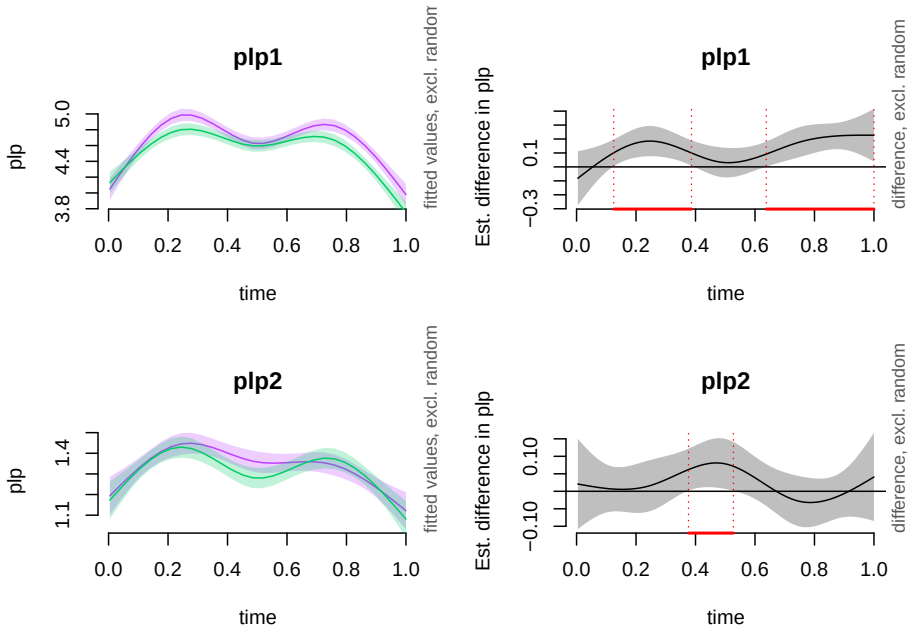

```
par(mfrow=c(1, 2))
plot_diff(mBplp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



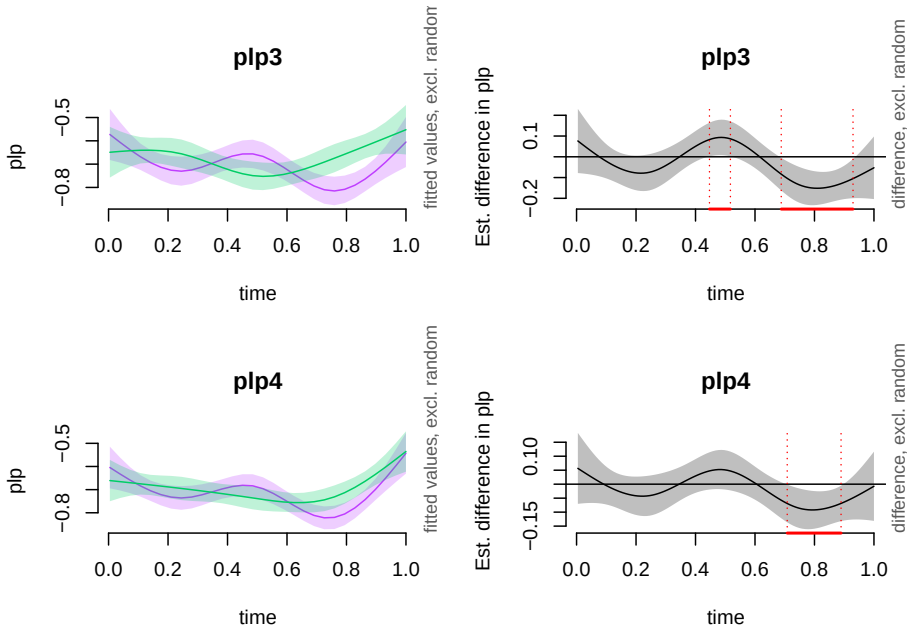
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(mBplp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



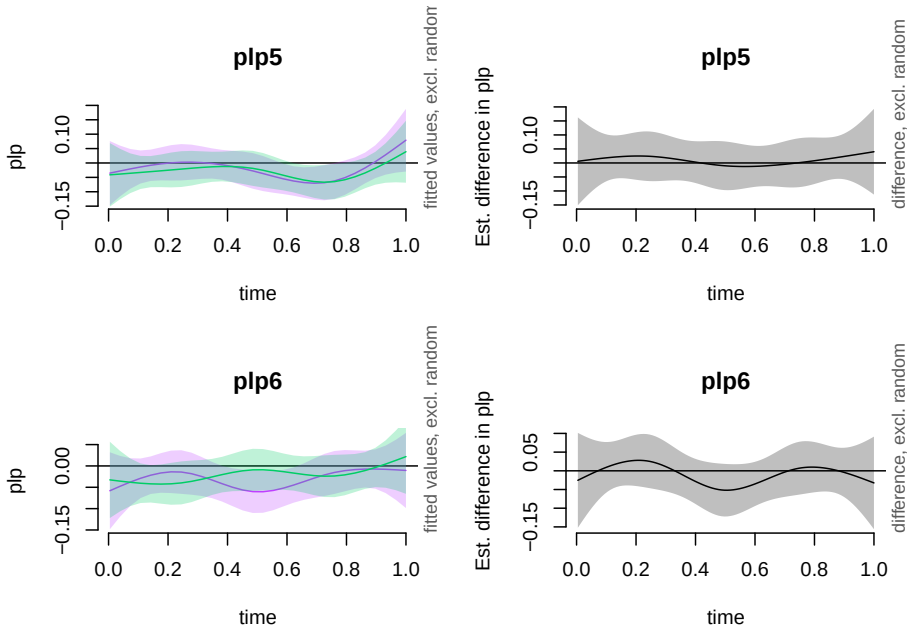

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



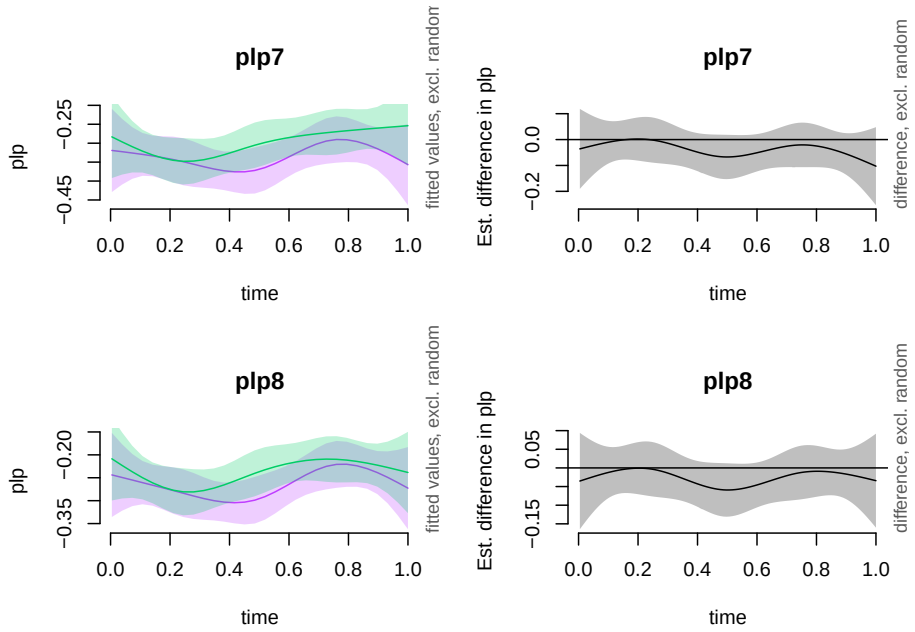

```
plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```



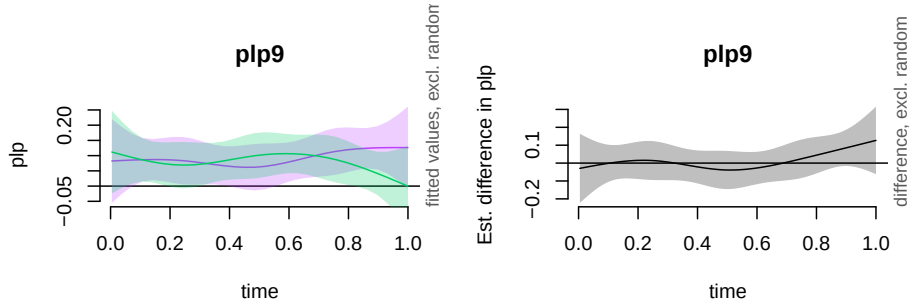

```
plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```




```
plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```




```
plot_smooth(mBplp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(mBplp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(mBplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```




```
summary(mBplp)
```

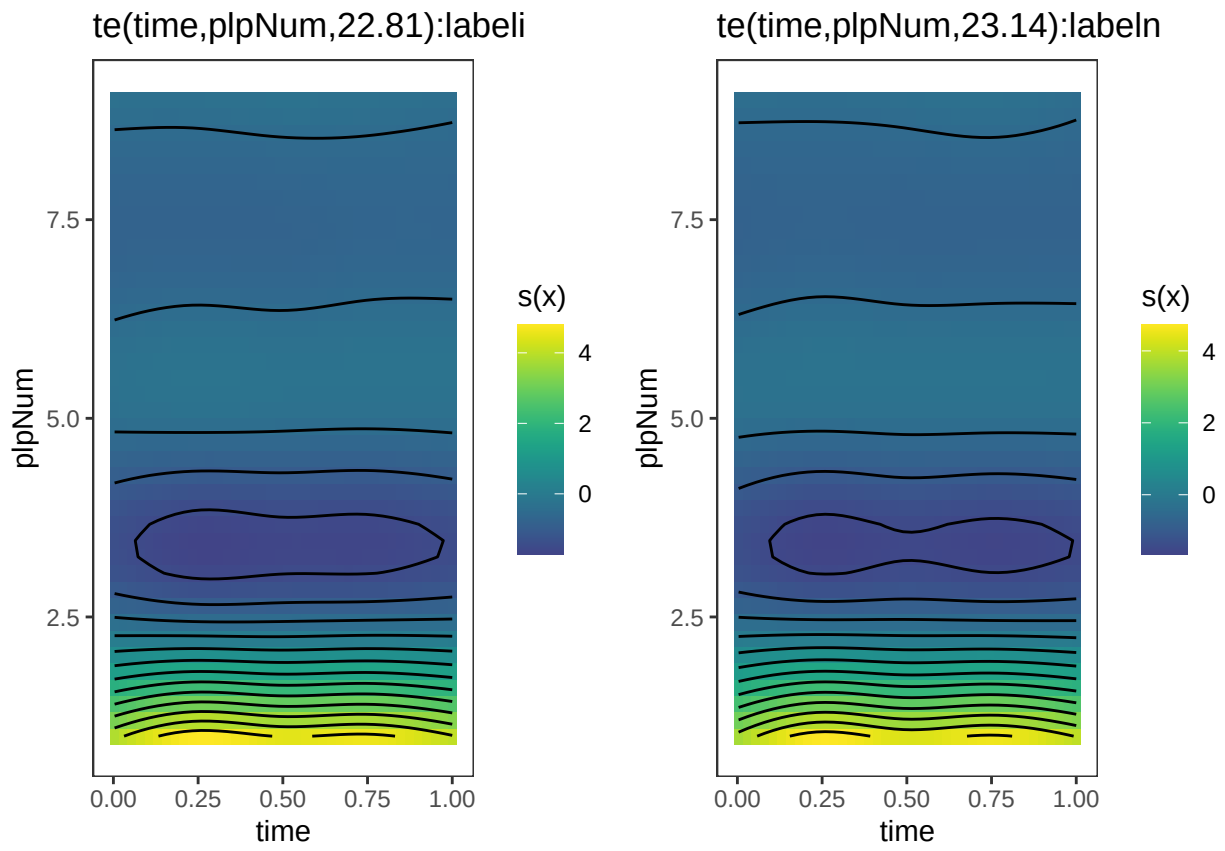
```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label)
##
## Parametric coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.440370   0.006474  68.017   <2e-16 ***
## labeln      -0.004573   0.009156  -0.499    0.617
## ---
## 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,plpNum):labeli 23.35  23.94 2558  <2e-16 ***
## te(time,plpNum):labeln 22.86  23.83 2426  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.855   Deviance explained = 85.5%
## fREML =  20166  Scale est. = 0.42394   n = 20250
```

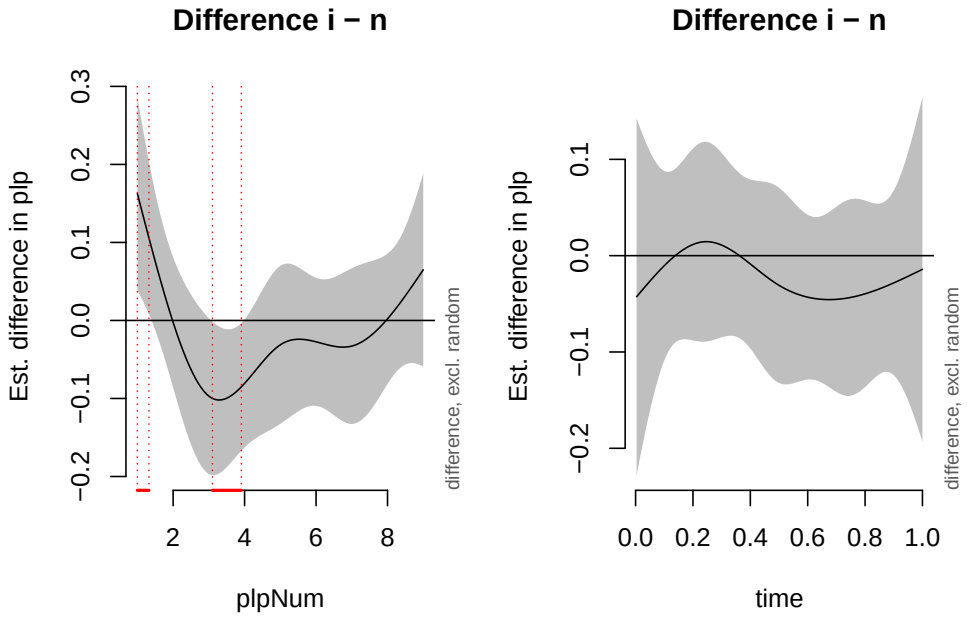
Speaker G

```
mGplp=bam(plp ~ label + te(time, plpNum, by=label), data=gplp)
mGplpViz = getViz(mGplp)
```

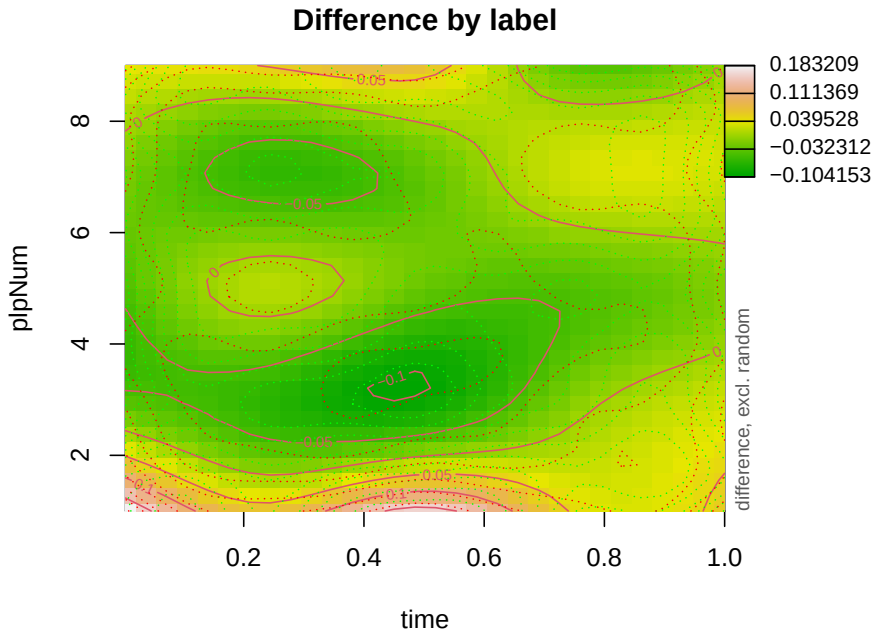
```
print(plot(mGplpViz, allTerms=T), pages=2)
```



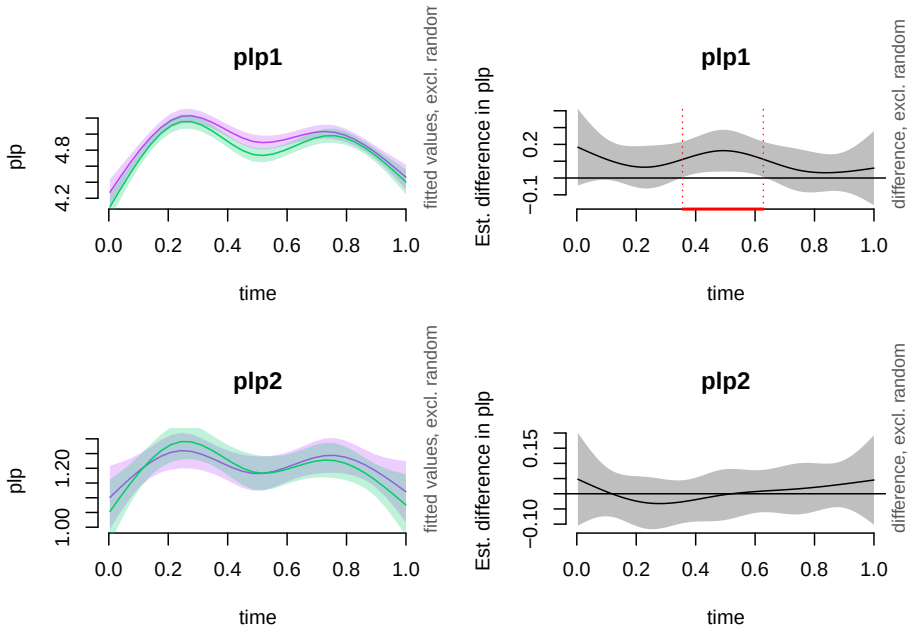

```
par(mfrow=c(1, 2))
plot_diff(mGplp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



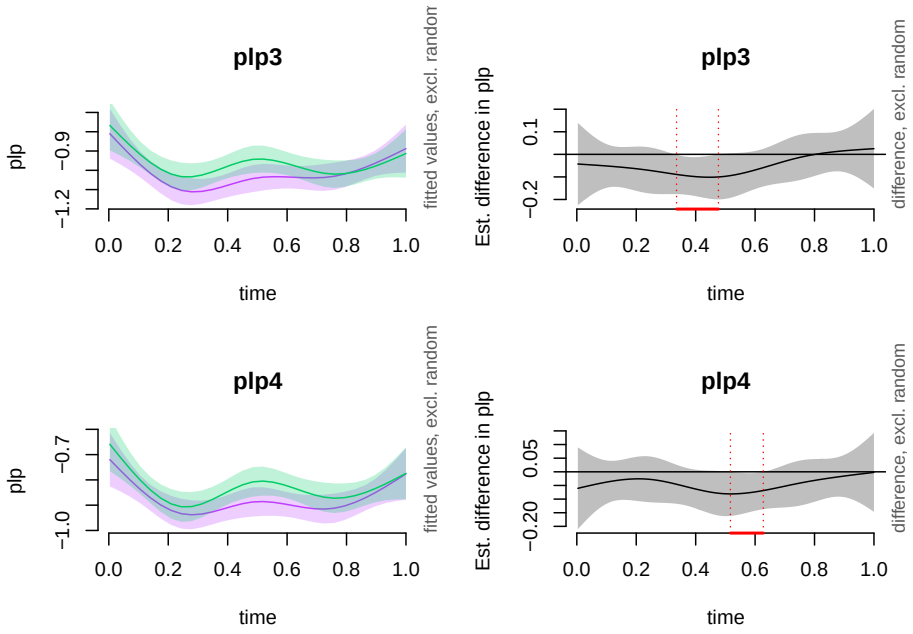
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(mGplp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



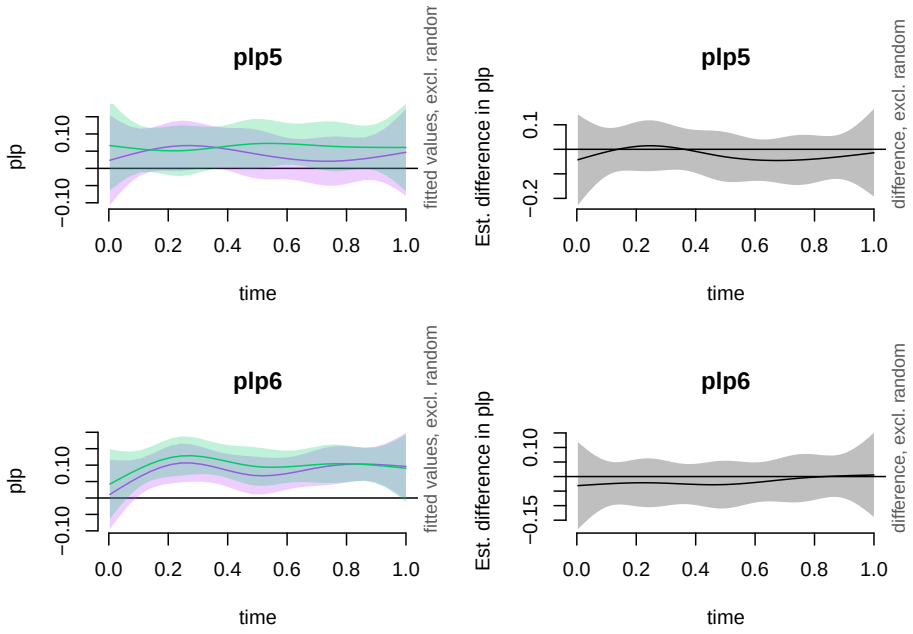

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



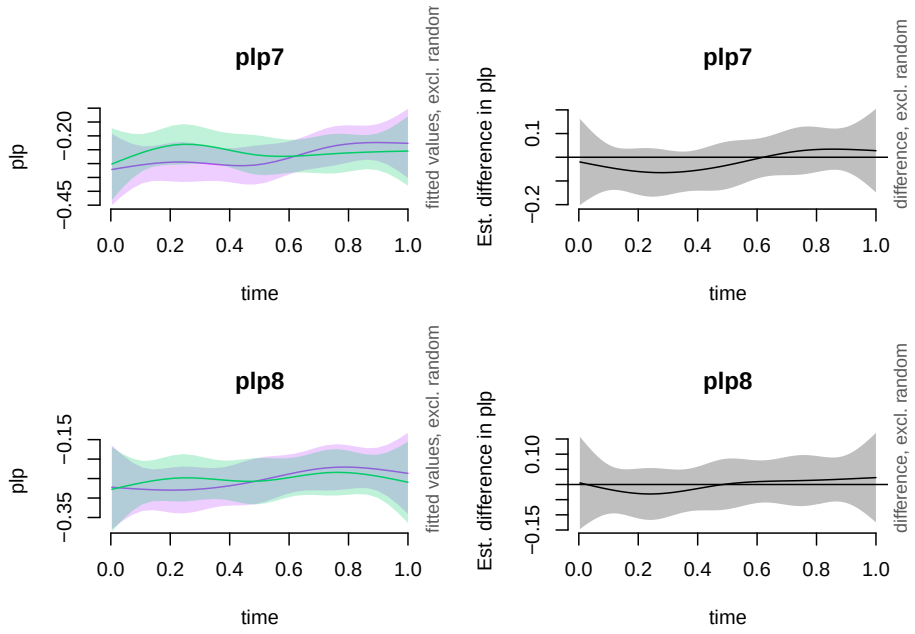

```
plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```



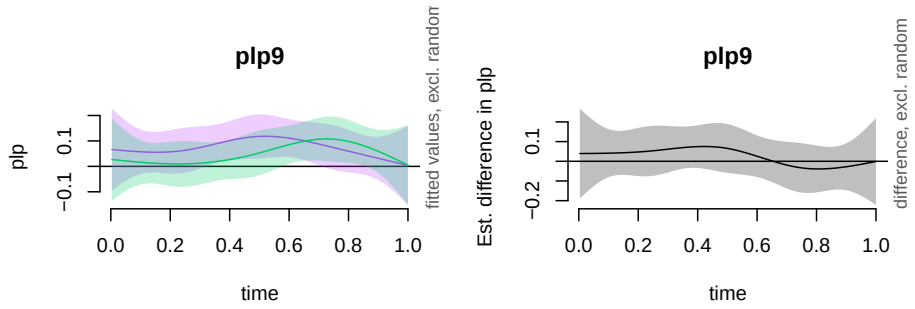

```
plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```




```
plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```




```
plot_smooth(mGplp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(mGplp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(mGplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```




```
summary(mGplp)
```

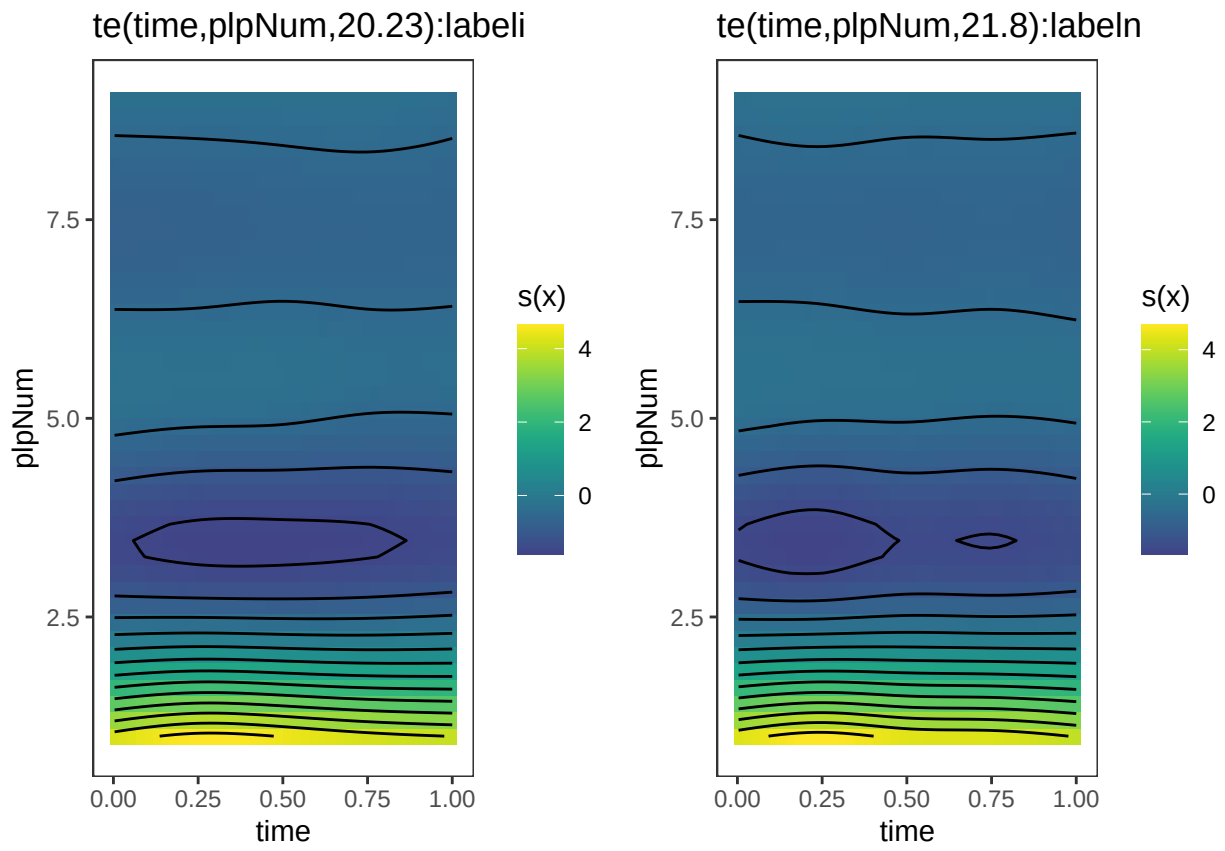
```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label)
##
## Parametric coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.426750   0.007604  56.121   <2e-16 ***
## labeln      0.003075   0.010754   0.286    0.775
## ---
## 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,plpNum):labeli 22.81  23.82 2100  <2e-16 ***
## te(time,plpNum):labeln 23.14  23.90 2002  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.829   Deviance explained = 82.9%
## fREML =  23420  Scale est. = 0.58485   n = 20250
```

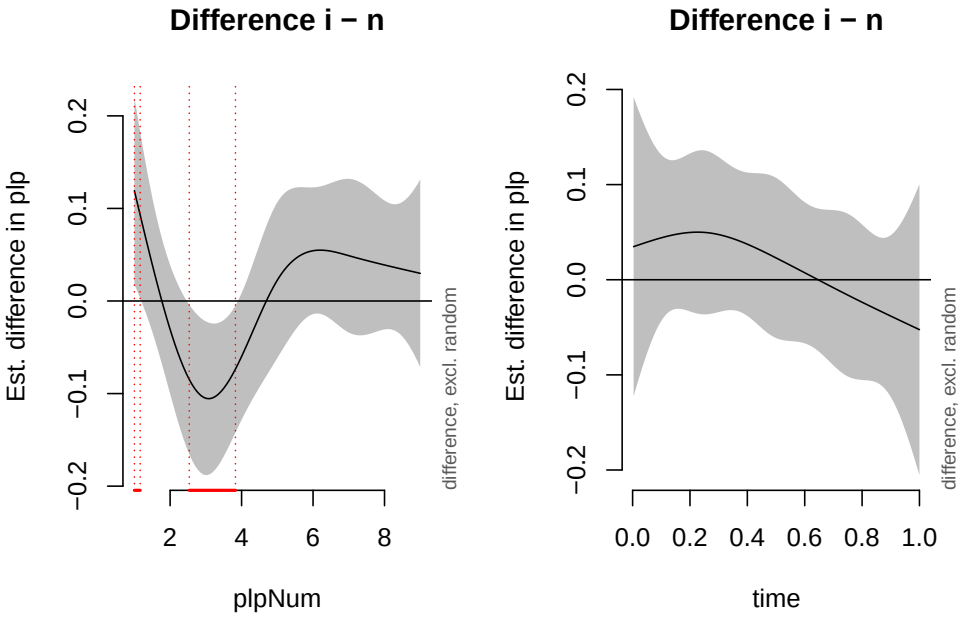
Speaker P

```
mPplp=bam(plp ~ label + te(time, plpNum, by=label), data=pplp)
mPplpViz = getViz(mPplp)
```

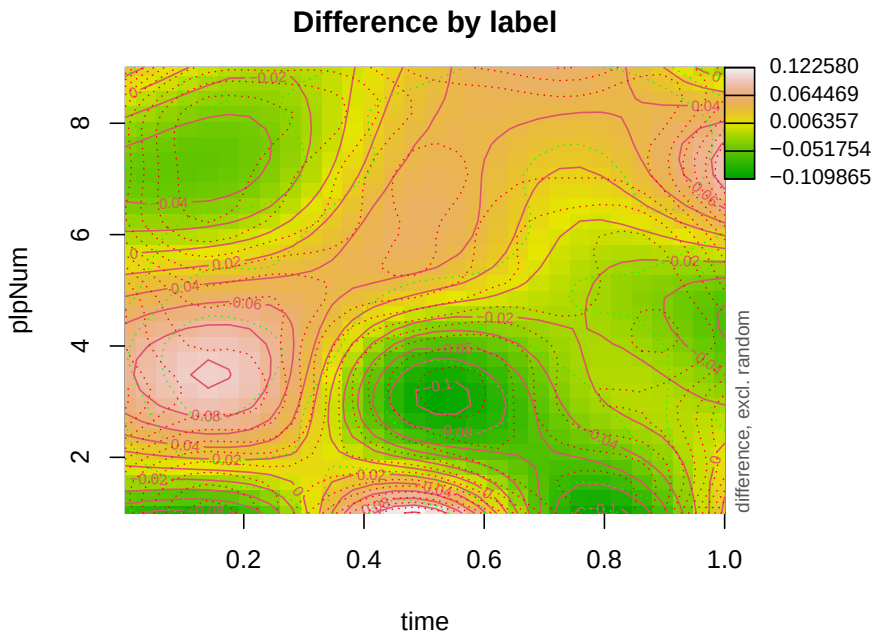
```
print(plot(mPplpViz, allTerms=T), pages=2)
```



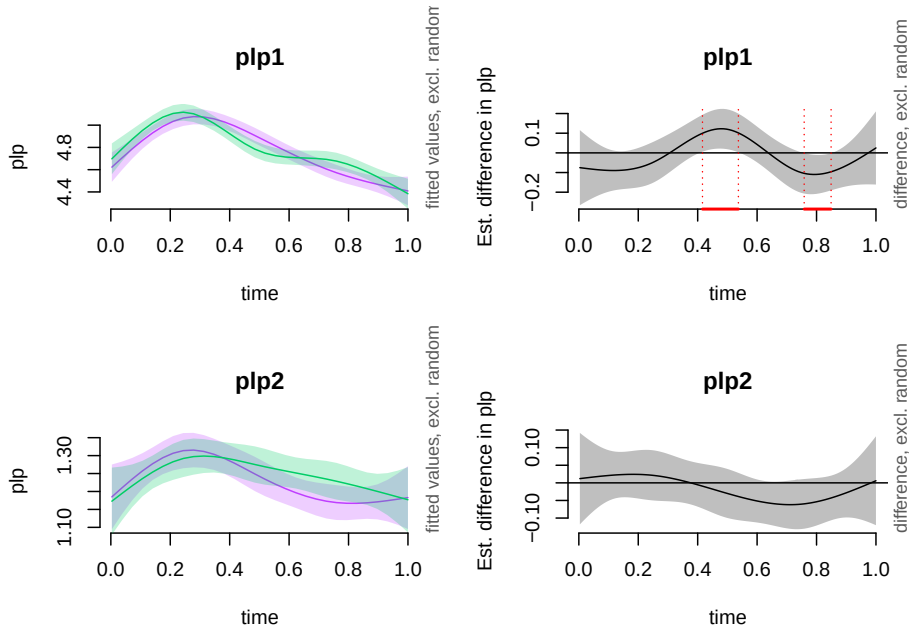

```
par(mfrow=c(1, 2))
plot_diff(mPplp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



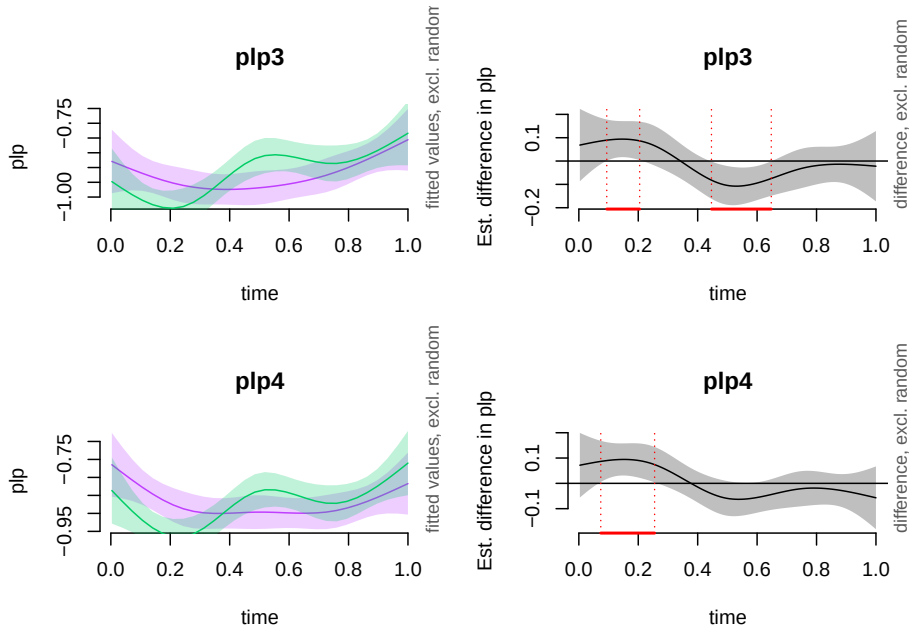
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(mPplp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



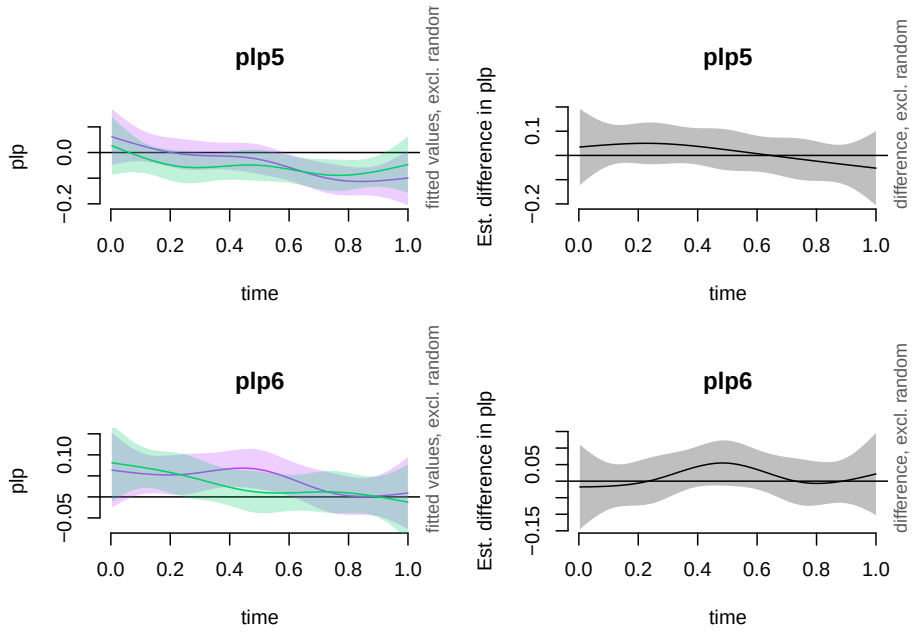

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



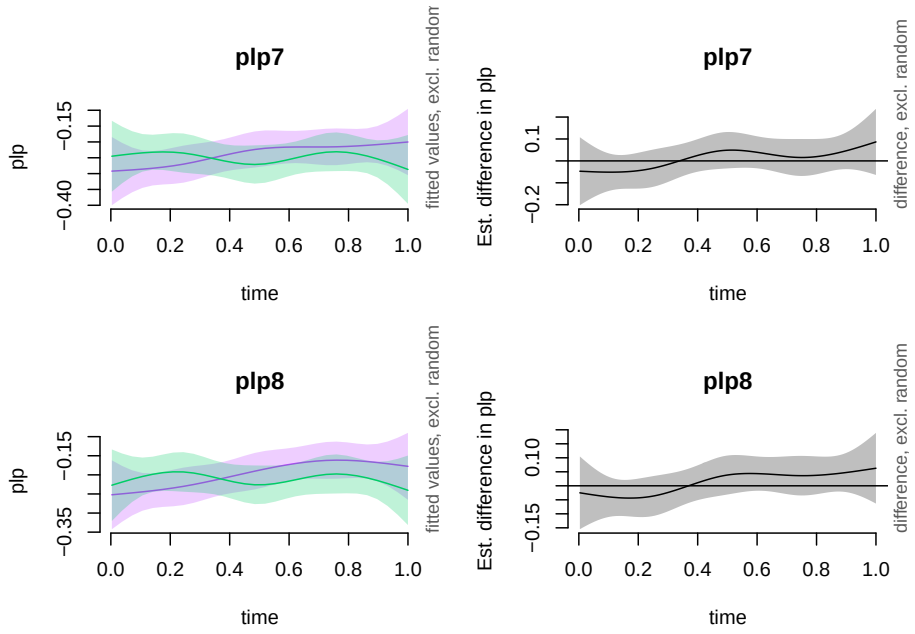

```
plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```



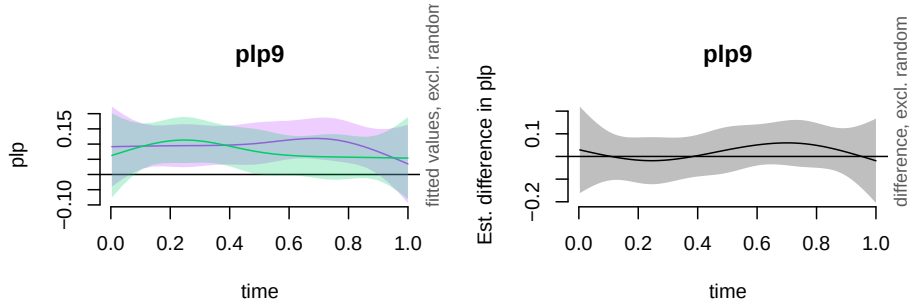

```
plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```




```
plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```




```
plot_smooth(mPplp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(mPplp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(mPplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```




```
summary(mPplp)
```

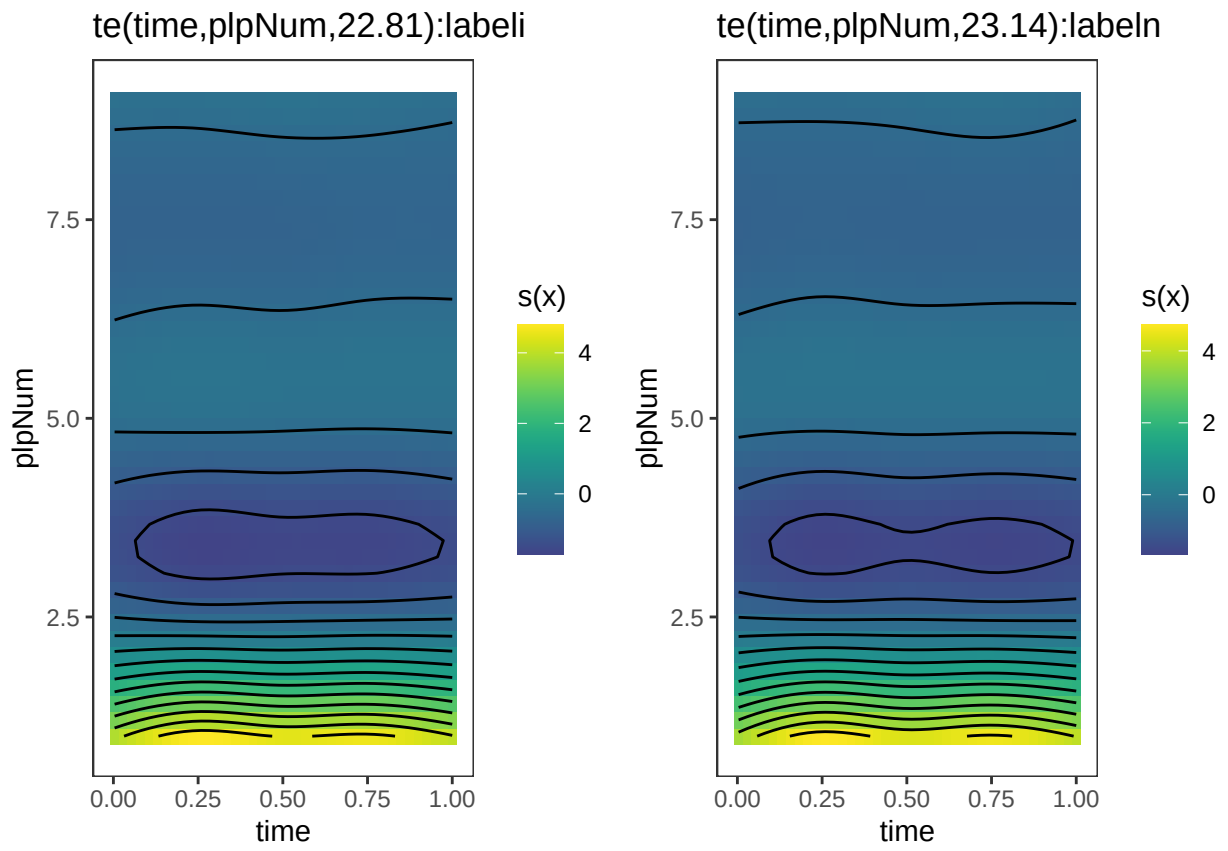
```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label)
##
## Parametric coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.422162   0.006768  62.375   <2e-16 ***
## labeln      -0.002786   0.009572  -0.291    0.771
## ---
## 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,plpNum):labeli 20.23  22.45 2644  <2e-16 ***
## te(time,plpNum):labeln 21.80  23.42 2559  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.855   Deviance explained = 85.5%
## fREML =  21046  Scale est. = 0.46333   n = 20250
```

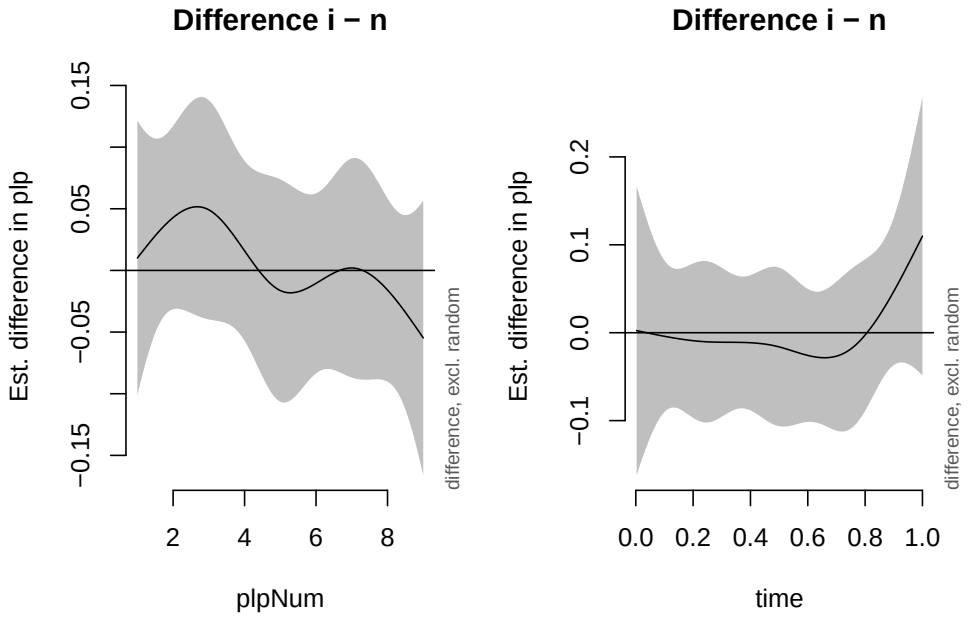
Speaker R

```
mRplp=bam(plp ~ label + te(time, plpNum, by=label), data=rplp)
mRplpViz = getViz(mGplp)
```

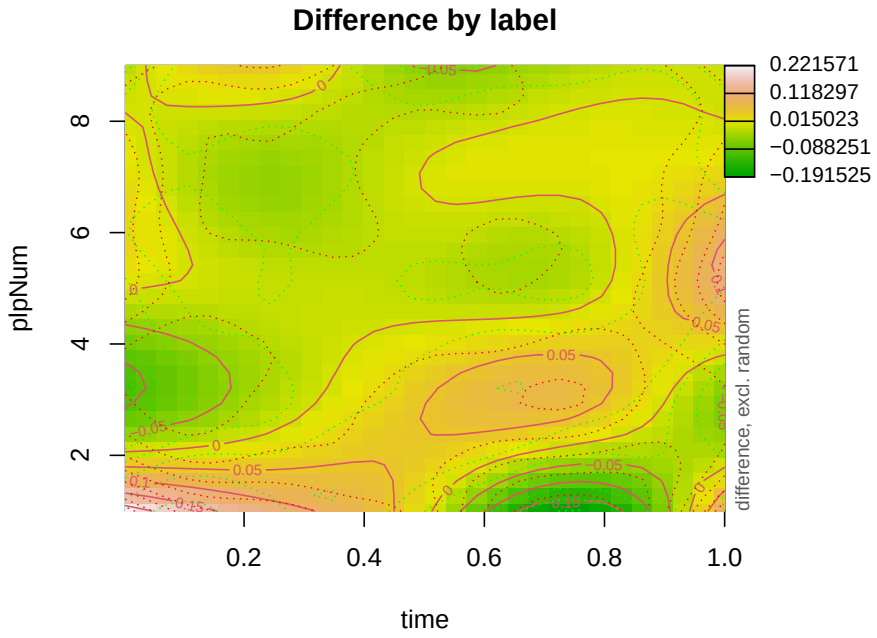
```
print(plot(mRplpViz, allTerms=T), pages=2)
```



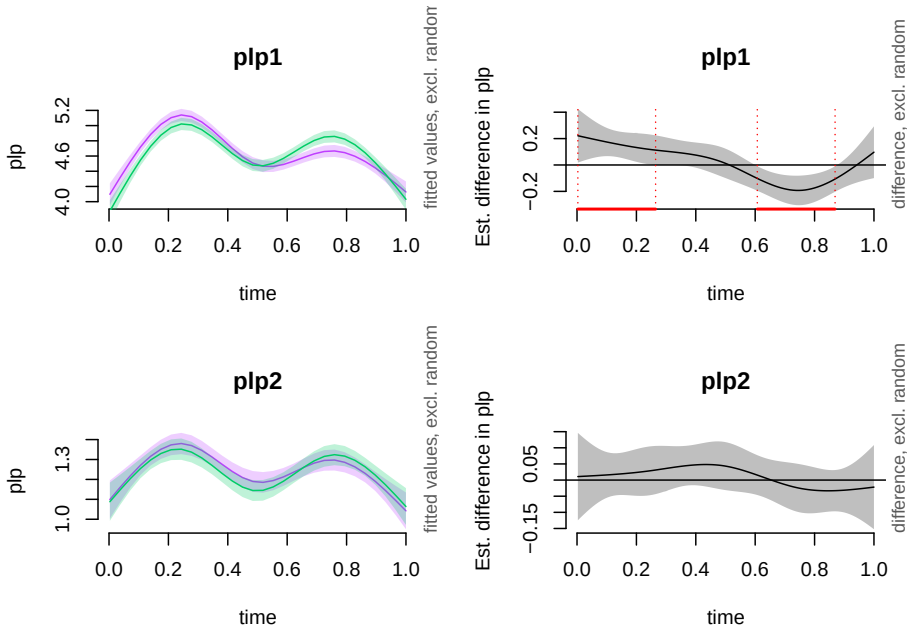

```
par(mfrow=c(1, 2))
plot_diff(mRplp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



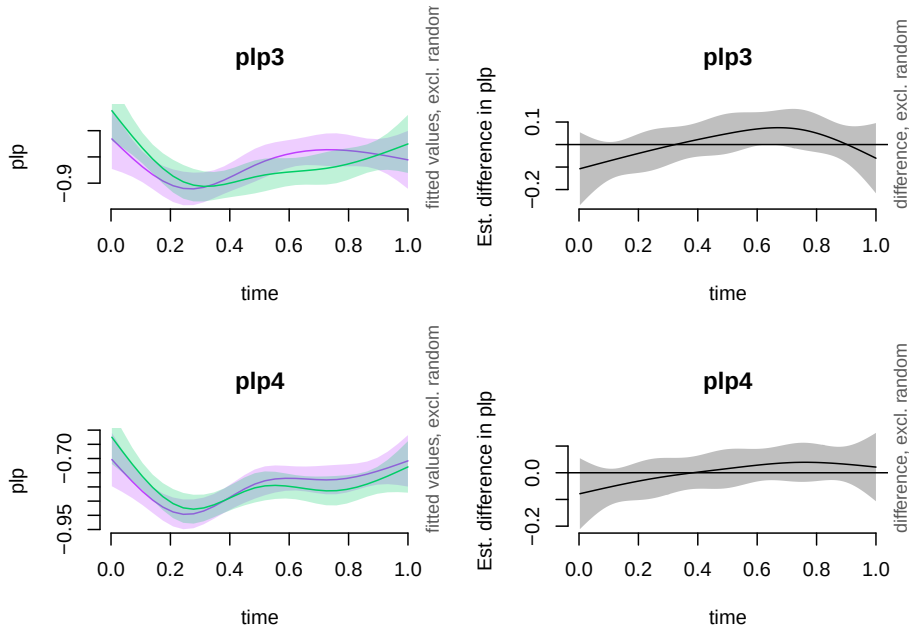
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(mRplp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



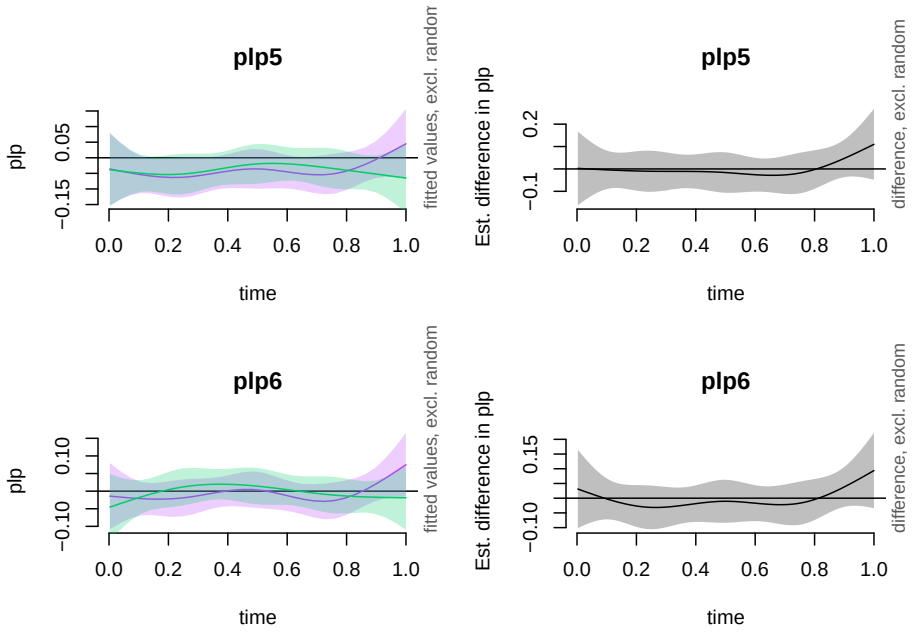

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



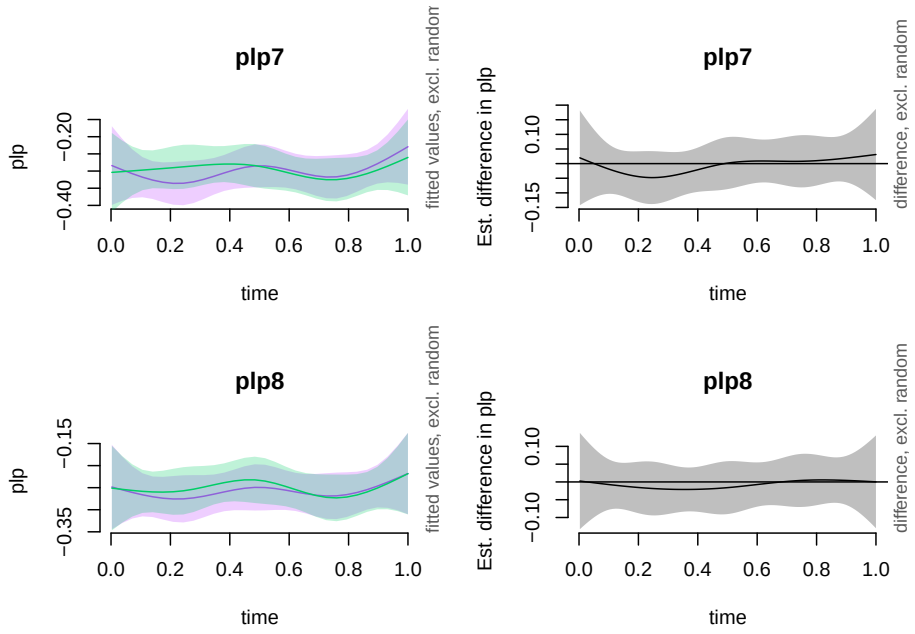

```
plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```



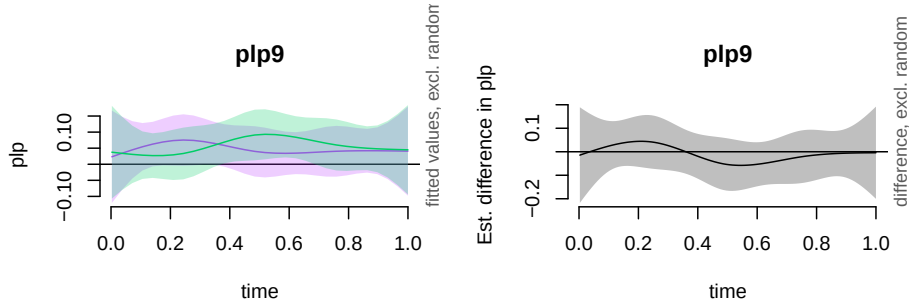

```
plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```




```
plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```




```
plot_smooth(mRplp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(mRplp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(mRplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```




```
summary(mRplp)
```

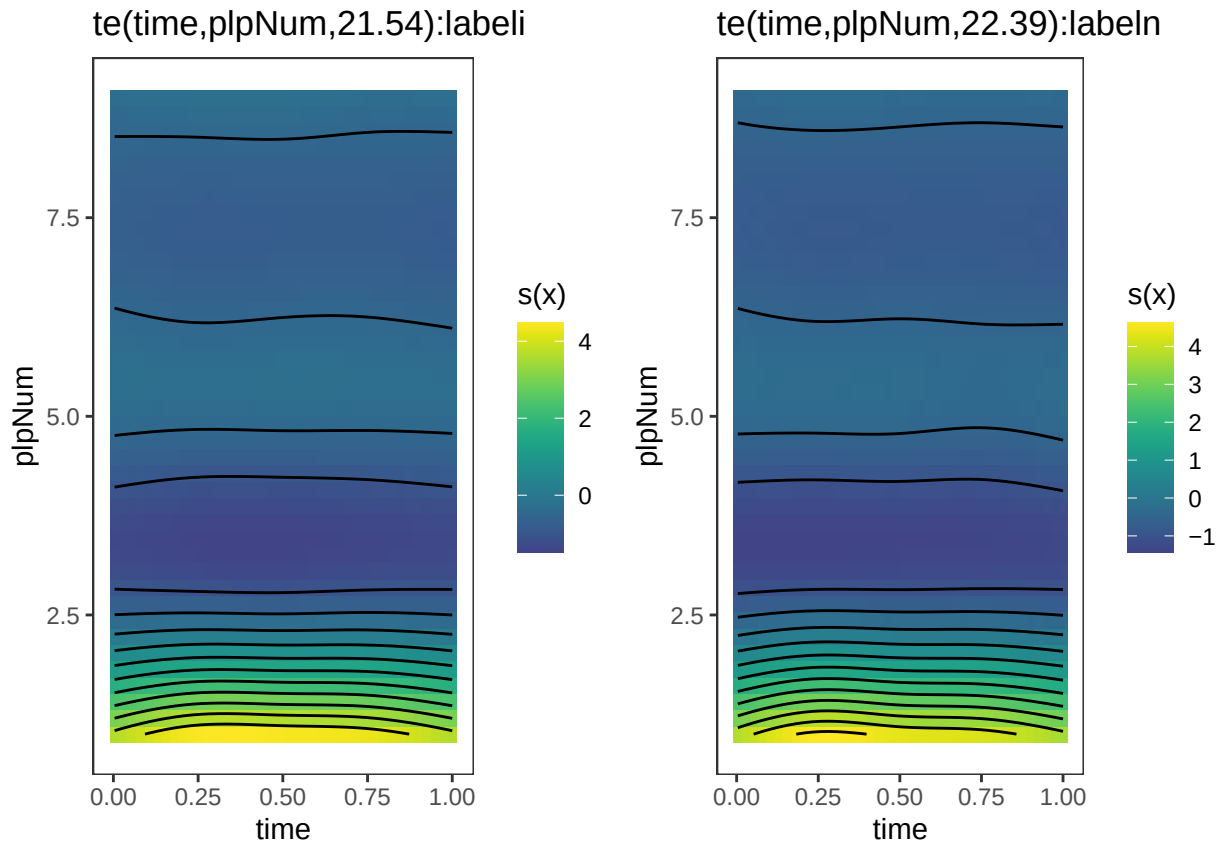
```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label)
##
## Parametric coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.4056759  0.0066459  61.041   <2e-16 ***
## labeln      -0.0009817  0.0093988  -0.104    0.917
## ---
## 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,plpNum):labeli 23.41  23.95 2437  <2e-16 ***
## te(time,plpNum):labeln 23.53  23.97 2421  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.852   Deviance explained = 85.2%
## fREML =  20703  Scale est. = 0.44673   n = 20250
```

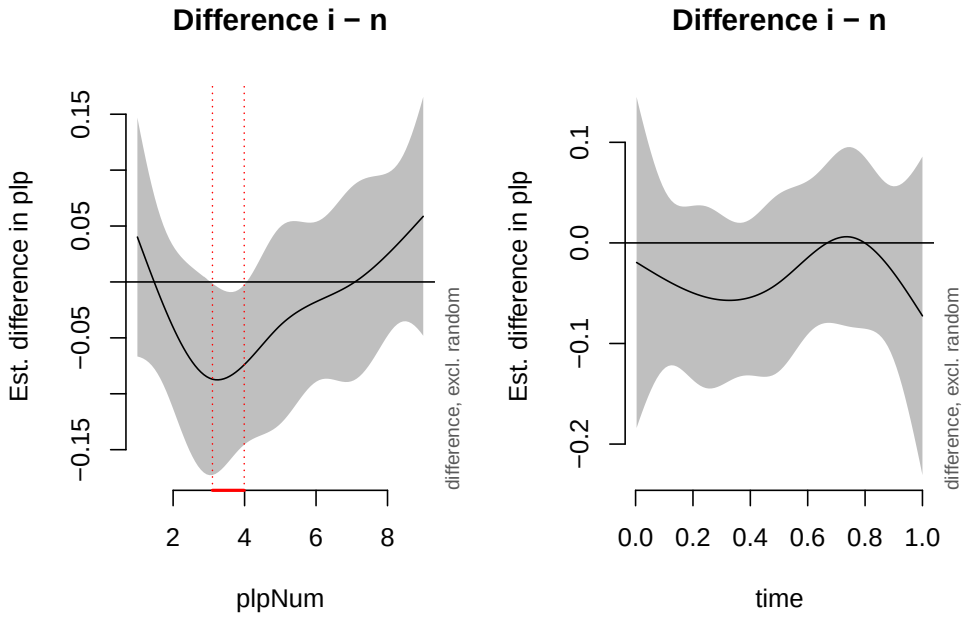
Speaker Y

```
mYplp=bam(plp ~ label + te(time, plpNum, by=label), data=yplp)
mYplpViz = getViz(mYplp)
```

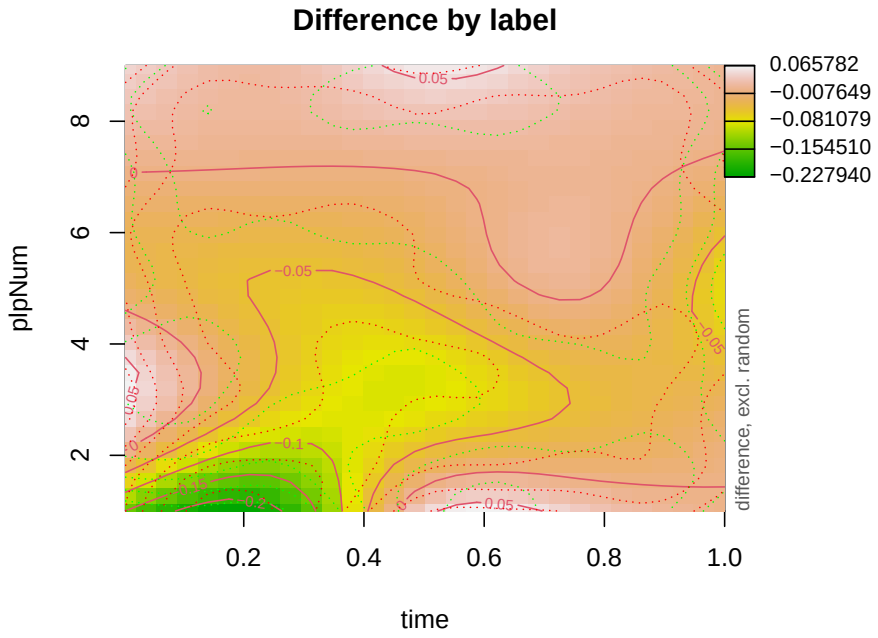
```
print(plot(mYplpViz, allTerms=T), pages=2)
```



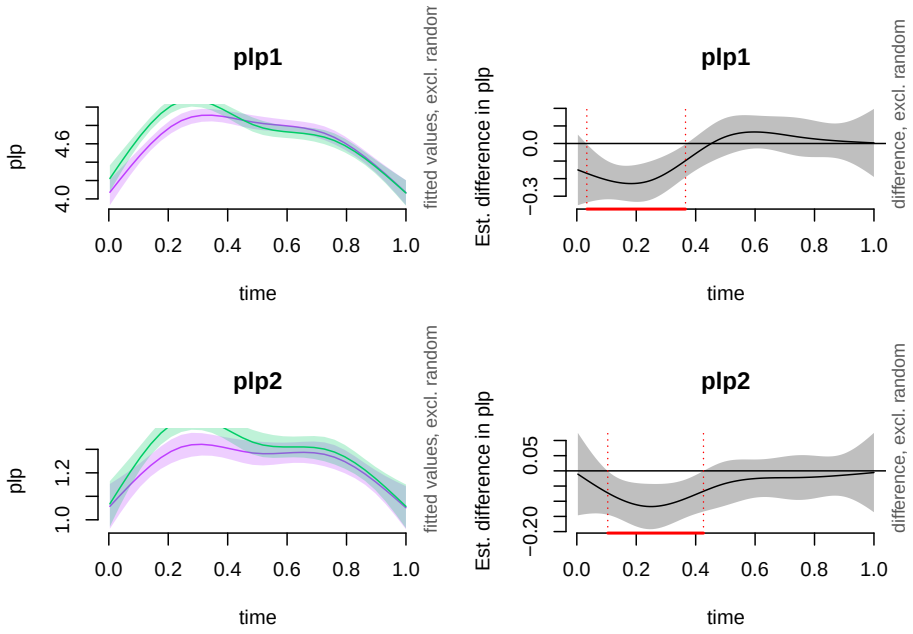

```
par(mfrow=c(1, 2))
plot_diff(mYplp, view="plpNum", shade=TRUE, comp=list(label=c("i", "n")))
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")))
```



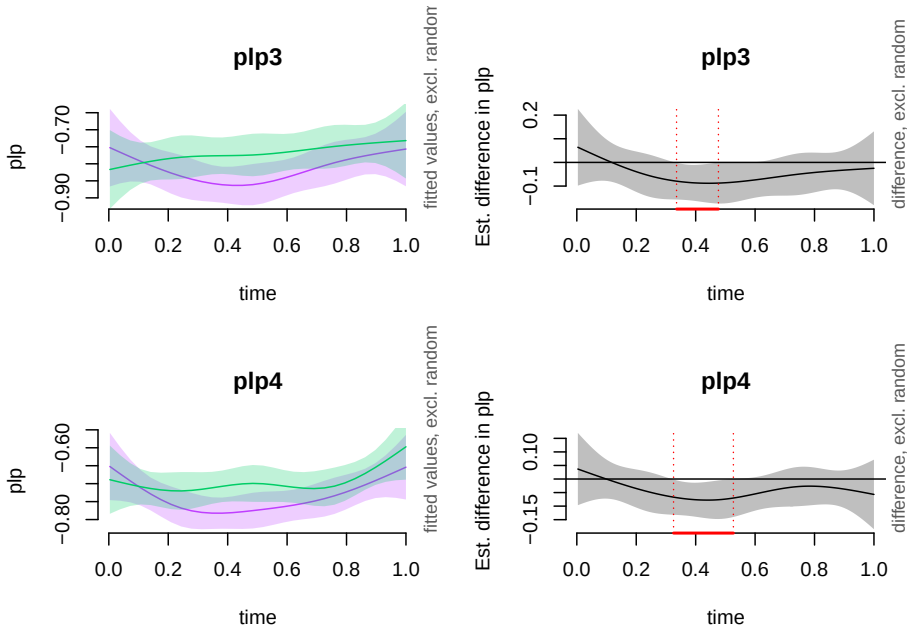
```
par(mfrow=c(1, 1))
par(mar=c(5, 5, 3, 8))
plot_diff2(mYplp, view=c("time", "plpNum"), comp=list(label=c("i", "n")),
           main="Difference by label")
```



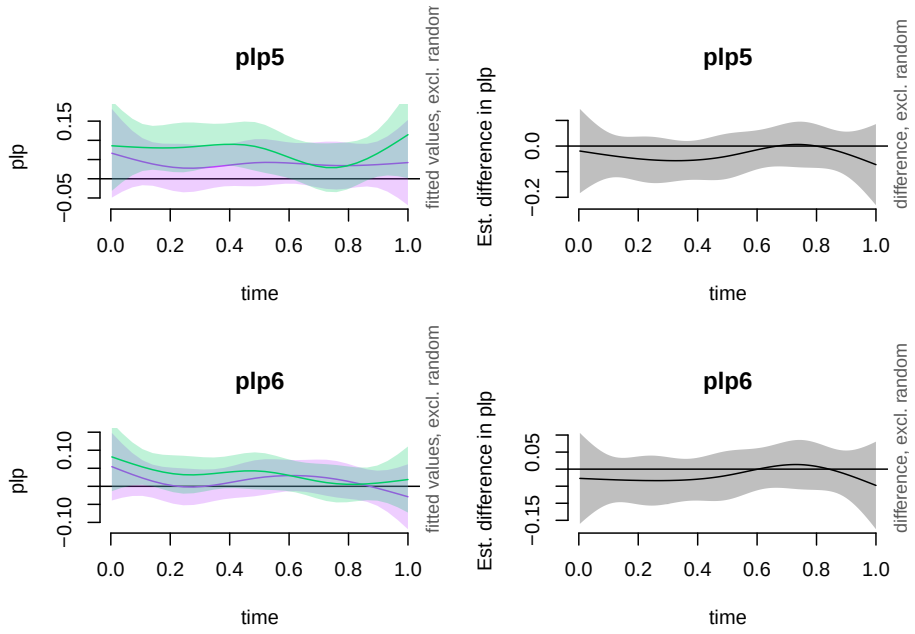

```
par(mfrow=c(2, 2))
plot.new
plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=1),
            col="darkorchid1", main="plp1")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=1),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=1), main="plp1")

plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=2),
            col="darkorchid1", main="plp2")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=2),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=2), main="plp2")
```



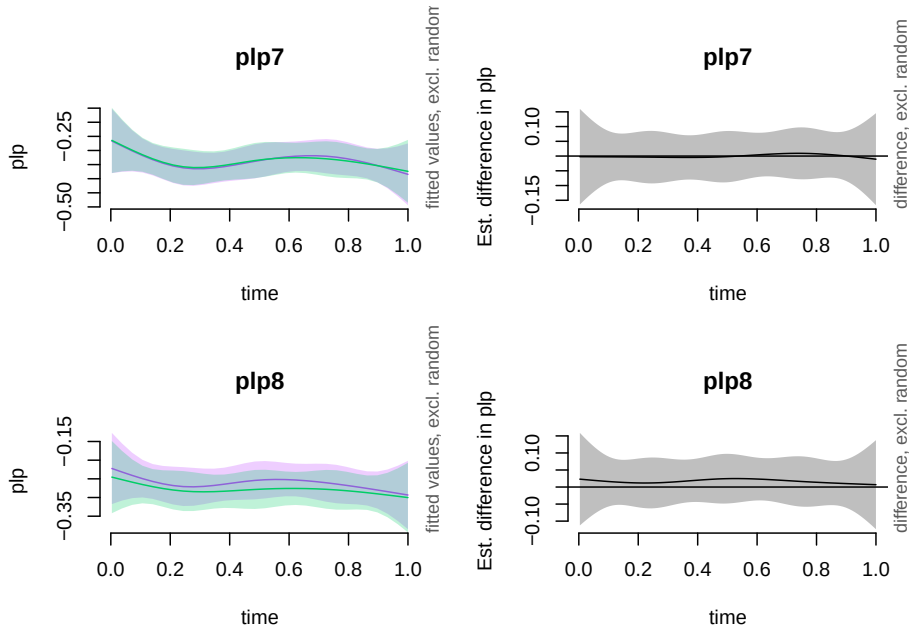

```
plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=3),
            col="darkorchid1", main="plp3")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=3),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=3), main="plp3")

plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=4),
            col="darkorchid1", main="plp4")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=4),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=4), main="plp4")
```



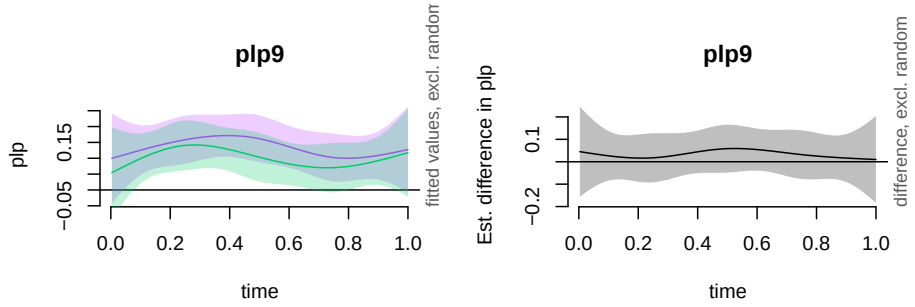

```
plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=5),
            col="darkorchid1", main="plp5")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=5),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=5), main="plp5")

plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=6),
            col="darkorchid1", main="plp6")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=6),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=6), main="plp6")
```




```
plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=7),
            col="darkorchid1", main="plp7")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=7),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=7), main="plp7")

plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=8),
            col="darkorchid1", main="plp8")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=8),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=8), main="plp8")
```




```
plot_smooth(mYplp, view="time", cond=list("label"="i", plpNum=9),
            col="darkorchid1", main="plp9")
plot_smooth(mYplp, view="time", cond=list("label"="n", plpNum=9),
            col="springgreen3", main="", add=TRUE)
plot_diff(mYplp, view="time", shade=TRUE, comp=list(label=c("i", "n")),
          cond=list(plpNum=9), main="plp9")
```




```
summary(mYplp)
```

```
##
```

```
## Family: gaussian
## Link function: identity
##
## Formula:
## plp ~ label + te(time, plpNum, by = label)
##
## Parametric coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.428881   0.006855  62.560   <2e-16 ***
## labeln      0.021519   0.009695   2.219   0.0265 *
## ---
## 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,plpNum):labeli 21.54  23.29 2325  <2e-16 ***
## te(time,plpNum):labeln 22.39  23.68 2321  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) =  0.843   Deviance explained = 84.4%
## fREML =  21311  Scale est. = 0.47538   n = 20250
```