Tracegram pilot

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08/03/2017

1 Data import

```
degg.tracing <- read_csv("./tracegram-pilot/results/results.csv") %>%
    separate(file, c("speaker", "phonation")) %>%
    mutate_if(is.character, as.factor) %>%
    mutate(phonation = factor(phonation, levels = c("modal", "breathy"))) %>%
    gather(peak, value, degg.maximum:degg.minimum)
```

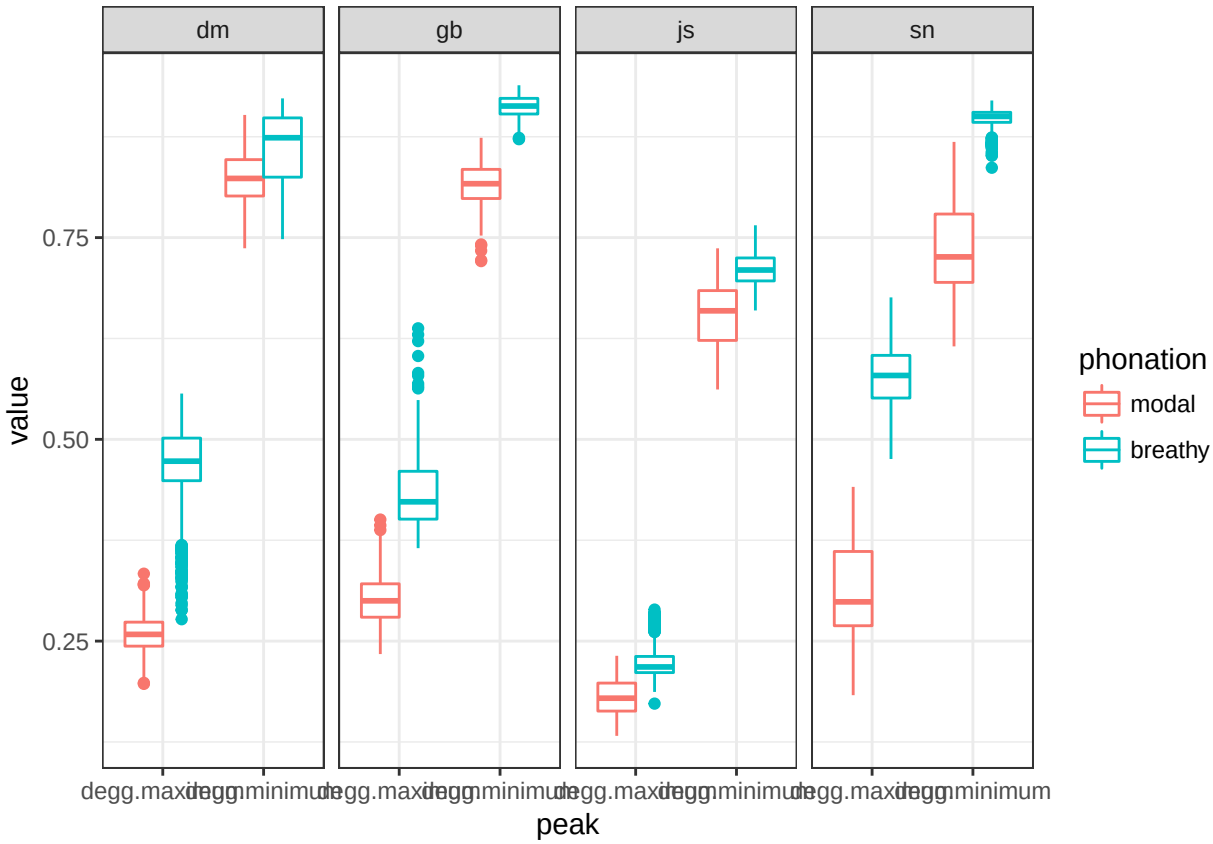
```
## Parsed with column specification:
## cols(
##   file = col_character(),
##   token = col_integer(),
##   time = col_double(),
##   egg.minimum = col_double(),
##   degg.maximum = col_double(),
##   degg.minimum = col_double()
## )
```

```
quotient <- read_csv("./tracegram-pilot/results/results.csv") %>%
    separate(file, c("speaker", "phonation")) %>%
    mutate_if(is.character, as.factor) %>%
    mutate(phonation = factor(phonation, levels = c("modal", "breathy")),
           closed.quotient = degg.minimum - degg.maximum
           ) %>%
    filter(speaker != "js")
```

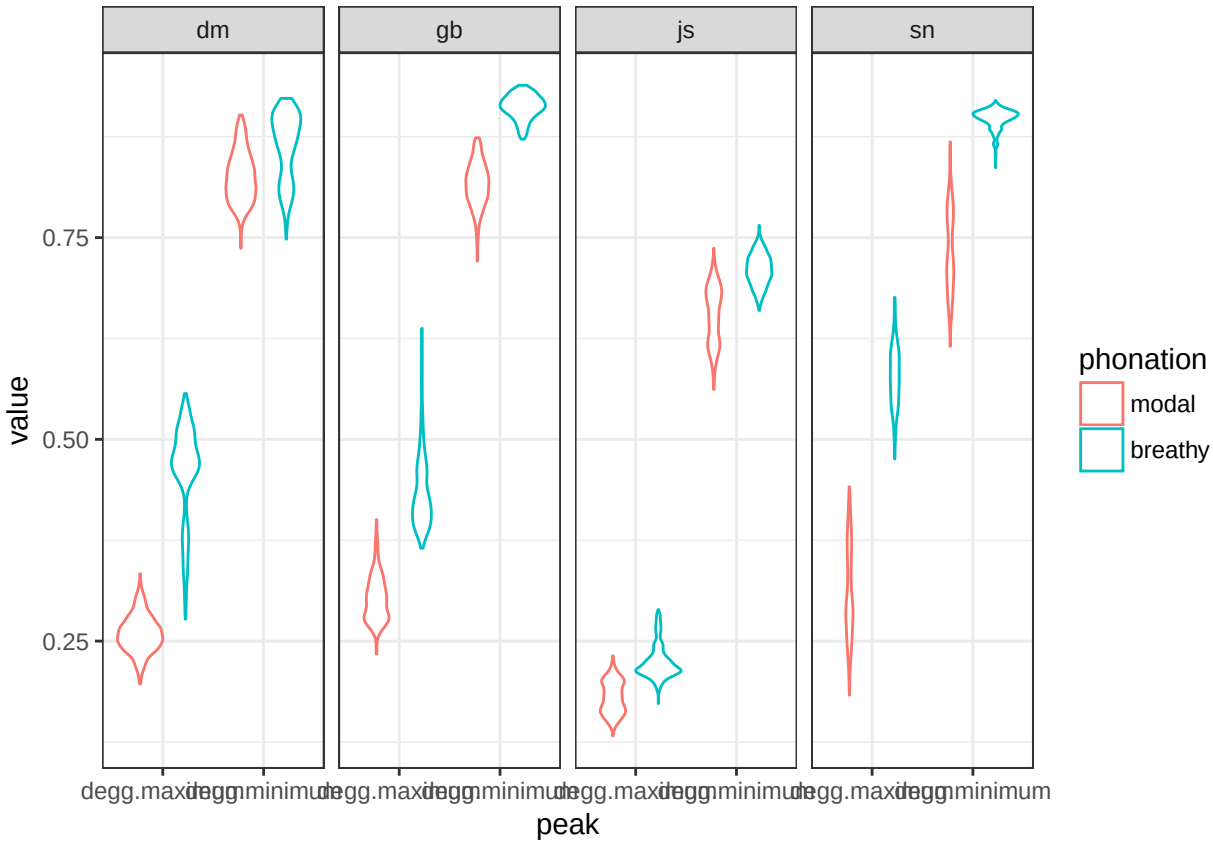
```
## Parsed with column specification:
## cols(
##   file = col_character(),
##   token = col_integer(),
##   time = col_double(),
##   egg.minimum = col_double(),
##   degg.maximum = col_double(),
##   degg.minimum = col_double()
## )
```

2 dEGG maxima and minima

```
ggplot(degg.tracing, aes(peak, value, colour = phonation)) +
    geom_boxplot() +
    facet_grid(. ~ speaker)
```

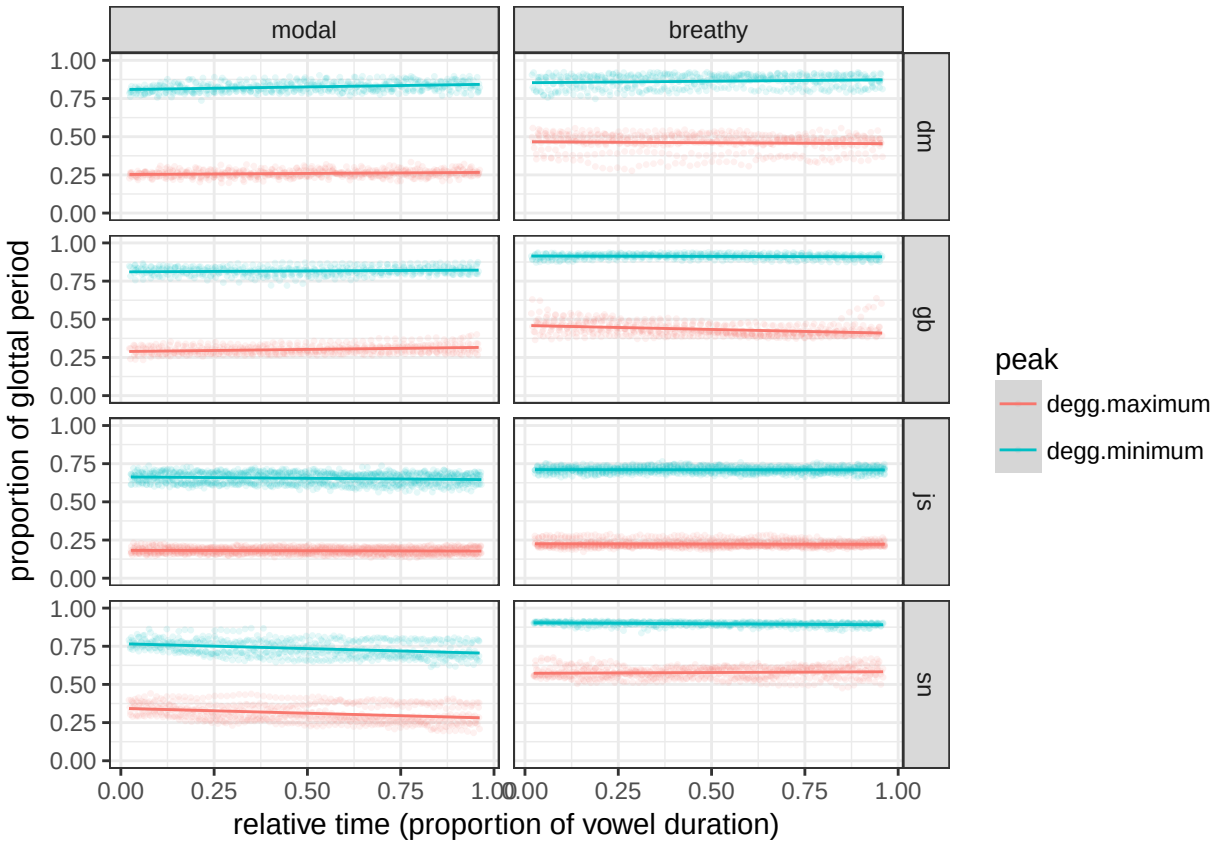



```
ggplot(degg.tracing, aes(peak, value, colour = phonation)) +
    geom_violin() +
    facet_grid(. ~ speaker)
```



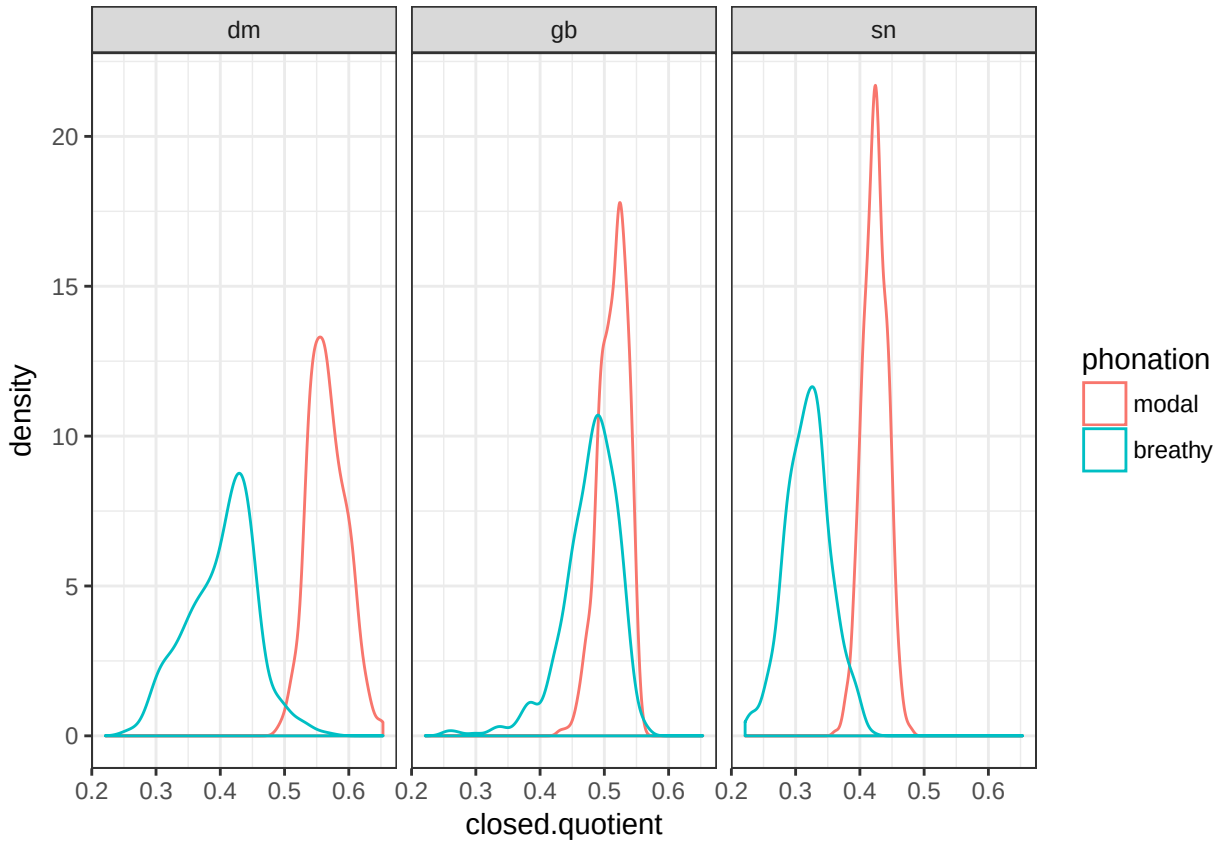
3 Tracegram plot

```
ggplot(degg.tracing, aes(time, value, colour = peak)) +
    geom_point(size = 0.5, alpha = 0.1) +
    geom_smooth(size = 0.5, method = "lm") +
    xlab("relative time (proportion of vowel duration)") +
    ylab("proportion of glottal period") +
    facet_grid(speaker ~ phonation) +
    ylim(0, 1)
```

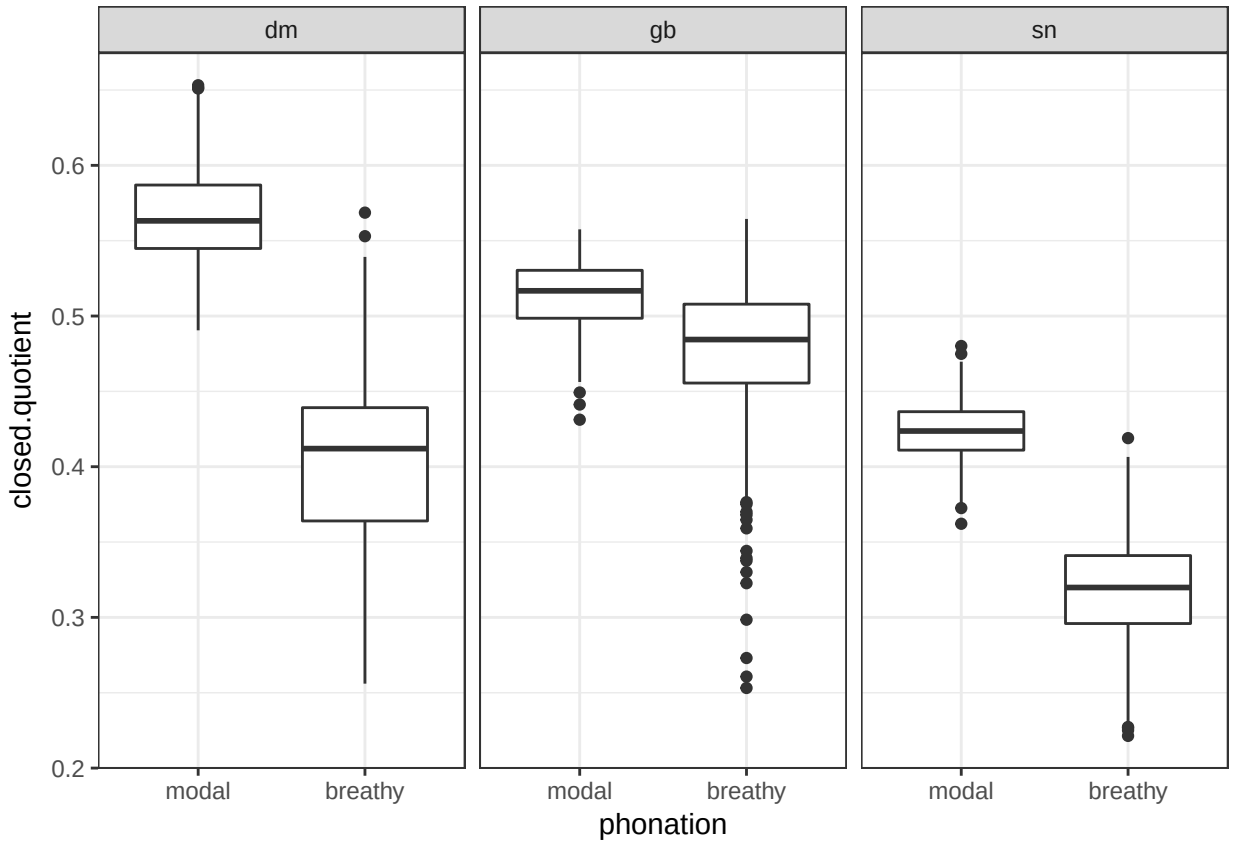


4 Closed quotient

```
ggplot(quotient, aes(closed.quotient, colour = phonation)) +
    geom_density() +
    facet_grid(. ~ speaker)
```




```
ggplot(quotient, aes(phonation, closed.quotient)) +
    geom_boxplot() +
    facet_grid(. ~ speaker)
```




```
quotient.lmer <- lmer(
    closed.quotient ~
        phonation +
        (1 + phonation|speaker),
    data = quotient
)

summary(quotient.lmer)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: closed.quotient ~ phonation + (1 + phonation | speaker)
##    Data: quotient
##
## REML criterion at convergence: -11773.5
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -6.3156 -0.5534  0.0455  0.6163  4.6714
##
## Random effects:
##  Groups   Name             Variance Std.Dev. Corr
##  speaker  (Intercept)      0.005236 0.07236
##           phonationbreathy 0.004085 0.06391  -0.33
##  Residual                  0.001262 0.03553
## Number of obs: 3082, groups:  speaker, 3
##
## Fixed effects:
```

```
##                  Estimate Std. Error t value
## (Intercept)       0.50127    0.04179  11.995
## phonationbreathy -0.10140    0.03692  -2.747
##
## Correlation of Fixed Effects:
##             (Intr)
## phontnbrthy -0.331
```

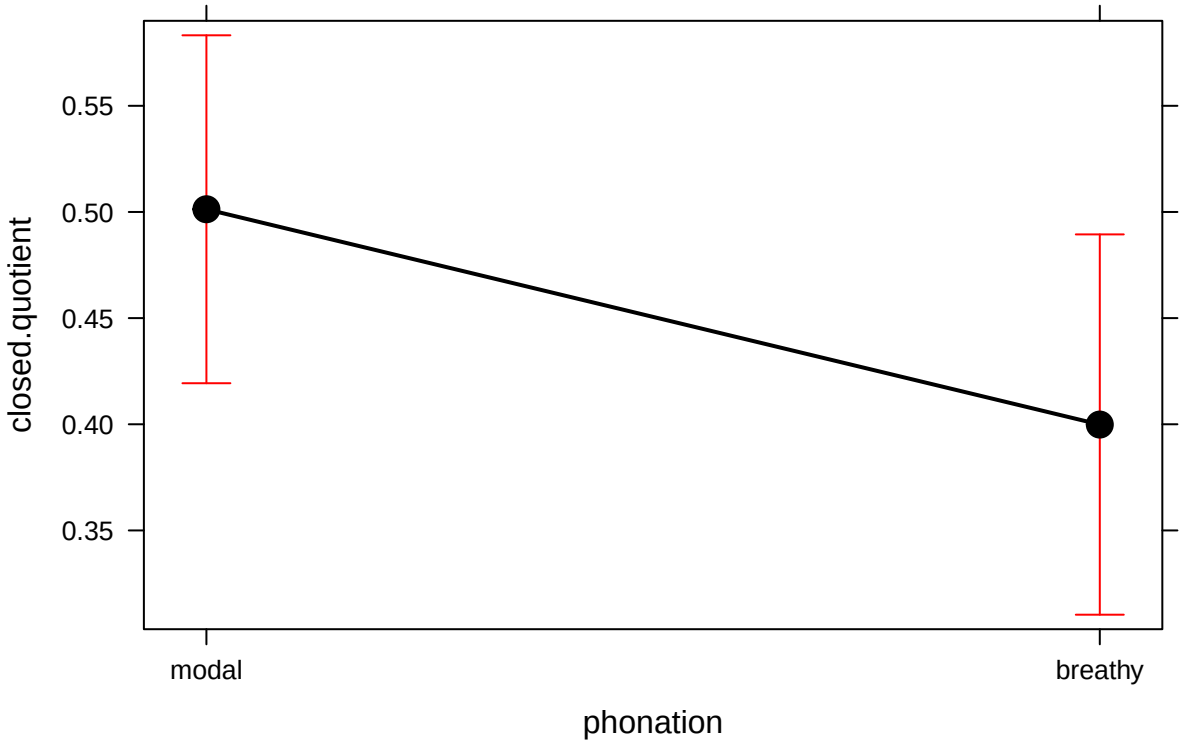
```
quotient.lmer.null <- lmer(
    closed.quotient ~
        (1 + phonation|speaker),
    data = quotient
)

anova(quotient.lmer.null, quotient.lmer)
```

```
## refitting model(s) with ML (instead of REML)
```

```
## Data: quotient
## Models:
## quotient.lmer.null: closed.quotient ~ (1 + phonation | speaker)
## quotient.lmer: closed.quotient ~ phonation + (1 + phonation | speaker)
##                    Df    AIC    BIC logLik deviance Chisq Chi Df
## quotient.lmer.null  5 -11769 -11738 5889.3   -11779
## quotient.lmer       6 -11771 -11735 5891.7   -11783 4.688      1
##                    Pr(>Chisq)
## quotient.lmer.null
## quotient.lmer         0.03037 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
mixed(
    closed.quotient ~
        phonation +
        (1 + phonation|speaker),
    data = quotient
)
```

```
plot(allEffects(quotient.lmer))
```


phonation effect plot
closed.quotient
0.55
0.50
0.45
0.40
0.35
modal
breathy
phonation