Examine dispersal values for males

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Goal

- Try to identify which males should share a common `disp_value` uisnt the 'disp_flag == uniform_2.

Recap

Set up

Install libraries

```
# install packages user might not have by replacing FALSE with TRUE

## load libraries
library(stats)
library(MASS) # provides negative binomial fitting:  glm.nb
library(ggplot2)
library(tidyverse)
library(viridisLite)
```

Load Data

```
input_dir <- file.path("input")
output_dir <- file.path("output")


## This data includes `motif_data_full`, which is unfiltered by males

load(file.path(input_dir, "data.processing_2023-04-05.Rda"),
     verbose = TRUE)
```

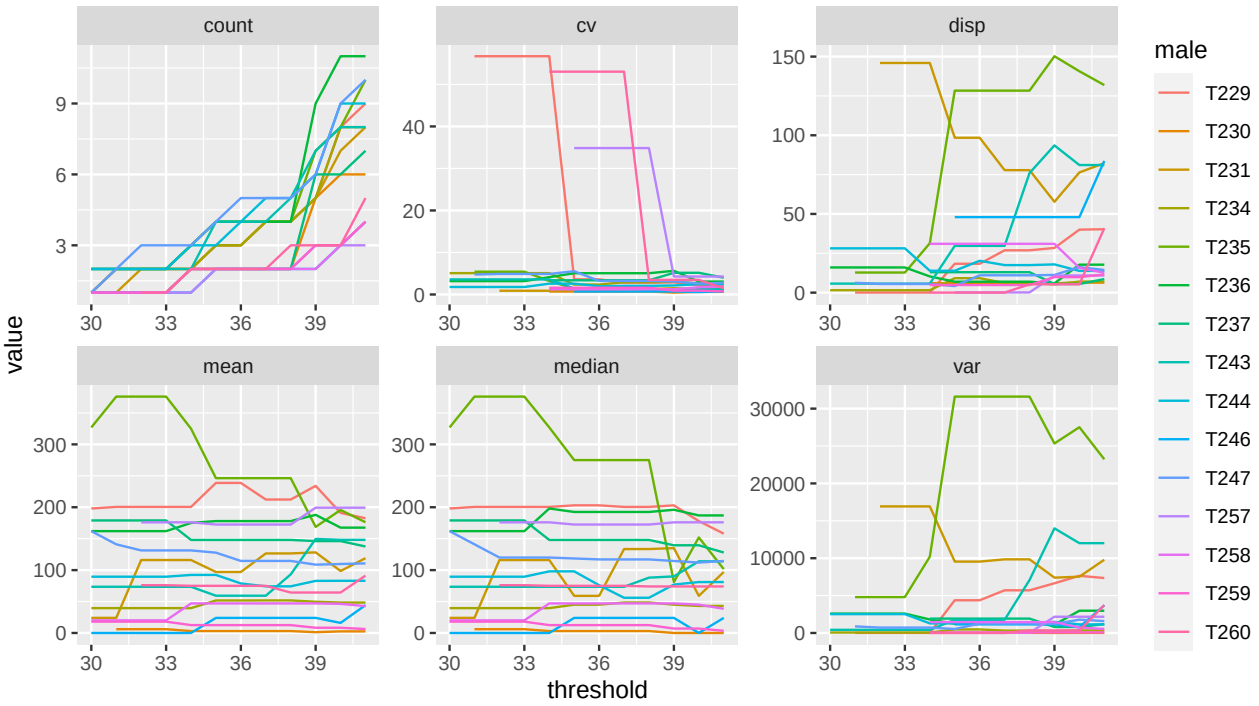
```
## Loading objects:
##   motif_data_full
##   motif_data
##   motif_data_40C
##   motif_stats
##   motif_stats_40C
##   bird_bill_data
```

```
summary(motif_data_full)
```

```
##       male        round       trial_round    motif_count    motif_prop
##  T247   :14   Min.   :1.00   Min.   :1.00   Min.   :  0   Min.   :0.000
##  T229   :13   1st Qu.:1.00   1st Qu.:2.00   1st Qu.: 41   1st Qu.:0.043
##  T231   :13   Median :2.00   Median :3.00   Median : 84   Median :0.081
##  T234   :13   Mean   :2.18   Mean   :2.82   Mean   :107   Mean   :0.103
##  T235   :13   3rd Qu.:3.00   3rd Qu.:4.00   3rd Qu.:167   3rd Qu.:0.126
##  T236   :13   Max.   :3.00   Max.   :6.00   Max.   :425   Max.   :0.720
##  (Other):67
##    temp_mean    humidity_mean  chamber     date              counter
##  Min.   :25.7   Min.   :15.6   1:10    Length:146         Length:146
##  1st Qu.:34.3   1st Qu.:22.4   2:43    Class :character   Class :character
##  Median :38.9   Median :24.2   3:10    Mode  :character   Mode  :character
##  Mean   :37.7   Mean   :26.0   4:42
##  3rd Qu.:41.3   3rd Qu.:29.9   5: 5
##  Max.   :45.8   Max.   :41.8   6:36
##  NA's   :2      NA's   :46
##    test_order    temp_target  temp_median    humdity_mean    motif_rate
##  Min.   :1.00   Min.   :27   Min.   :26.0   Min.   : 8.0   Min.   : 0.0
##  1st Qu.:2.00   1st Qu.:35   1st Qu.:34.5   1st Qu.:10.0   1st Qu.: 1.6
##  Median :3.00   Median :40   Median :40.0   Median :11.3   Median : 3.0
##  Mean   :3.03   Mean   :38   Mean   :38.3   Mean   :12.7   Mean   : 3.6
##  3rd Qu.:4.00   3rd Qu.:42   3rd Qu.:42.0   3rd Qu.:16.2   3rd Qu.: 5.3
##  Max.   :6.00   Max.   :44   Max.   :46.0   Max.   :19.5   Max.   :14.2
##  NA's   :30                  NA's   :2      NA's   :102    NA's   :75
##       mass       bill_length    bill_depth    bill_width   bill_date
##  Min.   :15.0   Min.   :7.8   Min.   :7.2   Min.   :5.9   Length:146
##  1st Qu.:16.1   1st Qu.:8.2   1st Qu.:7.3   1st Qu.:6.4   Class :character
##  Median :17.8   Median :8.6   Median :7.5   Median :6.6   Mode  :character
##  Mean   :17.5   Mean   :8.5   Mean   :7.5   Mean   :6.6
##  3rd Qu.:18.9   3rd Qu.:8.7   3rd Qu.:7.7   3rd Qu.:6.8
##  Max.   :20.0   Max.   :9.3   Max.   :8.0   Max.   :7.1
##  NA's   :132    NA's   :132   NA's   :132   NA's   :132
##  n_obs_completed motif_count_plus_1 log_motif_count_plus_1      temp
##  Mode:logical    Min.   :  1        Min.   :0.00           Min.   :25.7
##  TRUE:146        1st Qu.: 42        1st Qu.:3.74           1st Qu.:34.4
##                  Median : 84        Median :4.44           Median :39.0
##                  Mean   :108        Mean   :4.06           Mean   :37.8
##                  3rd Qu.:168        3rd Qu.:5.13           3rd Qu.:41.2
##                  Max.   :426        Max.   :6.05           Max.   :45.8
##
##  count_total_round  n_obs_round   count_mean_round count_sd_round
##  Min.   :   0       Min.   :3.00   Min.   :  0.0    Min.   :  0.0
##  1st Qu.: 253       1st Qu.:5.00   1st Qu.: 58.8    1st Qu.: 27.7
##  Median : 498       Median :5.00   Median :106.4    Median : 46.0
##  Mean   : 493       Mean   :4.63   Mean   :107.4    Mean   : 55.1
##  3rd Qu.: 651       3rd Qu.:5.00   3rd Qu.:140.1    3rd Qu.: 71.0
##  Max.   :1210       Max.   :6.00   Max.   :270.0    Max.   :159.0
##
##  count_cv_round   count_total       n_obs        count_mean        trial
##  Min.   :0.072   Min.   :  25   Min.   : 5.0   Min.   :  3.6   Min.   : 1.00
##  1st Qu.:0.307   1st Qu.: 601   1st Qu.: 8.0   1st Qu.: 76.4   1st Qu.: 3.00
```

```
##  Median :0.569   Median :1324   Median :13.0   Median :106.2   Median : 5.00
##  Mean   :0.601   Mean   :1256   Mean   :11.2   Mean   :107.4   Mean   : 6.09
##  3rd Qu.:0.811   3rd Qu.:1861   3rd Qu.:13.0   3rd Qu.:143.2   3rd Qu.: 9.00
##  Max.   :1.575   Max.   :2333   Max.   :14.0   Max.   :232.0   Max.   :14.00
##  NA's   :3
##  motif_prop_round    weights           svp             vpd         vpd_offset
##  Min.   :0.000    Min.   :0.002   Min.   : 33.6   Min.   :20.1   Min.   : NA
##  1st Qu.:0.139    1st Qu.:0.006   1st Qu.: 55.9   1st Qu.:40.3   1st Qu.: NA
##  Median :0.211    Median :0.012   Median : 72.4   Median :55.3   Median : NA
##  Mean   :0.224    Mean   :0.112   Mean   : 70.1   Mean   :51.7   Mean   :NaN
##  3rd Qu.:0.299    3rd Qu.:0.024   3rd Qu.: 82.4   3rd Qu.:60.3   3rd Qu.: NA
##  Max.   :0.842    Max.   :1.000   Max.   :105.7   Max.   :79.0   Max.   : NA
##  NA's   :3                        NA's   :2       NA's   :46     NA's   :146
```

```
data_working <- motif_data_full %>% relocate(male, temp, motif_count)


temp_stats_wide <- tibble(
    male = factor(0),
    mean = numeric(0),
    median = numeric(0),
    var = numeric(0),
    cv = numeric(0),
    disp = integer(0)
    )

temp_stats_wide <- tibble()

for(threshold in 30:41) {

    data_tmp <- filter(data_working, temp <= threshold)

    stats_tmp <- data_tmp %>%
        group_by(male) %>%
        summarize(mean = mean(motif_count),
                  median = median(motif_count),
                  var = var(motif_count),
                  cv = mean/sqrt(var),
                  disp = var/mean,
                  count = n()) %>%
        mutate(threshold = threshold)
    temp_stats_wide <- bind_rows(temp_stats_wide, stats_tmp, .id = NULL)
}


temp_stats_long <- pivot_longer(temp_stats_wide,
                                cols = -c(male, threshold),
                                names_to = "statistic"
                                )

ggplot(data = temp_stats_long) +
    geom_line(aes(x = threshold, y = value, color = male)) +
    facet_wrap(facets = vars(statistic), scales = "free")
```



“‘ # Fit Models

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