Practice Heat Shocks

Contents

Libraries

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:lubridate':
##
##     intersect, setdiff, union
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(ggplot2)
library(tidyr)
library(data.table)
```

```
##
## Attaching package: 'data.table'

## The following objects are masked from 'package:dplyr':
##
##     between, first, last

## The following objects are masked from 'package:lubridate':
##
##     hour, isoweek, mday, minute, month, quarter, second, wday,
##     week, yday, year
```

Obtaining the data from Github

```
dat<-fread("https://raw.githubusercontent.com/HannahHChu/Proteome_stability_project/master/Data/2018-06-

#glimpse(dat)
```

Changing MIN:SEC to minutes

```
rtime<- dat$kd_time
time<-lubridate::minute(ms(rtime))+lubridate::second(ms(rtime))/60
#time

#Adding new column of correct time
dat$time<-time
```

Creating the Data Frame

```
df<-data.frame(dat$kd_temp, dat$time, dat$treatment, dat$line, dat$sex)

#filtering out the non-static practice trials
staths<- df%>%
        filter(dat$treatment == "static")
```

ANOVA

```
fit<-aov(dat.time ~ dat.kd_temp*dat.line, staths)
summary(fit)
```

```
##                      Df Sum Sq Mean Sq F value Pr(>F)
## dat.kd_temp           1  41580   41580 134.452 <2e-16 ***
## dat.line              3    733     244   0.790  0.504
## dat.kd_temp:dat.line  3     94      31   0.102  0.959
## Residuals            62  19174     309
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

The ANOVA doesn't indicate a relationship between the different lines and KD temperature. The only significant variable is KD temperature, which means we can reject the null hypothesis that there are equal means for KD temperature.

Figures

Overview of static HS

```
staticoverview <- ggplot(staths,aes(x=dat.kd_temp,y=dat.time))+geom_point()+
  labs(x = "KD Temperature (ºC)", y = "KD time (min)") + theme(
        axis.ticks.x=element_blank(),legend.position="bottom",
        axis.ticks.y=element_blank(),panel.background = element_blank(),
        panel.grid.major = element_blank(),panel.grid.minor =
          element_blank(),axis.text=element_text(size=9),text=element_text(size=15))+geom_smooth(method=
staticoverview
```

```
## `geom_smooth()` using method = 'loess'
```
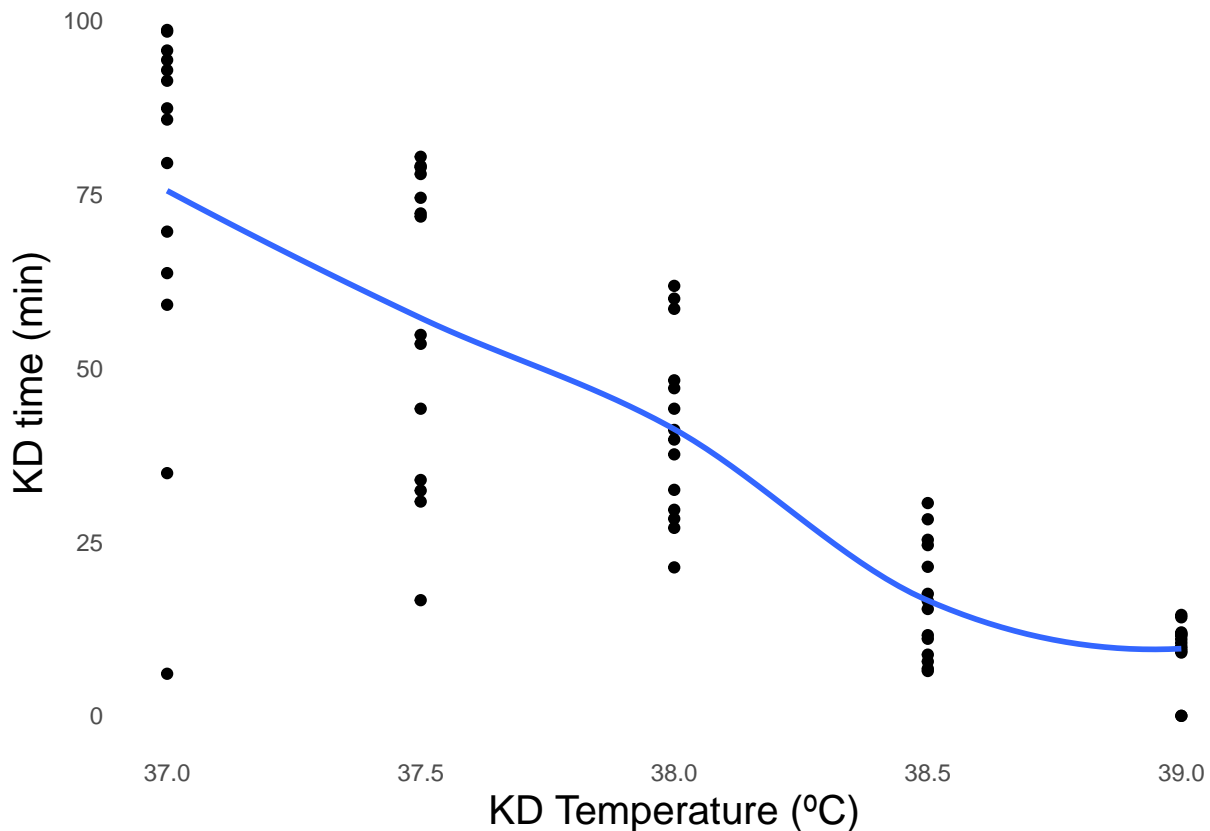

Overall, it looks like as flies reach their upper thermal limit, their tolerance range narrows. The shape of the graph suggests that there is more variation at lower temperatures.

Static HS based on lines

```
p<- ggplot(staths,aes(x=dat.kd_temp,y=dat.time, colour=dat.line))+geom_point()+
  labs(x = "KD Temperature (ºC)", y = "KD time (min)") + theme(
       axis.ticks.x=element_blank(),legend.position="bottom",
       axis.ticks.y=element_blank(),panel.background = element_blank(),
       panel.grid.major = element_blank(),panel.grid.minor =
         element_blank(),axis.text=element_text(size=9),text=element_text(size=15))+geom_smooth(method=
fig <- p + scale_colour_discrete(name = "lines")
fig
```

`geom_smooth()` using method = 'loess'

Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
parametric, : pseudoinverse used at 36.99

Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
parametric, : neighborhood radius 1.01

Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
## parametric, : reciprocal condition number 4.8814e-17

Warning in simpleLoess(y, x, w, span, degree = degree, parametric =
parametric, : There are other near singularities as well. 0.25
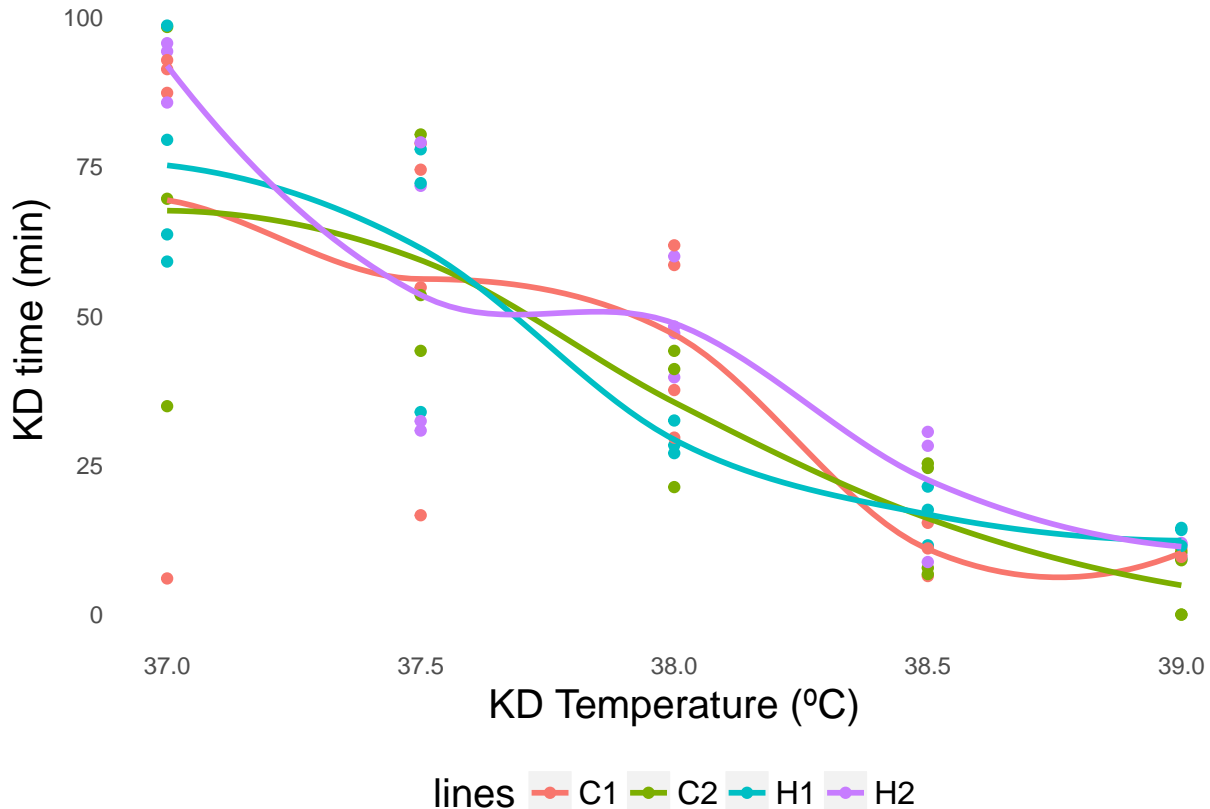
Slow ramp HS based on lines

```
slowdat <- df%>%
  filter(dat$treatment == "slow", dat$kd_temp > "37")

q<- ggplot(slowdat,aes(x=dat.kd_temp,y=dat.time, colour=dat.line))+geom_point()+
  labs(x = "KD Temperature (ºC)", y = "KD time (min)") + theme(
        axis.ticks.x=element_blank(),legend.position="bottom",
        axis.ticks.y=element_blank(),panel.background = element_blank(),
        panel.grid.major = element_blank(),panel.grid.minor =
          element_blank(),axis.text=element_text(size=9),text=element_text(size=15))
slowfig <- q + scale_colour_discrete(name = "lines")
slowfig
```
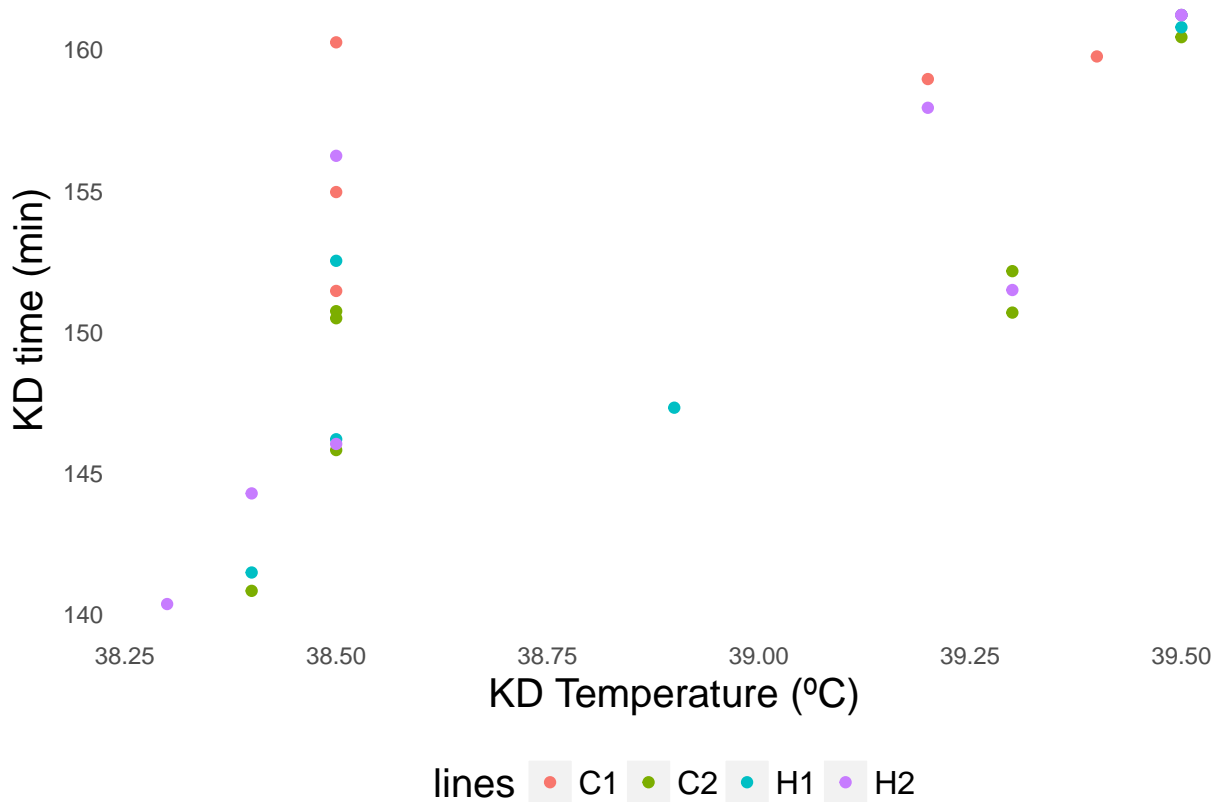

Fast ramp HS based on line

```
fastdat <- df%>%
  filter(dat$treatment == "fast")

r<- ggplot(fastdat,aes(x=dat.kd_temp,y=dat.time, colour=dat.line))+geom_point()+
  labs(x = "KD Temperature (ºC)", y = "KD time (min)") + theme(
        axis.ticks.x=element_blank(),legend.position="bottom",
        axis.ticks.y=element_blank(),panel.background = element_blank(),
        panel.grid.major = element_blank(),panel.grid.minor =
          element_blank(),axis.text=element_text(size=9),text=element_text(size=15))
fastfig <- r + scale_colour_discrete(name = "lines")
```

```
fastfig
```
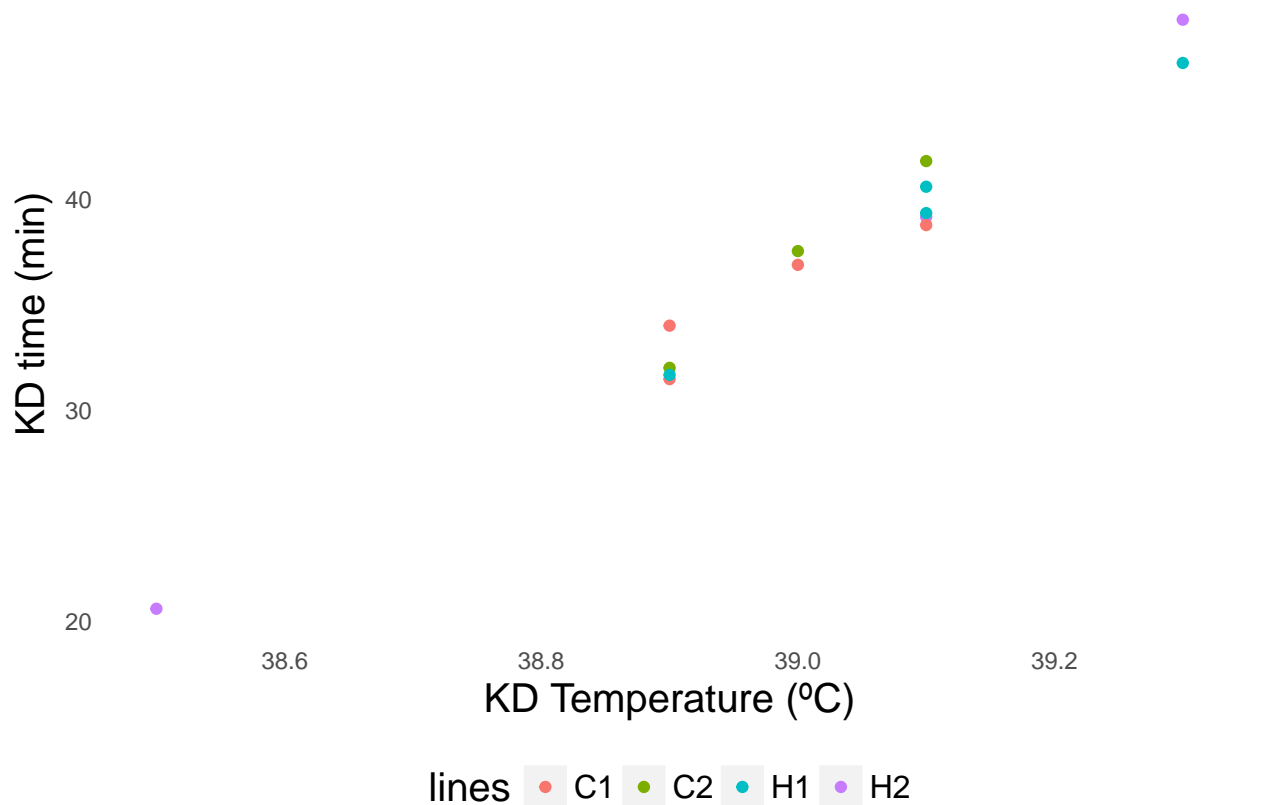

Session Info

```
sessionInfo()
```

```
## R version 3.5.0 (2018-04-23)
## Platform: x86_64-apple-darwin15.6.0 (64-bit)
## Running under: macOS High Sierra 10.13.5
##
## Matrix products: default
## BLAS: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] bindrcpp_0.2.2    data.table_1.11.4 tidyr_0.8.1       ggplot2_2.2.1
## [5] dplyr_0.7.5       lubridate_1.7.4
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_0.12.17      knitr_1.20        bindr_0.1.1       magrittr_1.5
```

```
##  [5] munsell_0.4.3     tidyselect_0.2.4 colorspace_1.3-2 R6_2.2.2
##  [9] rlang_0.2.0       plyr_1.8.4       stringr_1.3.1    tools_3.5.0
## [13] grid_3.5.0        gtable_0.2.0     htmltools_0.3.6  lazyeval_0.2.1
## [17] yaml_2.1.19       rprojroot_1.3-2  digest_0.6.15    assertthat_0.2.0
## [21] tibble_1.4.2      purrr_0.2.5      curl_3.2         glue_1.2.0
## [25] evaluate_0.10.1   rmarkdown_1.9    labeling_0.3     stringi_1.2.2
## [29] compiler_3.5.0    pillar_1.2.3     scales_0.5.0     backports_1.1.2
## [33] pkgconfig_2.0.1
```