# Analysis_TurnAngle_SpatDisc

*Anna Steel*

*November 14, 2016*

## Turning Angles

Using dataset filtered and discretized by distance, we will calculate the turning angles (only for rel 1&2)

## get data

```
red.r21 <- readRDS("Maestros/RediscSpat_25m.RData")

 options(digit.secs = 6)
 red.r21$date = as.POSIXct(red.r21$date)
```

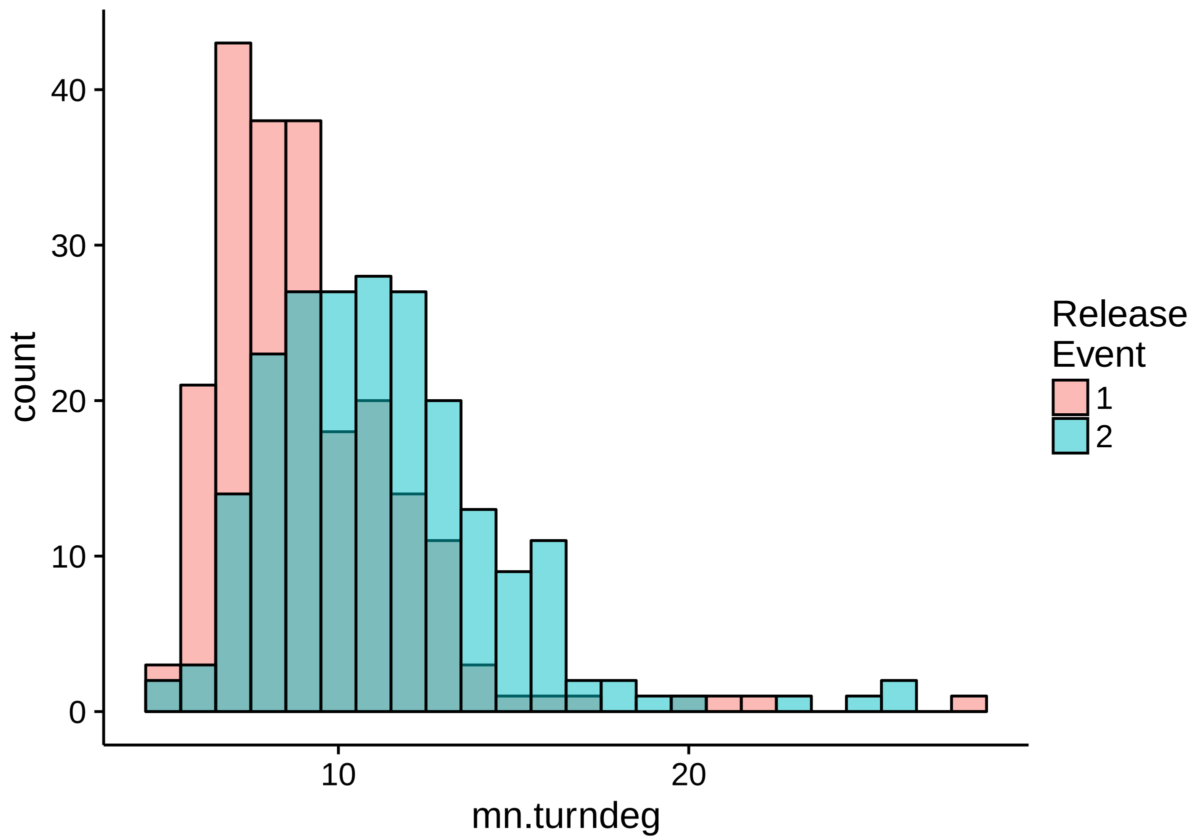
## clean data

## autocorrelation eval; isn't working yet

## mean bearings and turning angles - unsure if this is correct! Check conversion to bearings wth mo's for-loop and function ('bearing()')

```
## Calculate mean bearings and turn angles for each fish so we can use standard statistics on independen
   red.indivmn = as.data.frame(summarise(group_by(red.r21, id, RelEv),
          mn.bearing=as.numeric(mean.circular(circular(compass.angle, units="degrees"))),  # use circul
          mn.turndeg=as.numeric(mean(abs(rel.deg), na.rm=T)),  # because these are +/- values from stra
          mn.stgft = as.numeric(mean(stage_ft))))

   # plot of turn angles by water velocity and release event:
   ggplot(data=red.indivmn, aes(x=mn.turndeg, group=factor(RelEv), fill=factor(RelEv))) + geom_histogra
```

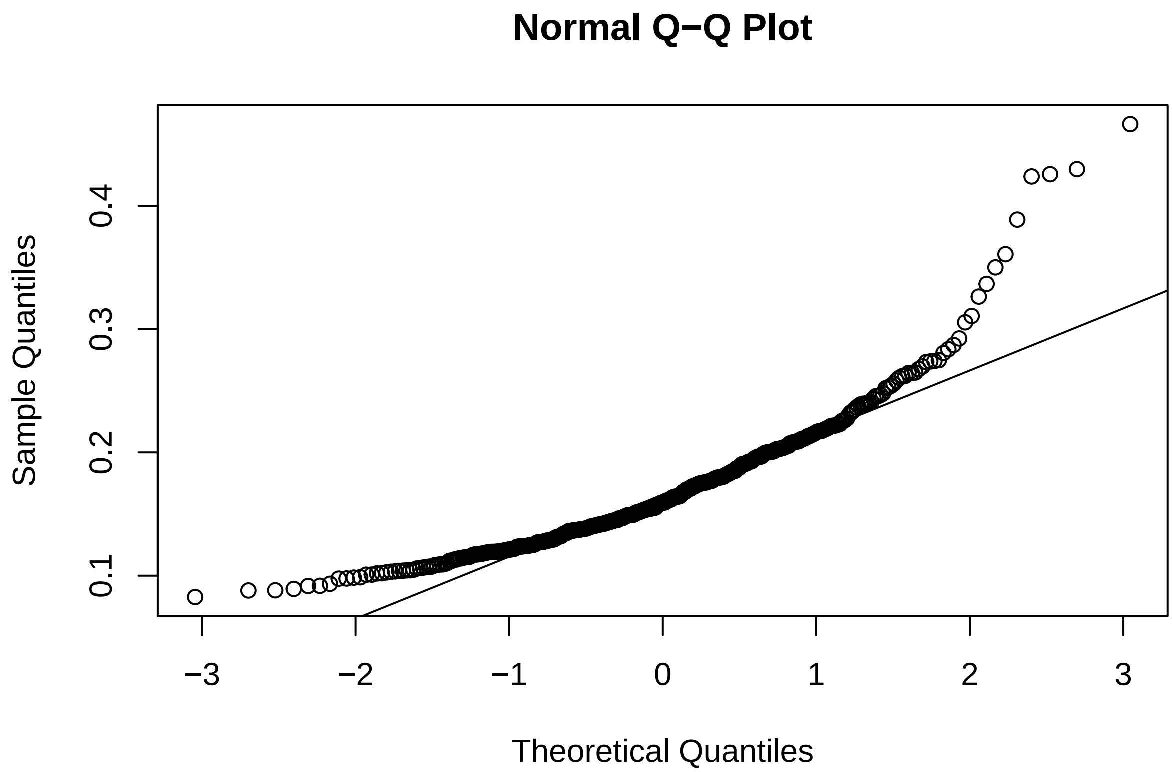



```
## Look at normality and heterogeneity of variance
  # check for homogeneitry of var for subsequent ANOVA
    bartlett.test(red.indivmn$mn.turndeg~red.indivmn$RelEv)
```

```
##
## 	Bartlett test of homogeneity of variances
##
## data:  red.indivmn$mn.turndeg by red.indivmn$RelEv
## Bartlett's K-squared = 4.6493, df = 1, p-value = 0.03107
```

```
        # Bartlett's K-squared = .38811, p=0.533

  # check for ~N
    #windows()
     qqnorm(red.indivmn$mn.turndeg/60)
     qqline(red.indivmn$mn.turndeg/60)
```




```
        # not perfect but not tooo bad


      # From Lix et al 1996, the Welch test is the least sensitive (in terms of type 1 error) to skew/k
      #  but this is still a parametric test that compares means (assumes means describe the distributi
      #   pt.Welch.aov = oneway.test(red.indivmn$mn.turndeg ~ factor(red.indivmn$RelEv))
      #       # F = 29.166, num df = 1, denom df = 427.53, p-value = 0.0000001104
      #   library(userfriendlyscience)
      #    posthocTGH(y=red.indivmn$mn.turndeg, x=factor(red.indivmn$RelEv)  )

      # t.test
   t.test(red.indivmn$mn.turndeg~red.indivmn$RelEv)
```

```
##
##  Welch Two Sample t-test
##
## data:  red.indivmn$mn.turndeg by red.indivmn$RelEv
## t = -6.906, df = 417.84, p-value = 1.864e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -2.695862 -1.501244
## sample estimates:
## mean in group 1 mean in group 2
##        9.192257       11.290810
```