When performing this analysis on a set of data, we start with the autocorrelation functions of the two channels in each image, and labels of whether these images are bijels or not.

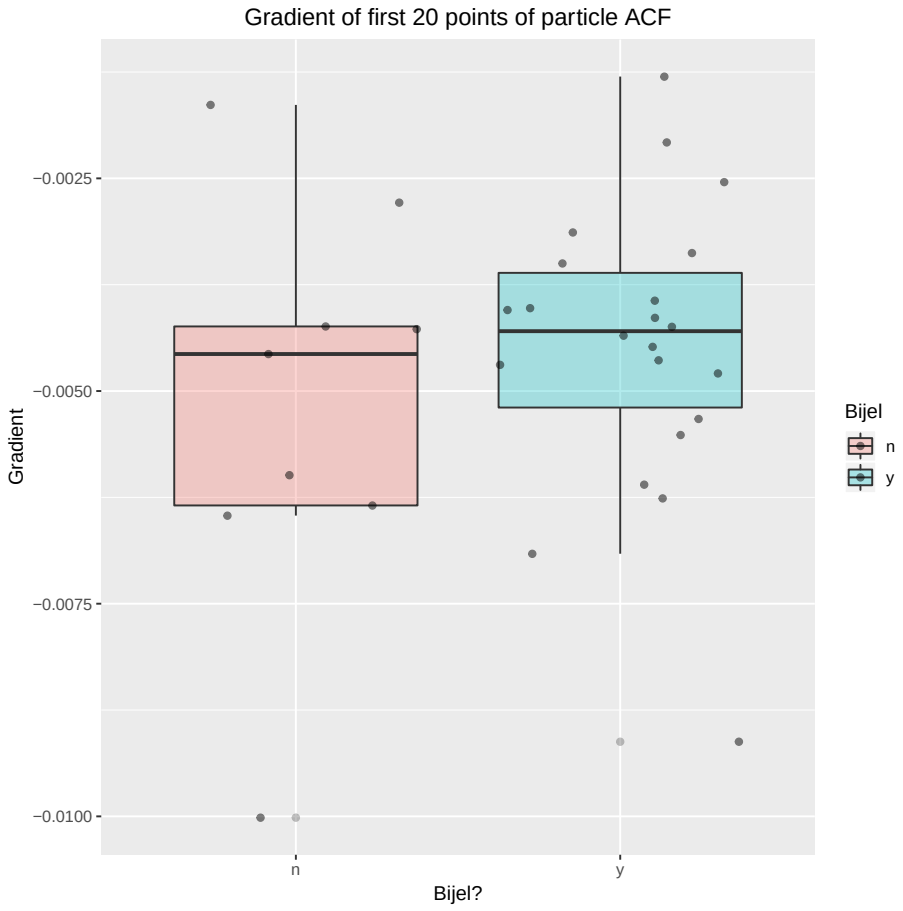
```
##      Sample.Number Bijel
## 19              19     n
## 20i            20i     y
## 20ii          20ii     y
## 21              21     n
## 22i            22i     n
## 22ii          22ii     n
```

We then need to turn these functions into a set of single-valued variables that describe features that may separate bijels from non-bijels, such as:

- The gradient of the particle channel autocorrelation function

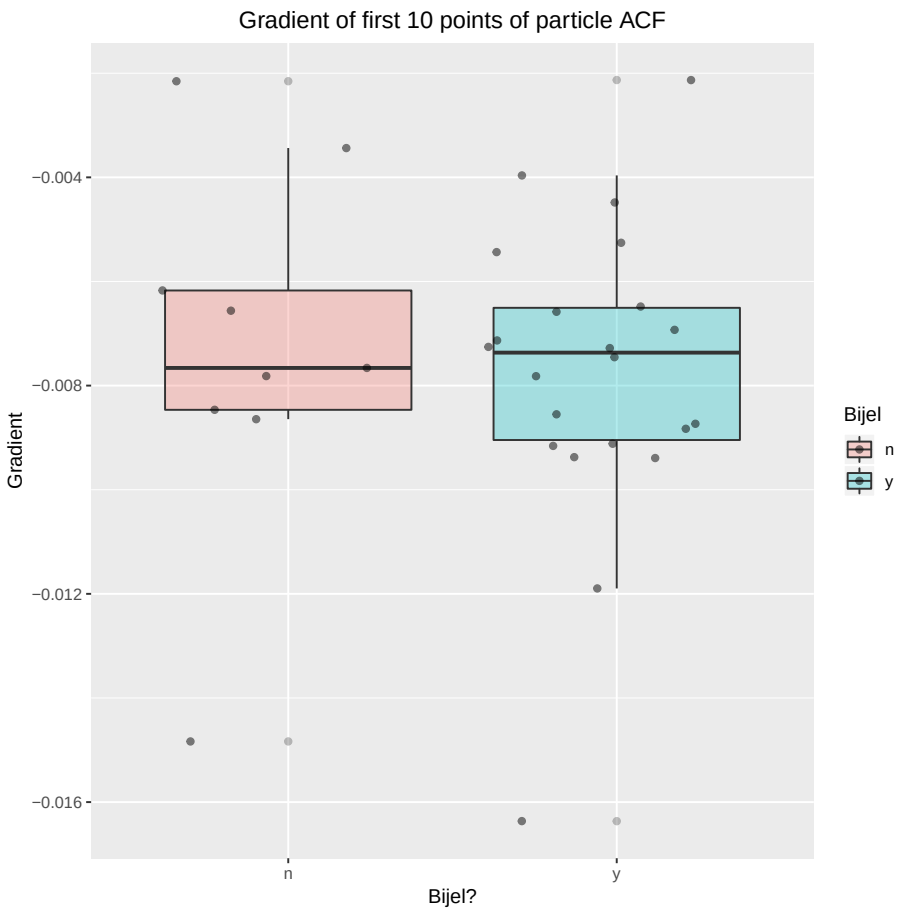
```
r <- c(1:256)
num_points <- length(exp_Data$Sample.Number)
y <- exp_Data$Autocorrelation.Particle[1:20]
lineFits <- lapply(1:num_points,
                   function(n) lm(unlist(y[n,]) ~ r[1:20]))
lineCoeffs <- lapply(lineFits,
                     function(m) m$coefficients)
lineGradients <- lapply (1:num_points,
                         function(p) unname(lineCoeffs[[p]][2]))
exp_Data$Particle.Gradients.20 <- unlist(lineGradients)


library(ggplot2)
ggplot(exp_Data,
       aes(x=as.factor(Bijel), y=Particle.Gradients.20, fill=Bijel)) +
       geom_boxplot(alpha=0.3) +
       geom_jitter(alpha=0.5) +
       xlab("Bijel?") + ylab("Gradient") +
       ggtitle("Gradient of first 20 points of particle ACF") +
       theme(plot.title = element_text(hjust = 0.5))
```




```
y2 <- exp_Data$Autocorrelation.Particle[1:10]
lineFits2 <- lapply(1:num_points,
                    function(n) lm(unlist(y2[n,]) ~ r[1:10]))
lineCoeffs2 <- lapply(lineFits2,
                      function(m) m$coefficients)
lineGradients2 <- lapply (1:num_points,
                          function(p) unname(lineCoeffs2[[p]][2]))
exp_Data$Particle.Gradients.10 <- unlist(lineGradients2)

ggplot(exp_Data,
       aes(x=as.factor(Bijel), y=Particle.Gradients.10, fill=Bijel)) +
       geom_boxplot(alpha=0.3) +
       geom_jitter(alpha=0.5) +
       xlab("Bijel?") + ylab("Gradient") +
       ggtitle("Gradient of first 10 points of particle ACF") +
       theme(plot.title = element_text(hjust = 0.5))
```



- The position of the first turning point in the liquid channel autocorrelation function

```
library(pastecs)
liquidTurns <- lapply(1:num_points,
                      function(y) turnpoints(unlist(exp_Data$Autocorrelation.Liquid[y,])))

## Warning in turnpoints(unlist(exp_Data$Autocorrelation.Liquid[y,
])): value out of range in 'gammafn'

firstTurn <- lapply(1:num_points,
                    function(y) liquidTurns[[y]]$tppos[1])
exp_Data$Liquid.First.Turn <- unlist(firstTurn)
```

```
ggplot(exp_Data,
       aes(x=as.factor(Bijel), y=Liquid.First.Turn, fill=Bijel)) +
       geom_boxplot(alpha=0.3) +
       geom_jitter(alpha=0.5) +
       xlab("Bijel?") + ylab("Position") +
       ggtitle("Position of first turning points of liquid ACF (pixels)")
```