Relationship between learnability, expressivity and systematicity

Introduciton

How does learnability correlate with:

- Expressivity (number of unique labels)
- Systematicity (correlation between lexical and semantic distances)
- Mean word length of language
- Distinctiveness (average levenshtein distance between word pairs)

Load libraies

```r
library(dplyr)
library(party)
```

Load data

```r
d = read.csv("../data/ExperimentData_with_all_Learnability.csv", stringsAsFactors = F)
```

```r
d.mean = d %>% group_by(phase,condition,loadFile) %>%
  summarise(
  Learnability = mean(Learnability,na.rm=T),
  Expressivity = mean(Expressivity),
  Systematicity = mean(Systematicity),
  mean.word.length = mean(mean.word.length),
  distinctiveness = mean(distinctiveness)
)
d.mean = d.mean[!is.na(d.mean$Learnability),]
```
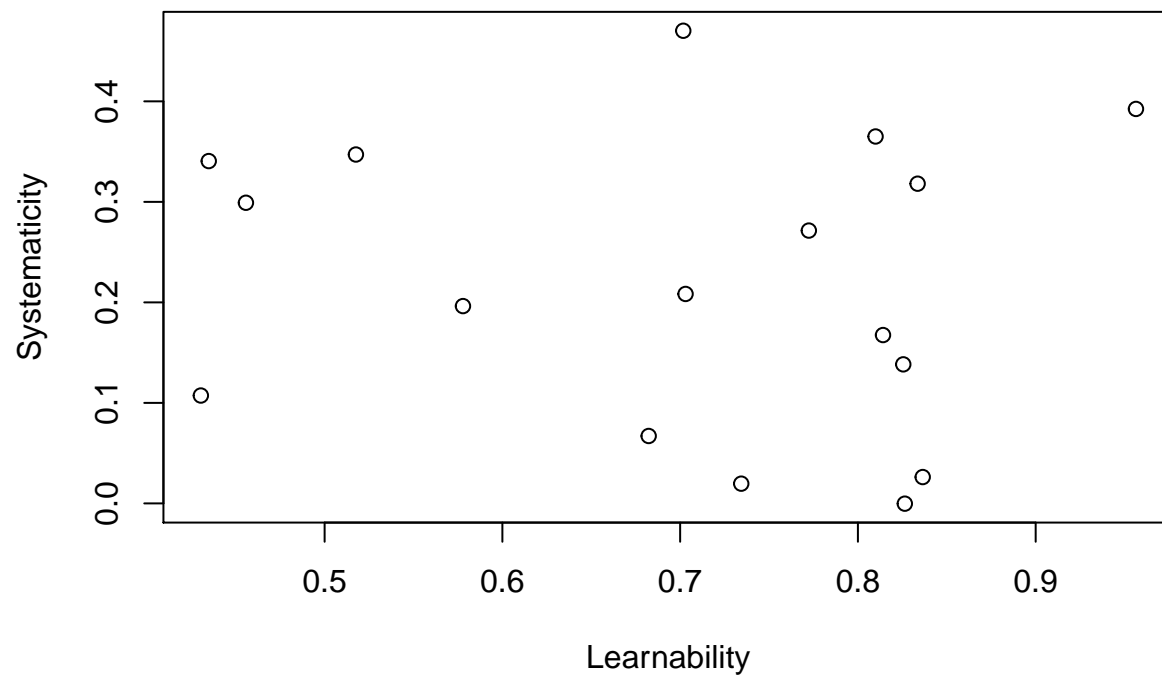
Analysis

Look at the correlations between measures:

```r
cor.short = function(X,Y,la,lb){
  plot(X,Y,xlab=la,ylab=lb)
  cx= cor.test(X,Y)
  return(c(cor=cx$estimate, p=cx$p.value))
}

cor.short(d.mean$Learnability,d.mean$Expressivity,
          "Learnability","Expressivity")
```
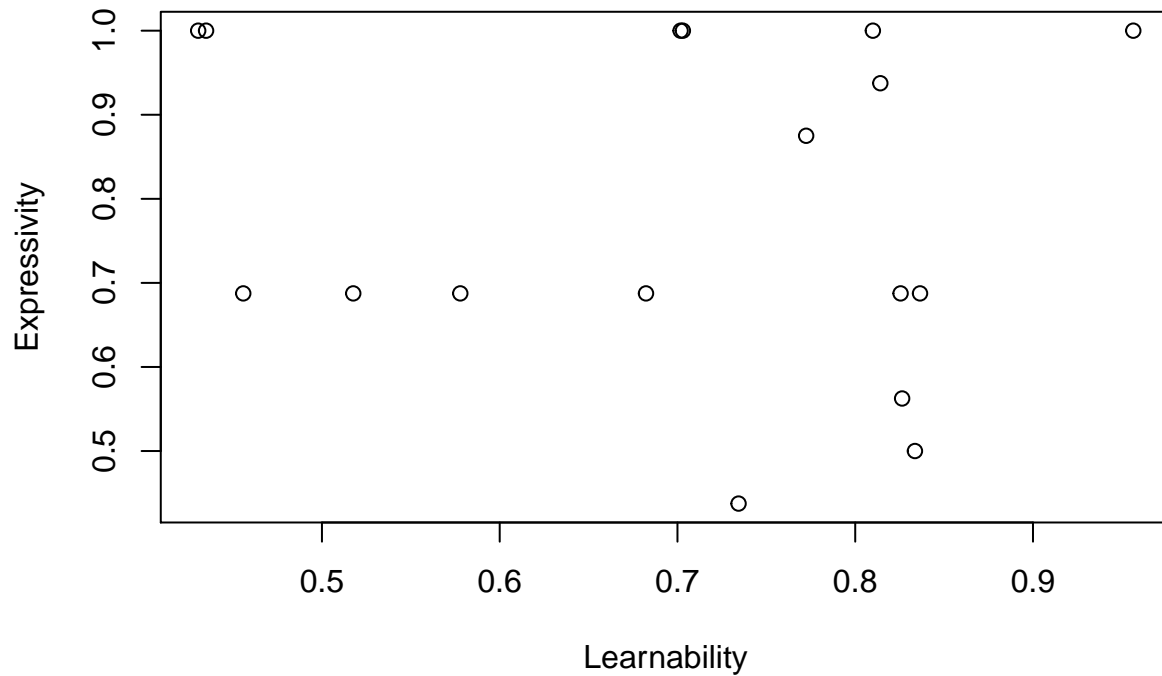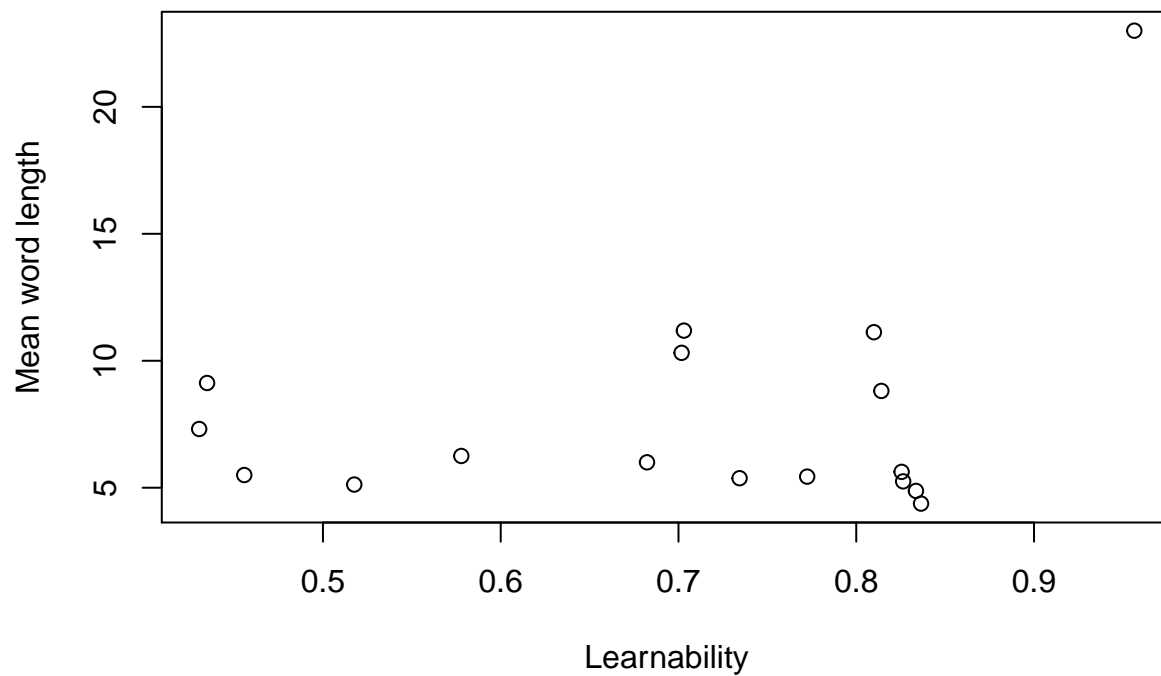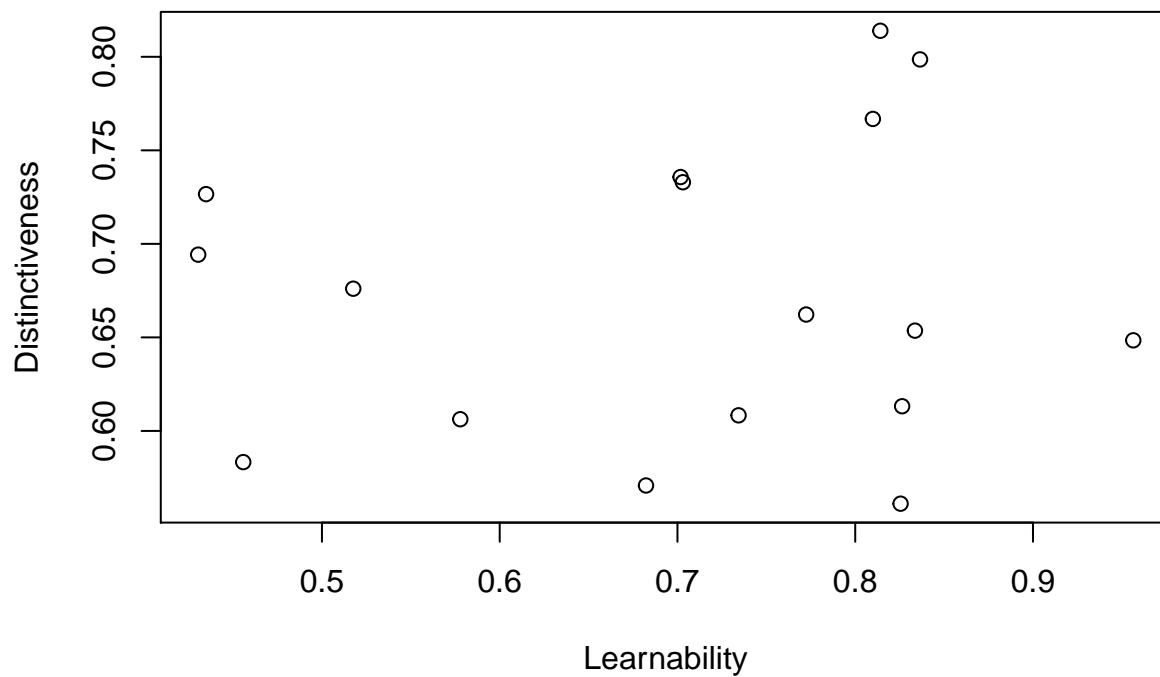
```
##      cor.cor          p
## -0.1179276  0.6521547
```

```
cor.short(d.mean$Learnability,d.mean$Systematicity,
        "Learnability","Systematicity")
```



```
##      cor.cor          p
## -0.1030682  0.6938445
```

```
cor.short(d.mean$Learnability,d.mean$mean.word.length,
        "Learnability","Mean word length")
```
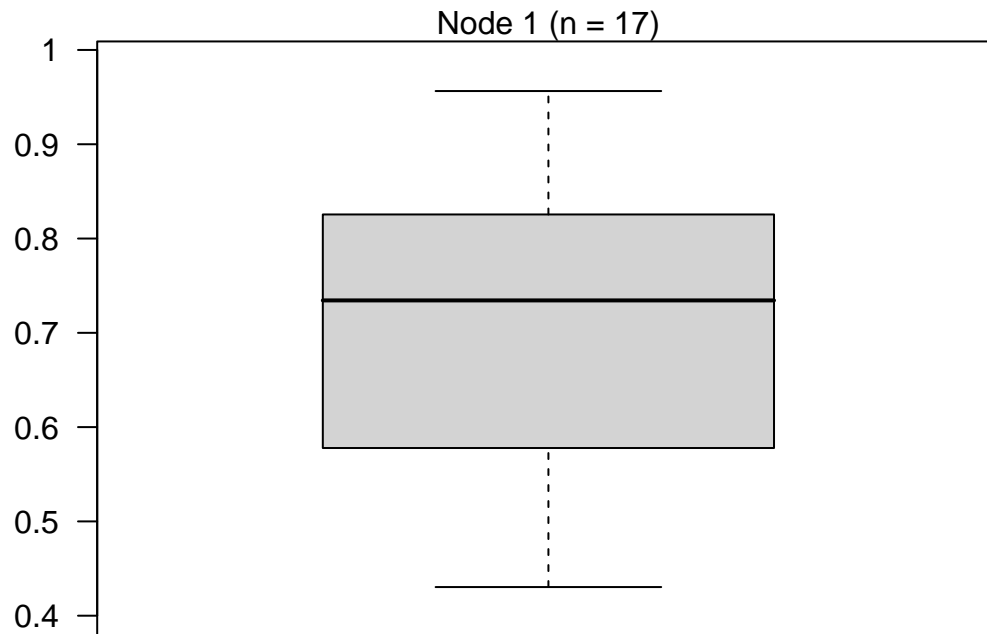
```
##   cor.cor         p
## 0.3216058 0.2081089
```

```
cor.short(d.mean$Learnability,d.mean$distinctiveness,
          "Learnability","Distinctiveness")
```



```
##   cor.cor         p
## 0.1065018 0.6841320
```

Decision tree

```
ct = ctree(Learnability~Expressivity+Systematicity + distinctiveness + mean.word.length, data=d.mean)
plot(ct)
```


Node 1 (n = 17)

No partitions, suggesting there are no patterns in the data.