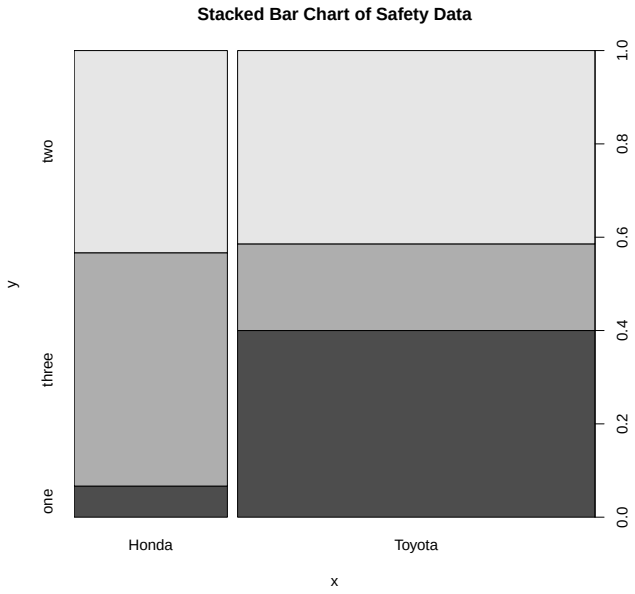
STAT 217: Chi-Squared Tests 10-9

1. Two random samples of cars were taken (one sample of 30 Hondas, and one sample of 70 Toyotas), and then the safety rating of the vehicle was recorded in stars (one star, two star, or three star). The data are shown in the **contingency table** below.

```
safetytable<-tally(~brand+stars,margins=F)
safetytable
```

```
##         stars
## brand    one three two
##   Honda    2    15  13
##   Toyota  28    13  29
```



(a) Based on what you see in the contingency table and stacked bar charts above, do you think the null hypothesis is true? Why or why not?

```
chisq.test(safetytable)
```

```
##
##  Pearson's Chi-squared test
##
## data:  safetytable
## X-squared = 15.204, df = 2, p-value = 0.0004994
```

(b) Below, draw the chi-square distribution with 2 df.

(c) Write a conclusion based on the p-value above.

(d) Calculate the table of expected counts.

(e) Find the χ^2 test statistic by hand.

2. A random sample of Brazilians aged 18 and older was taken, and each subjects Age - (Under 30, 30-49, 50 and over) and Political Ideology-(Liberal, Moderate, Conservative) were noted.

```
PolAge <- as.table(rbind(c(83,140,73), c(119,280,161), c(88,284,214)))
dimnames(PolAge) <- list(age=c("underthirty","thirtytofortynine","fiftyandOver"),
party=c("Liberal","Moderate", "Conservative"))
PolAge
```

```
##                   party
## age                Liberal Moderate Conservative
##   underthirty           83      140           73
##   thirtytofortynine    119      280          161
##   fiftyandOver          88      284          214
```

(a) Would this be a test of independence or homogeneity?

(b) Write out the hypotheses.

(c) Find the table of expected counts and then calculate the χ^2 test statistic by hand.