Project 7: Exploratory factor analysis

DA 410

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13.7 Use the words data of Table 5.9.

(a) Obtain principal component loadings for two factors.

```
fa <- principal(data, nfactors = 2, rotate = 'none', covar = FALSE)
fa
```

```
## Principal Components Analysis
## Call: principal(r = data, nfactors = 2, rotate = "none", covar = FALSE)
## Standardized loadings (pattern matrix) based upon correlation matrix
##                  PC1    PC2   h2    u2  com
## Informal words  0.80  -0.54 0.93 0.070 1.7
## Informal verbs  0.86  -0.33 0.84 0.161 1.3
## Formal words    0.88   0.27 0.85 0.147 1.2
## Formal verbs    0.71   0.66 0.94 0.057 2.0
##
##                       PC1  PC2
## SS loadings          2.67 0.90
## Proportion Var       0.67 0.22
## Cumulative Var       0.67 0.89
## Proportion Explained 0.75 0.25
## Cumulative Proportion 0.75 1.00
##
## Mean item complexity =  1.6
## Test of the hypothesis that 2 components are sufficient.
##
## The root mean square of the residuals (RMSR) is  0.07
##  with the empirical chi square  0.95  with prob <  NA
##
## Fit based upon off diagonal values = 0.98
```
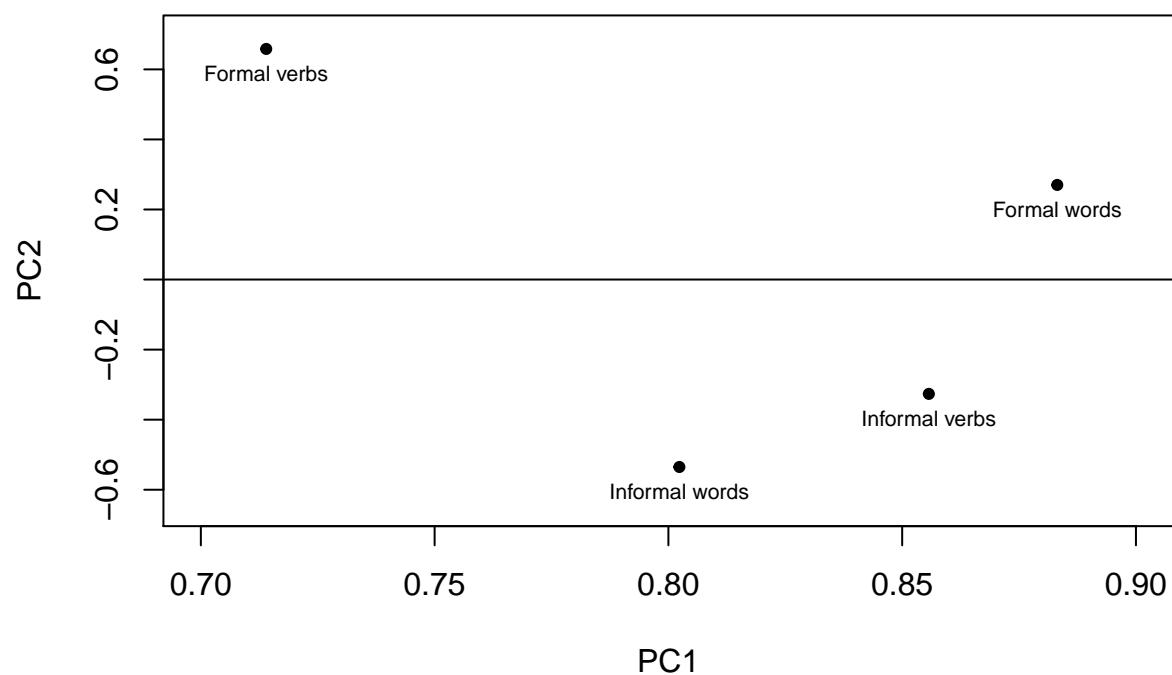
```
fa.diagram(fa)
```

Components Analysis

Formal words	

```
Formal words ──0.9──→ PC1
Informal verbs ──0.9──→ PC1
Informal words ──0.8──→ PC1
Formal verbs ──0.7──→ PC1

                      PC2
```
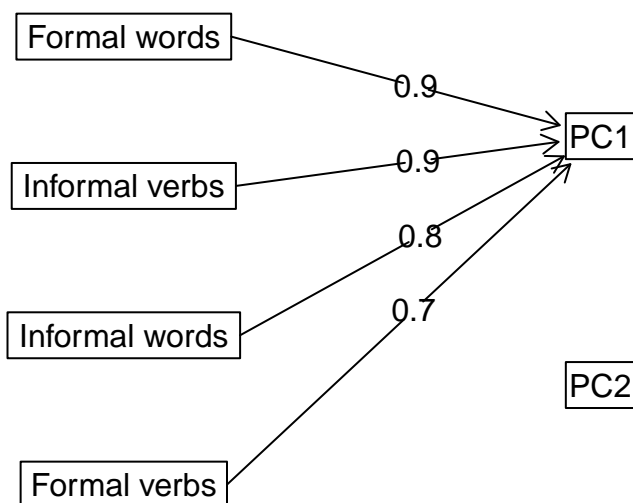
```
plot(fa, labels=names(data), cex=.7, ylim=c(-.65,.7), xlim=c(.7,.9)) # add variable names
```
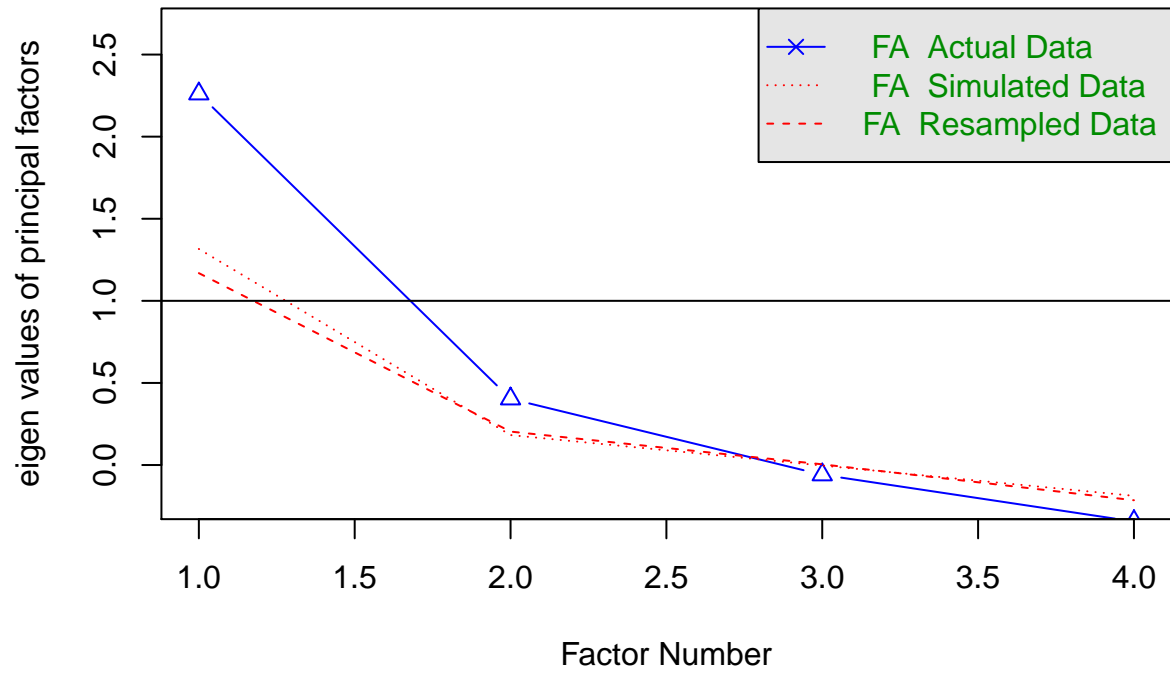
Principal Component Analysis

Informal words, Informal words, Formal words all have high factor loadings around 0.8 on the first factor (PC1). The first two factors account for 89.13% of the total sample variance.

```
parallel <- fa.parallel(data, fm = 'minres', fa = 'fa')
```

Parallel Analysis Scree Plots

Parallel analysis suggests that the number of factors = 2 and the number of components = NA