

Project 9: Exploratory factor analysis

DA 410

Marjorie Blanco

13.7 Use the words data of Table 5.9.

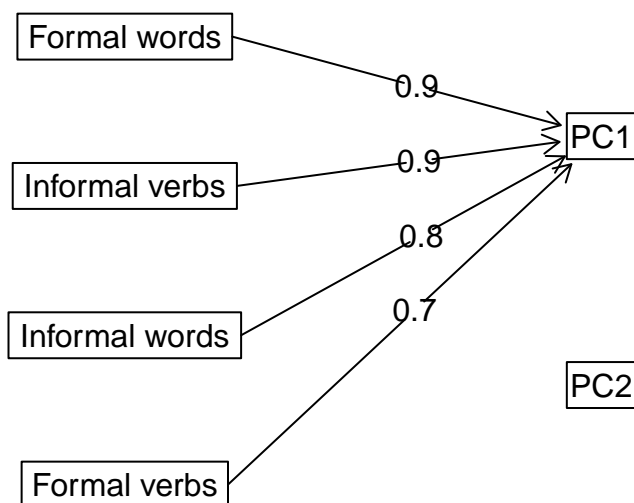
(a) Obtain principal component loadings for two factors.

```
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

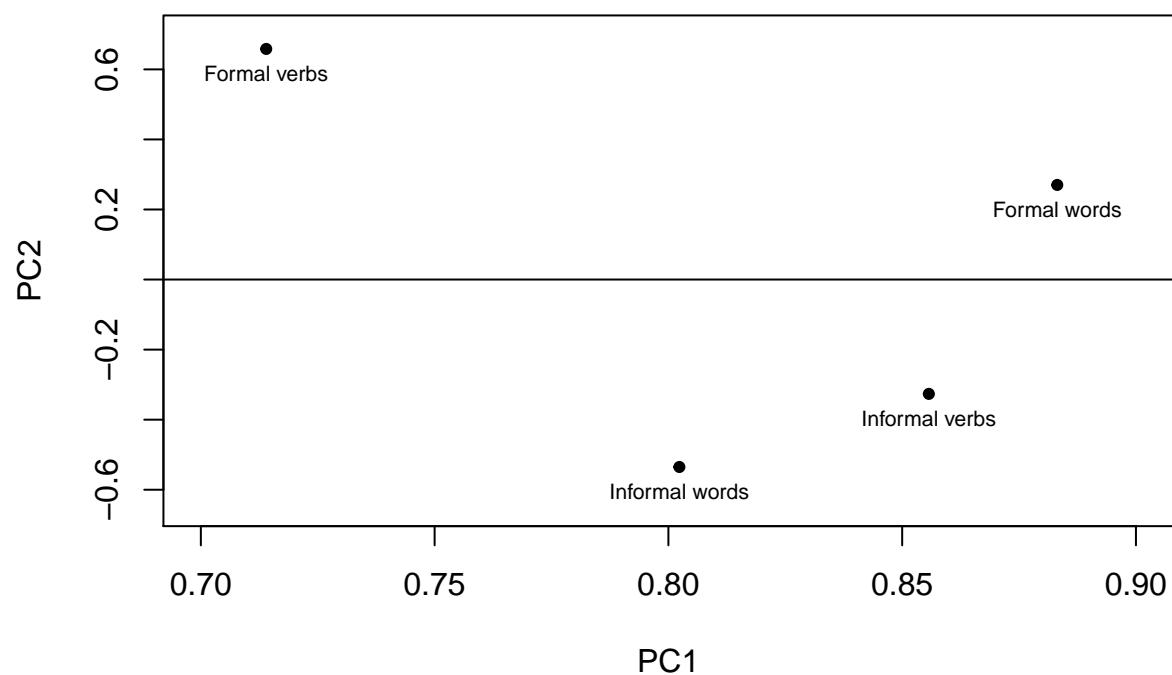
fa.diagram(fa)
```

Components Analysis



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

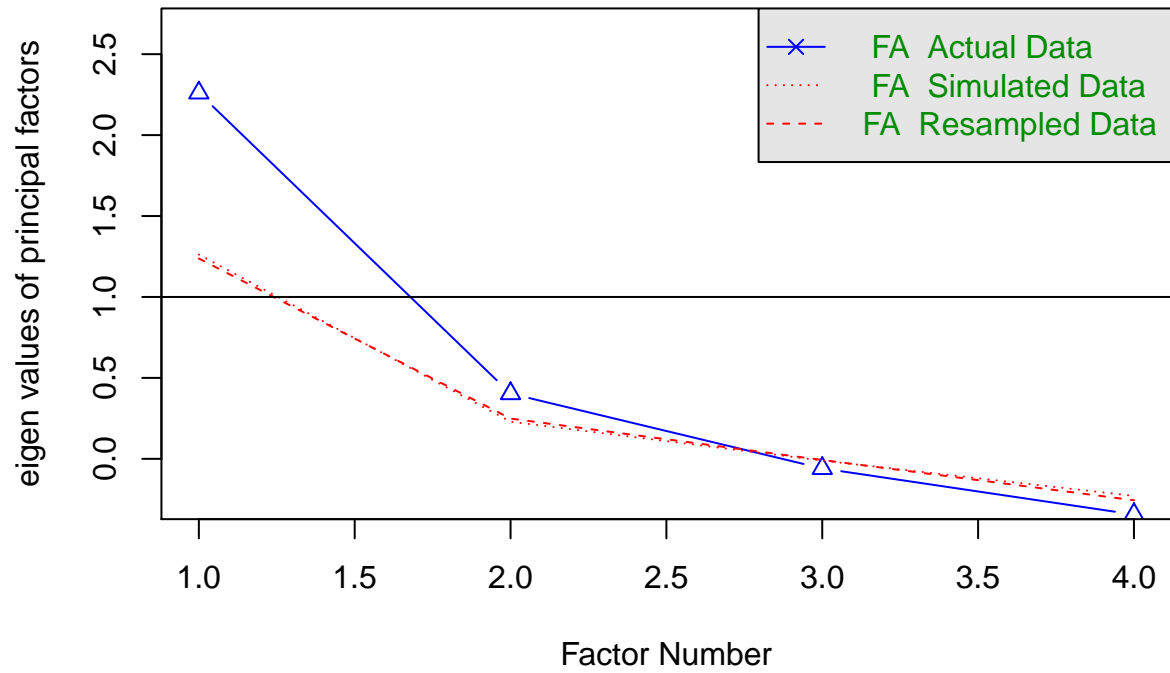
Principal Component Analysis



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 = 1 and the number of components = NA