

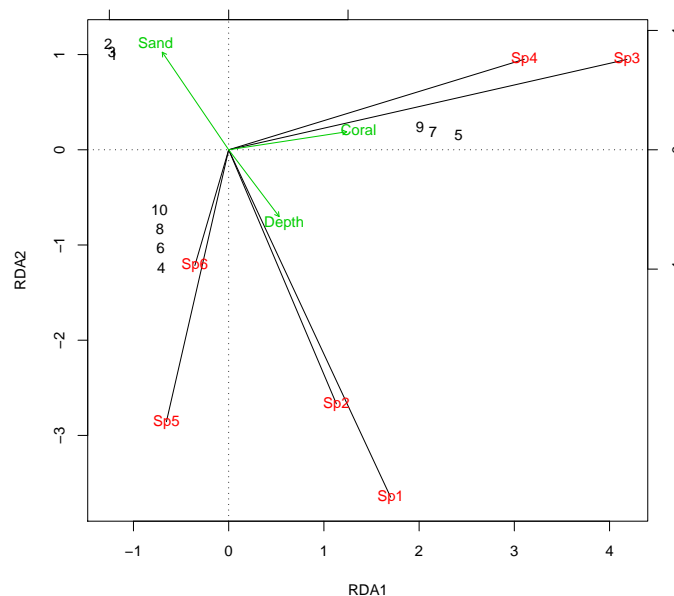
## MULTIVAR STATS IN ECOL AND GENETICS — EXERCISES, SHEET 7

**Exercise 1** Download the data set 'artificialFishes.txt' from the web page.

- Execute the R commands from the lecture and produce the triplots (do not forget to load the library `vegan` first).
- Play a bit around with `rda()`. For example try `scale=TRUE`, look in the help pages `?rda`, `?plot.rda` or plot the the returned RDA object with `plot()` and different arguments to the option `display=`.
- Here is a different way to produce a triplot:

```
plot(myrda, type="n", scaling=2)
segments(x0=0,
         y0=0,
         x1=scores(myrda, display="species", scaling=2)[,1],
         y1=scores(myrda, display="species", scaling=2)[,2])
text(myrda, display="sp", scaling=2, col=2)
text(myrda, display="bp", scaling=2,
     row.names(scores(myrda, display="bp")), col=3)
text(myrda, labels=fishes$Site, display="sites", scaling=2)
```

Note that `text(rda.obj)` calls `text.cca(rda.obj)`. Learn from these commands and try to produce the respective distance biplot which looks as follows



**Exercise 2** Download the data set 'RIKZGroups.txt' from the web page. Use `week`, `exposure`, `salinity`, `temperature`, `NAP`, `grainsize`, `humus` and `chalk` as explanatory variables.

- Apply redundancy analysis and produce the distance triplot and the correlation triplot.
- Look at the triplots and try to understand the data. Is there an interpretation for the first two principal components? What dependencies do you conjecture? What could be uncorrelated?
- Try to explain your conjectures with what you expect as habitat of insecta, crustacea, polychaeta and mollusca.
- The samples from week 1 seem to deviate a bit from the average. To visually inspect that, redraw the distance biplot with the observations being colored according to the week in which they were sampled in. We did this kind of coloring in the PCA for the height-weight data. (This coloring has not been done in the lecture. If you don't manage to do it, leave it)

**Exercise 3** Download the data set 'artificialFishes.txt' from the web page. This artificial data is a good example for reading off conjectures from triplots.

- Apply redundancy analysis and produce the distance triplot and the correlation triplot from the lecture. You could also use the commands from the first exercise of this sheet to produce nicer triplots.
- Look at the triplots and try to understand the (artificial) data. Is there an interpretation for the first two principal components? What dependencies do you conjecture? What could be uncorrelated? (The data is self-generated, so don't use or knowledge of nature).

**Exercise 4** Load the library `vegan`. Then enter `data(dune)` and `data(dune.env)`. Now the data frames `dune` and `dune.env` are known and contain dune meadow vegetation data. Try to understand the data (here without guidance). Put up conjectures. (`?dune` gives you some explanations about the data. If the variables are still unclear, translate the words or use wikipedia.)