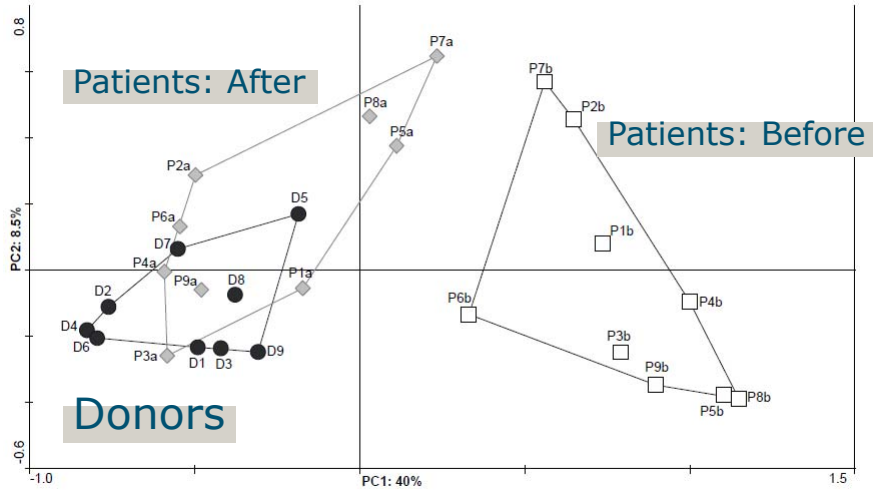


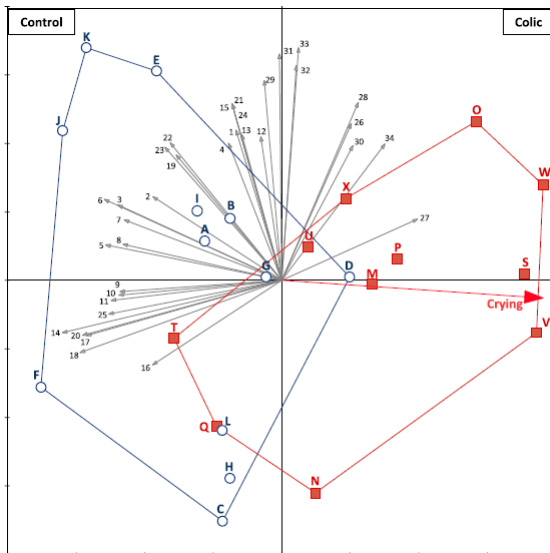
Ex1: Comparison of three groups by PCA



Transplant study: van Nood et al. 2012 NEJM
Data: microbiota taxa (Susana Fuentes, W. de Vos)



Ex2: Extension of t-test (1)



- Comparison of two groups by RDA
- Horizontal (constrained) axis = difference of Control and Colic
- Vertical (unconstrained) axis = main residual pattern
- Correlation with Crying of babies

De Weerth et al 2012, Pediatrics
Microbiota (Susana Fuentes, W. de Vos)



Ex2: Extension of t-test (2)


We see three types of data in this example

- Response data (the main/focal data) :
 - Amounts of 33 microbiota taxa
- Explanatory data:
 - Treatment, a factor with 2 levels (Control and Colic)
- Supplementary data:
 - Crying

From Canoco 4.x to Canoco 5 (1)

Canoco 4: terms used	Canoco 5: terms used in manual and some help
Sample	Case
Species	Response
Environmental data	Explanatory data
	Supplementary data
Supplementary data	Supplementary data
Direct/ indirect analysis	Constrained/ Unconstrained + + + +
If you wanted a PCA of soil properties: Enter soil data as 'species data': In output: species == soil property	Output uses the term you must define when entering the data. Above terms are used in manual and some help

From Canoco 4.x to Canoco 5 (2)

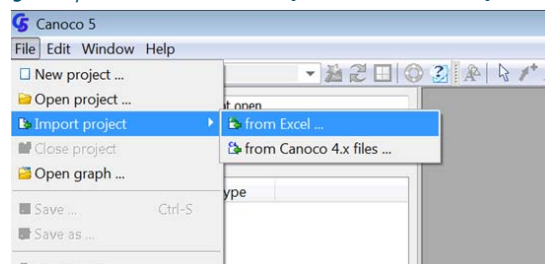
	Canoco 4	Canoco 5
Project	One analysis	Data tables with analyses
Data from Excel	WCanoImp	Integrated
Plotting	Canodraw	Integrated
Solution in:	log and Canoco.sol	Analysis notebook
Factors	Dummy (1/0) variables	Factors with editing facilities
Factors	Define as nominal variables in CanoDraw	Automatic: classes plotted as centroid points
Change scaling of diagrams	Redo the whole analysis!	On the fly with & recreate graph 

Possible roles of data tables

- Response data (main data table)
 - to be visualized, perhaps in combination with others
- Supplementary data
 - to interpret the response data
- Explanatory data
 - to explain the response data
- Covariate data (for advanced users)
 - to account or adjust for.
 - to enable detection of structure in response *after* accounting for the variation explained by these covariates

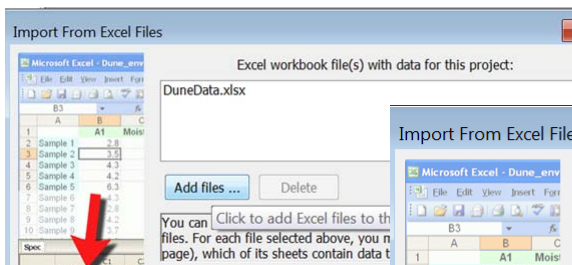
Starting a new Canoco project (1)

- Canoco 5 focuses on research questions on a set of data
- A Canoco 5 project thus consists of
 - one or more data tables
 - analyses on these data
- Easiest to start a new project with
File/Import project/from Excel... (Alt-F-I-Enter)



Starting a new Canoco project (2)

- Select one or more Excel files, here 1
- Select the number of project data tables, here 2

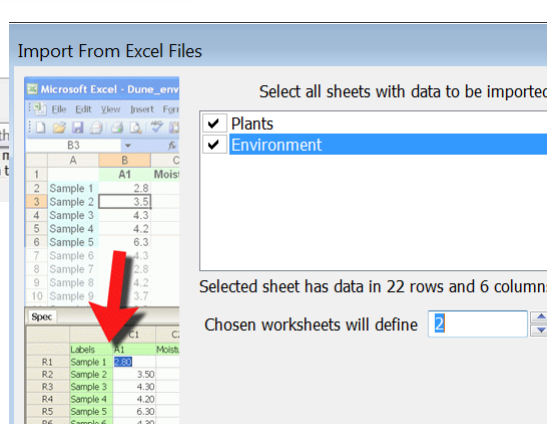


Excel workbook file(s) with data for this project:

DuneData.xlsx

Add files ... Delete

You can click to add Excel files to the files. For each file selected above, you can specify which of its sheets contain data to be imported.



Select all sheets with data to be imported


Plants

Environment

Selected sheet has data in 22 rows and 6 columns

Chosen worksheets will define

- Excel file can contain more than one sheet
- Each sheet can give ≥ 1 data tables

 **WAGENINGEN UR**
For quality of life

Example with data in three Excel sheets

- Select one or more Excel files, here 3
- Select the number of project data tables, here 3

Import From Excel Files

Excel workbook file(s) with data for this project:

Cases x explanatory variables.xlsx
Cases x response variables.xlsx
Response variables x traits.xlsx

Add files ... Delete

You can import Canoco 5 files. For each file select page, which of its sheets

Import From Excel Files

Select for each workbook the sheets with import data

Environmental data R Abundance data L

Selected sheet has data in 933 rows and 8 columns
Selected sheet has data in 933 rows and 105 columns

Cases x explanatory variables.xlsx
Cases x response variables.xlsx

Use the scroll-bar to navigate to other workbooks:

Selected worksheets will define 3 project tables

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Starting a new Canoco project (3a)

Give names to YOUR units and variables

- choose from list or
- start typing
 - singular, then
 - plural

Import From Excel Files: Table 1/2

Table specified here will become the main (primary) data table of this project.

Table identity

Each observational unit is a meadow
multiple units are called meadows

Each variable in the table is a plant species
multiple variables are called plant species

Table name: Plants

Data Sources

Data for table are in a single sheet split over more sheets

Choose sheet with data:

Plants
Environment

Selected sheet has data in 22 rows and 31 columns

Data are transposed, with plant species arranged in rows

For numeric data, empty cells are zeros missing values

This table represents general compositional data

Import all plant species as factors

WAGENINGEN UR
For quality of life

Starting a new Canoco project (3b)

Give names to YOUR units and variables

Empty cells: 0 or mis

Data kind is

- General or

- Compositional:

-row sum has meaning

-variables measured on the same scale (≥ 0)

The right choice helps to select suitable methods



Import From Excel Files: Table 1/2

Table specified here will become the main (primary) data table of this project.

Table identity

Each observational unit is a meadow
multiple units are called meadows

Each variable in the table is a plant species
multiple variables are called plant species

Table name: Plants

Data Sources

Data for table are in a single sheet split over more sheets

Choose sheet with data:

Plants
Environment

Selected sheet has data in 22 rows and 31 columns

Data are transposed, with plant species arranged in rows

For numeric data, empty cells are zeros missing values

This table represents general compositional data

Import all plant species as factors

Starting a new Canoco project (3c)

Default kind:

- first data table -

Compositional (e.g. species data)

- Later tables -

General (e.g. env. data/ study design)

Cannot do DCA or transformation on all columns (e.g. log) on a General table

Kind can be changed in table tab



Import From Excel Files: Table 1/2

Table specified here will become the main (primary) data table of this project.

Table identity

Each observational unit is a meadow
multiple units are called meadows

Each variable in the table is a plant species
multiple variables are called plant species

Table name: Plants

Data Sources

Data for table are in a single sheet split over more sheets

Choose sheet with data:

Plants
Environment

Selected sheet has data in 22 rows and 31 columns

Data are transposed, with plant species arranged in rows

For numeric data, empty cells are zeros missing values

This table represents general compositional data

Import all plant species as factors

Starting a new Canoco project (4)

Names of row and column items:

- none
- short names (8 chars)
- full names (long)
- both

Excel Files: Table 1/2

Specification of the table 'Plants' continues here

Excel cell areas with data
The meadows (and plant species names) are
in rows 1 to 22
the plant species (and meadow names) are
in columns A to AE

Preview of the selected cell area:

	A	B	C	D
1		Achillea millefolium	Agrostis stolonifera	Aira praecox
2		Ach mil	Agr sto	Air pra
3	1		1	
4	2		3	
5	3			4
	
20	18			
21	19			

Labels Import

meadow names are

plant species names are



Starting a new Canoco project (5)

Result: two project data tables (Plants and Environment) and offer for starting analysis

Data tables:

you can

- View
- Edit
- Copy
- Export
- Change kind/name etc.

Plants Environment

	Labels	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
R1	1										
R2	2	3			2		3	4			
R3	3		4		7		2				
R4	4		8		2		2	3		2	
R5	5	2									
R6	6	2									
R7	7	2									
R8	8										
R9	9										
R10	10	4									
R11	11										
R12	12										
R13	13										
R14	14										
R15	15										
R16	16										
R17	17	2									
R18	18										
R19	19										
R20	20										
[R21]											
[R22]											
[R23]											
[R24]											

Introductory Analysis

Do you want to setup quickly a starting analysis for your project?

If so, select analysis type and click Yes button:

- unconstrained ordination of plant species, environmental variables projected
- constrained ordination of plant species, using all environmental variables
- constrained ordination of plant species, with selection of environmental variables

Show this dialog box after each suitable project import

Yes No Help



Starting a new Canoco project (6)

Accepting the offer and all default choices leads to

- Summary of DCA analysis
- Two graphs

Save your project!

- File Save.. or
- Ctrl-S



Canoco 5 - [Analysis Unconstrained-suppl-vars]

Project: DuneIntro.c5p

Data tables:

Table	Cases	Vars	Type
Plants	20	30	compos.

Analyses:

Unconstrained-suppl-vars

Summary

Analysed Data Summary

Cases: 20 meadows

Response vars: 30 plant species

Supplementary vars: 5 environmental variables [DF=7]

Summary of Results

Method: DCA with supplementary variables

Total variation is 2.11526, supplementary variables account for 55.7% (adjusted explained variation is 29.8%)

Summary Table:

Statistic	Axis 1	Axis 2	Axis 3	Axis 4
Eigenvalues	0.5360	0.2869	0.0814	0.0481
Explained variation (cumulative)	25.34	38.90	42.75	45.03
Gradient length	3.70	3.12	1.31	1.48
Pseudo-canonical correlation (suppl.)	0.8549	0.8748	0.8051	0.8070

Species-environment correlation

Starting a new Canoco project (6)

Accepting the offer and all default choices leads to

- Summary of DCA analysis
- Two graphs

Save your project!

- File Save.. or
- Cntr-S



Canoco 5 - [Analysis Unconstrained-suppl-vars]

Project: DuneIntro.c5p

Data tables:

Table	Cases	Vars	Type
Plants	20	30	compos.

Analyses:

Unconstrained-suppl-vars

Summary

Analysed Data Summary

Cases: 20 meadows

Response vars: 30 plant species

Supplementary vars: 5 environmental variables [DF=7]

Summary of Results

Method: DCA with supplementary variables

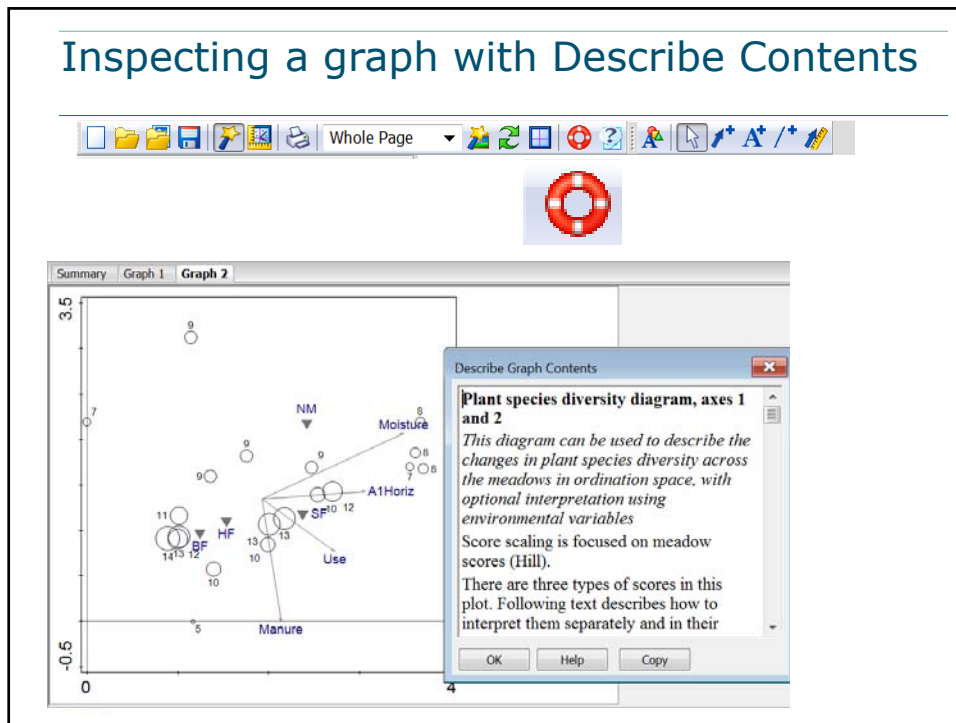
Total variation is 2.11526, supplementary variables account for 55.7% (adjusted explained variation is 29.8%)

Summary Table:

Statistic	Axis 1	Axis 2	Axis 3	Axis 4
Eigenvalues	0.5360	0.2869	0.0814	0.0481
Explained variation (cumulative)	25.34	38.90	42.75	45.03
Gradient length	3.70	3.12	1.31	1.48
Pseudo-canonical correlation (suppl.)	0.8549	0.8748	0.8051	0.8070

To view the data again, click Plants

Inspecting a graph with Describe Contents



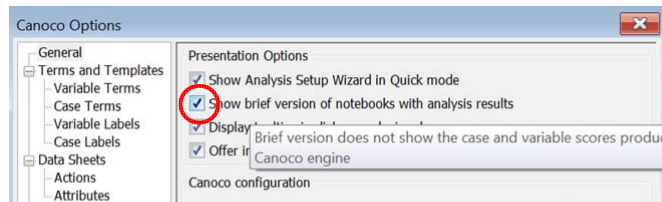
All scores are available too:

No separate Canoco.sol file anymore

Edit / Settings / Canoco5 Options:

- Uncheck Show brief version of notebooks with ...

Hide/Show analysis gives:



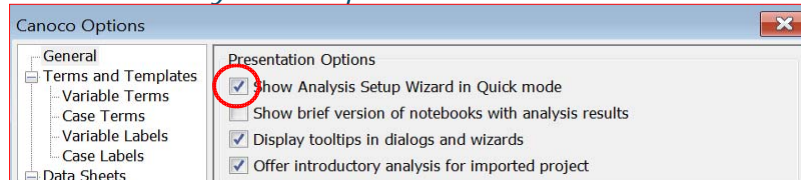
	Resp.1	Resp.2	Resp.3	Resp.4	RespW	RespN2	Tol.1	Tol.2	Tol.3	Tol.4	Tol4
Achillea millefolium	-0.3561	-0.8520	-0.6661	-0.1861	16.0000	6.0952	1.3641	1.9130	1.2816	0.7240	138.6271
Agrostis stolonifera	3.6 Positions of response variables (e.g. species) on ordination axes. In linear										
Aira praecox	-0.7 methods represent regression coefficients, in unimodal methods represent the										
Alopecurus geniculatus	3.0 "species optima"										
Anthoxanthum odoratum	-0.5796	2.7109	-0.1809	0.0430	21.0000	5.7273	1.4568	1.4038	0.8880	0.5835	114.2605
Bellis perennis	1.0092	0.5036	-0.9428	-0.5007	13.0000	5.8276	0.6525	0.6176	1.4455	1.0899	101.0523
Bromus hordeaceus	0.5673	-0.4497	-2.3301	0.2091	15.0000	4.5918	0.8303	1.3136	2.6773	0.3196	155.6025
Chenopodium album	3.0359	1.3324	-2.3487	-1.8633	1.0000	1.0000	0.4963	0.0526	2.8354	1.8633	171.4665
Cirsium arvense	2.1552	2.0161	-4.5330	2.2143	2.0000	1.0000	0.1464	0.9517	4.5330	1.7246	247.2326

Canoco 5 Quick wizard mode



or *Edit | Settings | Canoco5 Options:*

Uncheck *Show Analysis Setup Wizard in Quick mode*



For:

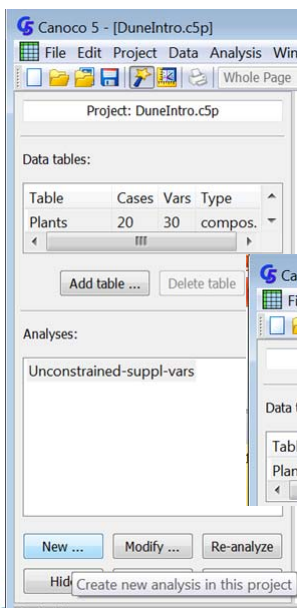
Weighting/deleting cases and response variables

Defining interactions between explanatory variables
(can also be done in the data table, click two columns)

Covariate and supplementary variable page



Adding a new analysis to the project (1)



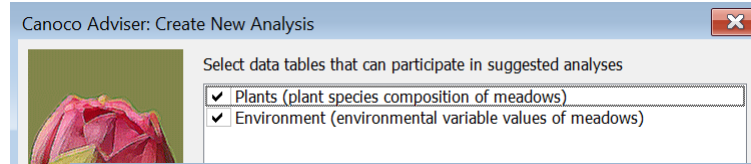
By :

- *New...* (under Analyses) or
- *Analysis | Add new analysis | Canoco Adviser...* (Alt-A-A-Enter)

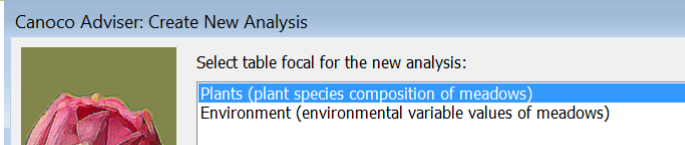
Adding a new analysis to the project (2)

Select:

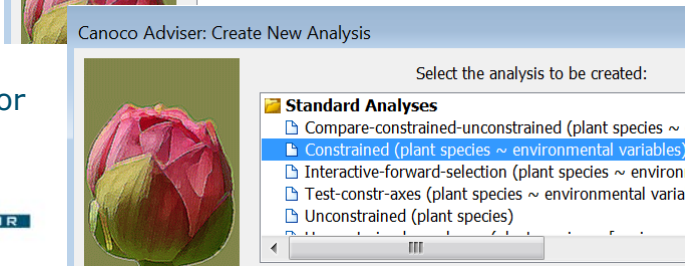
1. Tables



2. Focal table



3. Template for analysis

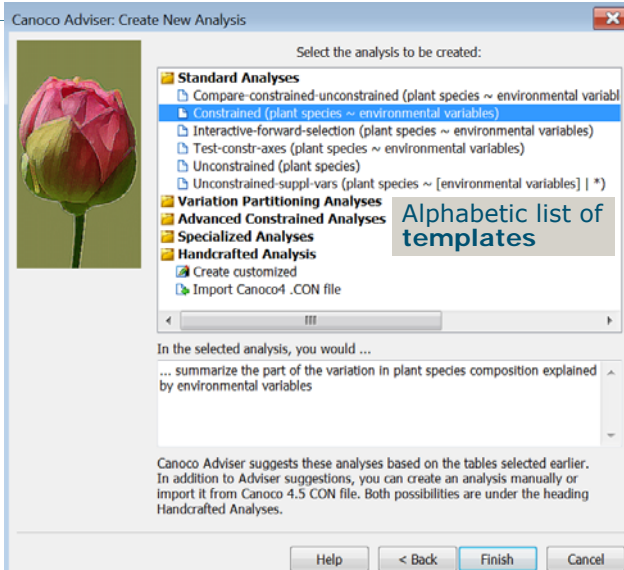


Adding a new analysis to the project (3)

3. Select **template**

-double click on bold terms to fold/unfold

(Can enlarge dialog window to see all)



Adding a new analysis to the project (4)

Standard analyses:

- Constrained: response variables ~ predictors
- Unconstrained: response variables
response variables ~ [supplementary variables]
- Compare constrained – unconstrained
- Test constrained axes
- Interactive forward selection of predictors
 - See also: Summarize effects of expl variables

See Advanced ... for constrained analysis with covariates



Adding a new analysis to the project (5)

Standard analyses:

Ordination method

Method	Linear	Unimodal
Unconstrained	<input type="radio"/> PCA	<input type="radio"/> CA (DCA)
Constrained	<input type="radio"/> RDA	<input checked="" type="radio"/> CCA

PCA: Principal component analysis

RDA: Redundancy analysis

CA (DCA): Correspondence analysis(Detrended)

CCA: Canonical correspondence analysis



Adding a new analysis to the project (6)

Test or Explore Predictor Effects

Not performed
 Forward selection of expl. variables
 All constrained axes test
 Summarize effects of expl. variables
 First constrained axis test
 Both above tests performed

Permutation Test Parameters

Unrestricted permutations
 Time series or linear transects
 Rectangular grids
 Hierarchical design
 Read from file
 Disable random shifts from mirror

Number of permutations: 499

Random number generator seeds: 23239 and 945

Blocks defined by covariates
 Leverage correction of residuals

From Canoco 4.x to Canoco 5 (3)

Canoco 4	Canoco 5
Automatic forward selection	Summarize effects of expl. variables
Manual forward selection	Forward selection of expl. Variables (or via specialized template)
Terms in result:	
Marginal effect	Simple effects
Conditional effects	idem
lambda-1 and -A	Explains %
F-value	Pseudo-F
P-value	Added: P(adj) for multiple testing correction or false discovery rate (FDR)

Summarize effects of expl. variables.

Dune meadow data

Plant species ~ Environment (CCA)

Term Effects

P values correction: False discovery rate

Simple Effects

Name	Explains %	pseudo-F	P	P(adj)
Moisture	19.4	4.3	0.002	0.016
Management.NM	15.0	3.2	0.004	0.016
Manure Amount	11.3	2.3	0.016	0.04267

Conditional Effects

Name	Explains %	pseudo-F	P	P(adj)
Moisture	19.4	4.3	0.002	0.008
Management.NM	12.2	3.0	0.002	0.008
A1 horizonz	6.7	1.7	0.06	0.16

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Forward selection of expl. variables

- Color code for significance
- FDR testing on-line, but only for viewed variables
 - Tip: increase window size to get correct FDR

Forward Selection Step

Candidate Terms

Name	Contribution %	F	P	P(adj)
Moisture	34.9	4.3	0.002	0.016
Management.NM	27.0	3.2	0.004	0.016
Manure Amount	20.3	2.3	0.016	0.04267
A1 horizonz	19.1	2.1	0.032	0.064
Management.SF	16.7	1.8	0.058	0.0928
Management.HF	12.5	1.4	0.17	0.22667
Management.BF	11.9	1.3	0.228	0.26057
Use Type	10.9	1.2	0.294	0.294

Test Include Stop Help

Include whole factor

Term Contribution

All considered variables explain together 55.7% of total variation
Out of this variation, the highlighted term would contribute 34.9%

Selected Terms

Order	Name	P	P(adj)
-------	------	---	--------

P values correction: False discovery rate

New: Canoco Adviser

On the basis of the data properties the Adviser suggests

- Transformation and standardization of variables

right-click on top-left cell
in data sheet

Or use

*Data | Default
transformation and ...*

	C5	C6	[C7]	[C8]
Manure Amount [PO4]				
	4	1000		
	2	100		
	4	10		
	4	1		
	2	923		

Canoco5

Log transformation is suggested by Canoco Adviser for 1 environmental variable. After you close the Variable Transformations dialog, suggested transformations will be stored and used in the analyses.

Do not show this dialog again

OK Help

New: Canoco Adviser

On the basis of the data properties the Adviser suggests

- Transformation and standardization of variables
- Common analyses via templates
- Choice between Linear and Unimodal

Ordination method

Method	Linear	Unimodal
Unconstrained	<input type="radio"/> PCA	<input type="radio"/> CA (DCA)
Constrained	<input type="radio"/> RDA	<input checked="" type="radio"/> CCA

Response data are compositional and have a gradient 3.7 SD units long, so unimodal method is suggested, but linear one would be also a good choice

Re-advise

New methods in Canoco 5 (1)

- Variation partitioning
- Distance-based methods
- Co-correspondence analysis
- Trait-based analyses
- Principal response curves (PRC) [via dedicated template]
- Generalized linear models (GLM) with permutation tests
(next two were available in CanoDraw 4)
- Response curves (GLM/GAMs with one predictor)
- Contour plots (GLM/GAM with two predictors)



Variation partitioning

Which part of variation is due to

- (a) Environment
- and which to
- (b) Management
- and which part is
- (c) shared?

two or three groups of variables



Partitioning

Variation Partitioning Results for Two Groups

Variation Explained

Fraction	Variation(adj)	% of Explained	% of All	DF	Mean Square
a	0.30775	50.2	14.5	2	0.20054
b	0.26405	43.1	12.5	4	0.13812
c	0.041408	6.8	2.0	--	--
Total Explained	0.61321	100.0	29.0	6	0.18126
All Variation	2.1153	--	100.0	19	--

Copy

Significance Tests

Tested Fraction	F	P
a+b+c	2.3	0.001
a	2.5	0.004
b	1.7	0.002

Copy

Group Members

First Group: A1 horizon

Second Group: Management

Copy Members

Compared groups are represented by circles in the following diagram. Lower case letters label individual estimated fractions and are referred in the summary tables above

Distance-based methods

- E.g. from intercity train-time to a map of cities
- PCO/NMDS/db-RDA/Procrustes analysis

Analysis Setup Wizard: NMDS Options (1)

Setup Non-metric MultiDimensional Scaling (NMDS)

Input Data Table

Table 'Plants' contains:

data for calculating meadow distances using this distance measure: **Bray-Curtis distance**

imported matrix of (dis)similarities and the actual values are: **distances**

Export distances into TSV file:

NMDS Options

NMDS solution based on **3** axes

Optimize solution by restarting from **0** perturbations of the initial, PCO-based configuration

Stress formula: type 2 type 1

Treatment of ties in distances: primary secondary

Project plant species as supplementary data

Co-correspondence analysis

- How are two compositional data tables related?

e.g. plant and beetle communities
(Schaffers et al. 2008)

Co-Correspondence Analysis Summary Graph 2

Co-Correspondence Analysis (CoCA) Results

Shared case weights are: taken from first table

Total inertias:

Beetle counts 3.9883

Plant abundances 5.7573

Cross-correlation between CoCA axes:

1	2	3	4
+0.9581	+0.9414	+0.8771	+0.9495

Test on first axis: lambda=0.2534, P=0.00400

Test on all axes: trace=0.9369, P=0.00200

Graph 1

Trait-based analyses and phylogenetic relations

- Trait averages
- Functional diversity
- RDA on community-mean traits
- 4th corner & RLQ (via Expand occurrences)
- Phylogenetic corrections

Species	Environment	Traits	Trait Averages	Functional Diversity			
			C1	C2	C3	C4	C5
	Labels	Polycarpic	CNratio	seed.mass.log	SLA	height	
R1	ACHIMILL	polycarp	12.94	-0.876	19.63	2	
R2	AGROCAPI	polycarp	17.421	-1.444	29.54	21	
R3	ANTHODOR	polycarp	13.778	-0.678	29.97	14	
R4	BRIZMEDI	polycarp	33.69	-0.578	25.93	20	
R5	BROMHORD	monocarp	16.183	0.305	26.19	12	
R6	CAPSBURS	monocarp					
R7	CAREFLAC	polycarp					
R8	CAREHIRT	polycarp					
R9	CARENIGR	polycarp					
R10	CENTJACE	polycarp					
R11	CERAAARVE	polycarp					
R12	CERAGLOM	monocarp					
R13	CIRSARVE	polycarp					
R14	CYNOCRIS	polycarp					
R15	DAUCCARO	polycarp					
R16	DESCCOESP.CE	polycarp					
R17	EQUIPALU	polycarp					
R18	FESTOVIN	polycarp					
R19	FESTPRAT	polycarp					
R20	FESTRUBR	polycarp	23.679	-0.235	18.6		
R21	GALIMOLL	polycarp	17.856	-0.372	21.11	4	
R22	GALIULIG	polycarp	27.043	-0.772	29.63		

Import Phylogenetic Tree

Name of imported file:
C:\Program Files\Canoco5\Sar Browse...

Default branch length: 1.0

Terminal items of the tree correspond to:
species

Item labels in the tree correspond better to:
 short labels full labels

OK Cancel Help



Principal response curves (PRC) (1)

Template in Advanced...

Requires at least two factors in explanatory data to show up

Canoco Adviser: Create New Analysis

Select the analysis to be created:

- Unconstrained-suppl-vars (species ~ [design descriptors] | *)
- Variation Partitioning Analyses**
- Advanced Constrained Analyses**
 - Compare-constrained-unconstrained-partial (species ~ design desc
 - Constrained-partial (species ~ design descriptors | design descript
 - Constrained-supplementary (species ~ design descriptors + [desig
 - Interactive-forward-selection-covariates (species ~ design descript
 - Principal-response-curves-first-set (species ~ design descriptors)**
 - Principal-response-curves-N-sets (species ~ design descriptors)
 - Show-high-leverages (species ~ design descriptors)
 - Test-constr-axes-covariates (species ~ design descriptors | design
- Specialized Analyses**
- Handcrafted Analysis**
 - Create customized
 - Import Canoco4 .CON file



Generalized linear models (GLM)

Via

- GLM template for ≥ 1 predictors
- Graph| Attribute plots

1 predictor:

- Multiple response curves in single graph

2 predictors:

- Contour plot

Term	b	SE	T	p(T)
(Intercept)	-5.58977	1.731284	-3.23	0.00371
WaterCon	3.14001	0.5211395	6.03	<0.00001
BareSand	0.0191125	0.2406353	0.08	0.93738
FallTwig	-0.847538	0.1932076	-4.39	0.00021
Refl Lux	0.0837154	0.2033162	0.41	0.68433



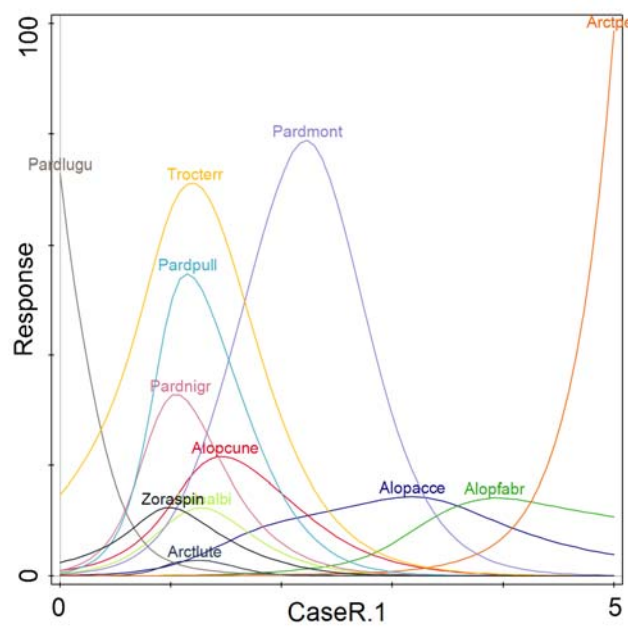
Nonlinear response curves via GLM or GAM

Fitted Generalized additive models

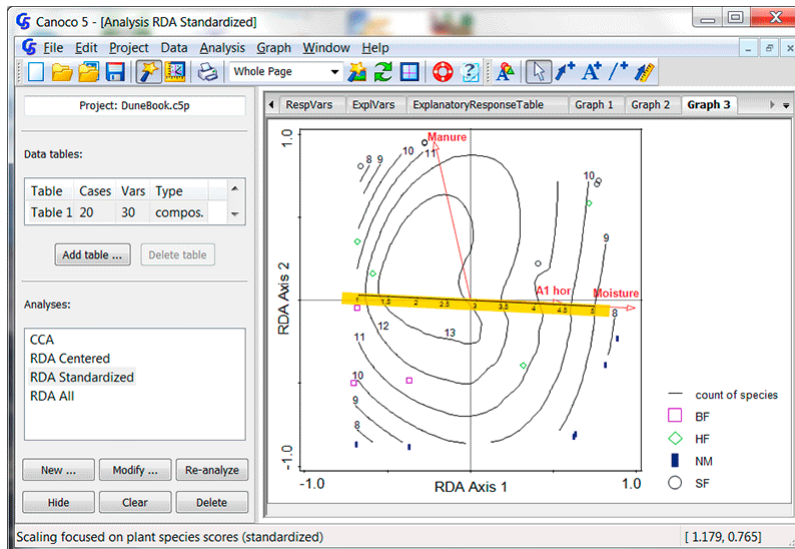
Predictors CaseR.1
 Distribution quasi-Poisson
 Link function log

GAM fitted for 12 response variables:

Response	T...	R2[%]	F	p
Alopacce	s3	63.7	53.0	<0.0000
Alopcune	s3	52.2	35.7	<0.0000
Alopfabr	s3	84.2	130.1	<0.0000



GAMs or GLMs with two predictors



Find out how to get a method, eg. GAM (1)

- Help|Help contents (Alt-H-H) opens the help system
- Type GAM in search field, press Enter, gives

canowin5

Hide Locate Back Forward Print Options

Contents Index Search Favorites

Type in the word(s) to search for:

GAM

List Topics Display

Select topic: Found: 13

Title	Location	Rank
GAM Options dialog	canowin5	1
Error fitting GAM	canowin5	2
GAM estimation failed - nega...	canowin5	3
Invalid DF for a GAM predictor	canowin5	4

WAGENINGEN UR
For quality of life

canowin5

Canoco5 Overview

Welcome to Canoco5 h

Canoco5 provides context sensitive help when you see them and need an assistance.

- [What is Canoco5](#)
- [Working with Canoco5](#)
- [Support for your work](#)
- [Canoco5 for Canoco 4.5 users](#)
- [How to get more memory available for Can...](#)

Find out how to get a method, eg. GAM (2)

Look in manual or use on-line help as follows:

- Help|Help contents (Alt-H-H) opens the help system
- Type GAM in search field, press Enter
- Click *GAM options dialog*
- Scroll down in the help page to find

Getting Here: You
or when specifying:

where it says:

Use one of the commands in *Graph / Attribute plots* submenu (use the *Model Options* button)

Type: response curves → topic Response curves plot →
Getting Here: use *Graph / Attribute plots / <Col-term> response curves*



New methods in Canoco 5 (2)

- **Predicted** and fitted **response values** for constrained methods, via *Data | Add new table | Predict..*; Alt-d-a-p
- Calibration - **predicted explanatory values**; imputing of missing explanatory values on basis of constrained meth. via *Advanced constrained template*
- Diversity indices, via *Data | Add new table | Statistics*; Alt-d-a-s
- Functional diversity via Alt-d-f
- Indicator values of species for a grouping
- Multiple testing and FDR
- Multi-step analyses and more...



New/better graphs in Canoco 5

Integrated! Graphs require at least one analysis

Graph options: -Edit | Settings (application wide) AND
-Analysis | plot creation options

- Better name placing in ordination diagrams

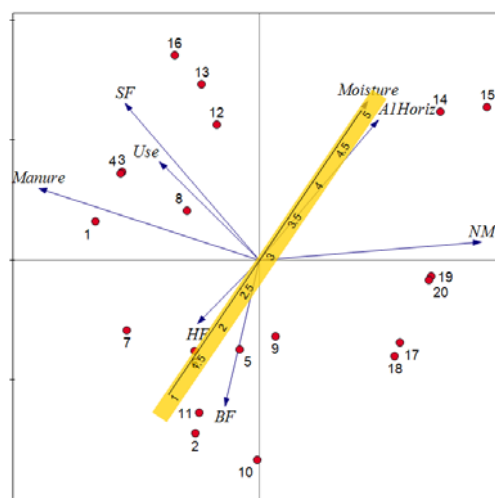
Examples of new graphs:

Calibration of arrows



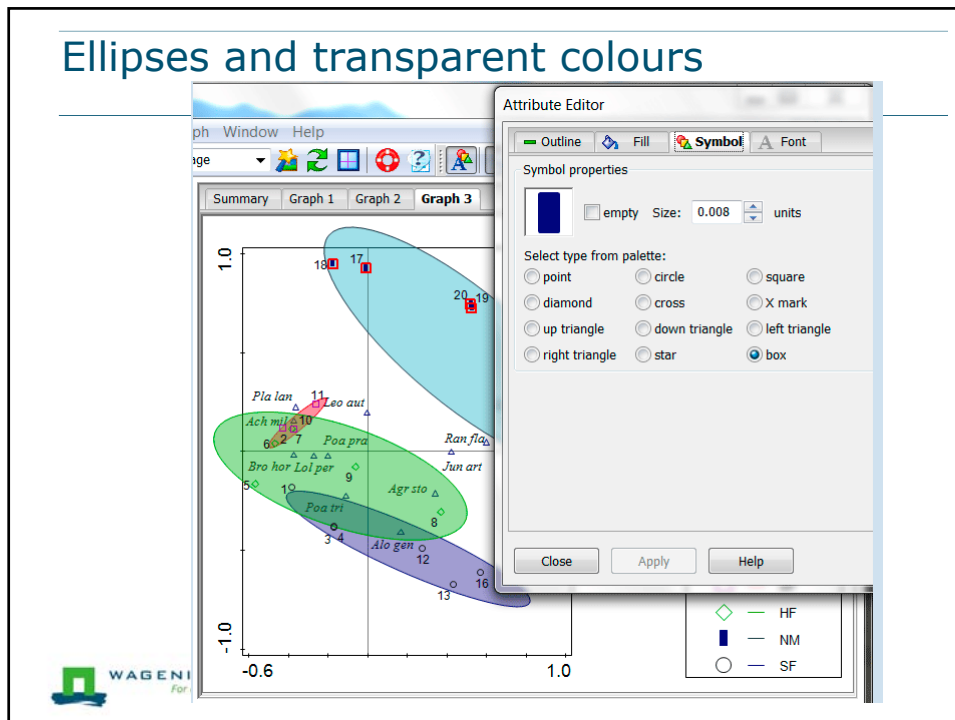
(Graffelman & Van Eeuwijk, 2005)

- E.g. PCA on
Environment data of
Dune Meadows
Arrow for Moisture
calibrated



Management automatic expanded to dummies

Ellipses and transparent colours



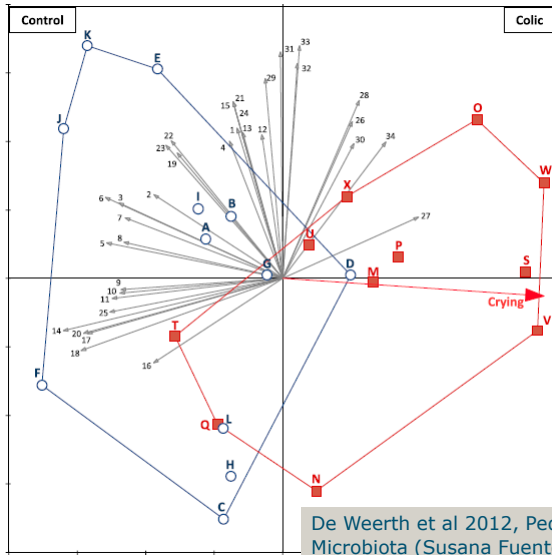
Resources/help

- Canoco 5 Tutorial under Programs
- Canoco 5 manual: ~500 pp
 - Look in WUR Library catalogue to see where it is available on loan or for sale
 - On sale now in tea break from 35€ for 25€
- Support site with Discussion list: www.canoco5.com
- Ask help from Biometris (often me...) English preferred
- Demo and practical



Ex2: Extension of t-test (1)

RDA or CCA: response ~ factor Advice Graphs: ex.3



- Comparison of two groups by RDA
- Horizontal (constrained) axis = difference of Control and Colic
- Vertical (unconstrained) axis = main residual pattern
- Correlation with Crying of babies

De Weerth et al 2012, Pediatrics Microbiota (Susana Fuentes, W. de Vos)

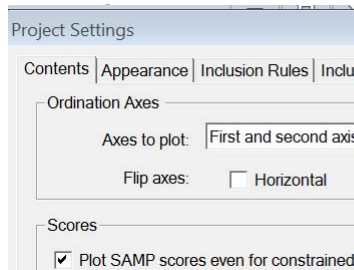
From Canoco 4.x to Canoco 5 (4)

RDA or CCA: response ~ factor

Canoco 4

- Canodraw | Project | Settings

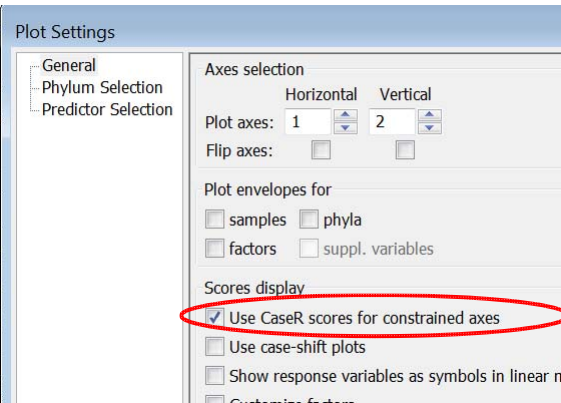
Plot Samp scores even



Canoco 5

- Analysis | Plot creation options (Alt-A-P)

● Use CaseR scores...



Canoco 5: partial RDA/CCA

Groups avoid
one variable taking both roles!

Via Advanced
constrained analyses

Division of variables in
one table in:

- Explanatory variables
(First group)
- Covariates (Second
group)

Use of 'grouped' in:

Template and own
multistep analyses

Definition of Groups

To define the groups, please select each group in turn
from the following list and move its members from
'Pool' to 'Members' list

Groups of 'environmental variables'
from 'Environment' data table

Explanatory Variables

Covariates

Pool:

A1Horiz
Moisture
Mngmnt
Use
Manure

Members:

>>



Thank you!

Resources:

www.canoco.com

www.canoco5.com

Overview/Tips/Issues

Mailing list of Canoco
users

