The Corina Book

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Table of Contents

List of Figures

List of Tables

List of Examples

List of Equations

Chapter 1. Installation

System Requirements

a computer	(specs)
Java	(version)

Additionally, there are some other things that, while not required, can be used by Corina:

data from another program (??)
a measuring station (??)
an internet connection
a database

Installing Java

WRITEME: how to install java (win32, mac, linux)

Installing Corina

download corina.sf.net/?/corina.jar, put it in Applications/Program Files, make a link to it / put it in the dock, fire it up. (linux: put in /usr/share/java/Corina.jar, make shell script /usr/bin/corina which launches it; what's its gnome/kde icon?)

```
#!/bin/sh
exec java -jar /usr/share/java/Corina.jar
```

WRITEME: different versions concurrently? just rename, it doesn't care about the name.

WRITEME: how to uninstall? remove corina.jar, remove temp files (/tmp/corina-map-files/..., etc.), maybe remove prefs (~/.corina/). your data is untouched; if you never plan to use corina again, you will need to convert your data to tucson (ref -- how?).

MOVEME: Corina gets your preferences from a file in your home folder, and your name from the operating system (for example, to put on printouts).

Importing Your Data

WRITEME

Chapter 2. The File Browser

What's It Do?

-- why you'd need such a beast; what it is/does

How To Browse Samples

To start the Corina File Browser, choose File->Browse... (**control-shift-O**) You will see the File Browser in a new window; initially, it will be browsing your toplevel data directory.

IMAGE: the basic file browser

In the upper-left corner, you see a popup labelled Folder. This is the folder you're looking at. If you click and ...

WRITEME - how to use it: the folder popup, arrow keys, pgup/dn, enter, mouse, descending folders, ascending folders, opening samples.

Displaying Fields and Sorting

If the Corina File Browser only allowed you to browse files by their filenames, it wouldn't be much more useful than the Finder (on the Mac) or Explorer (on the PC). But it has a killer feature that's completely impossible from almost any normal file browser: because it's part of Corina, it knows about Corina metadata fields. And you can display, sort by, or search for any of these fields.

WRITEME: how to display fields

WRITEME: how to sort

WRITEME: when do they get updated? (if at all)

Tip

If your hands are on the keyboard, you can quickly sort by a column by pressing **control** and the number of the column. For example, if the second column is "Size", press **control-2** to sort by size.

You can also sort by 2 or more criteria. For example, suppose you wanted to sort by the number of sapwood rings, and then (for those samples with the same number of sapwood rings) by end year. Click on them in the opposite order: "End", then "Sapwood Count". When you sort by "Sapwood Count", it won't disturb the sort order from the "End" sort unless it needs to, so samples with the same number of sapwood rings will still maintain their relative order. (--need an example of this--)

The following fields are available:

Name	The name of the file, as it's saved on the disk. (This field is always visible.)
Date Modified	The time and date this file was last modified. If it was modified today or yesterday, the date is shown as "Today" or "Yesterday", to make it easier to skim a list of files, and also for searching (discussed later).
Size	The size of this file on disk, in bytes or KB.
Kind	The kind of this file; usually this will be "Corina sample" or "Folder", but may also be something like "Tucson file" (for other dendro filetypes) or "Other document" (for non-dendro filetypes).

Range, Start, End, Length — The range is available either as the entire range ("1001-1036 (n=36)"), just the start-year ("1001"), just the end-year ("1036"), or just the length ("36"). The first option is easiest to read, usually, and the other options give you more flexibility when sorting. You can sort by end-year, for example.

And all of the sample's normal metadata fields, exactly as you entered them on Metadata panel

The Search Field

Sorting by a metadata field is a great way to organize samples, especially when you're sorting by a numerical value, like the number of sapwood rings. It doesn't work as well for some text fields, like the species, and it doesn't really work at all for other text fields, like the comments field. This is what the *search field* does really well.

In the top-right corner of a the File Browser window, there's a text field labelled "Search for:". When you type a word in this field, Corina will hide files that don't contain this text. You don't even need to press **return**: it updates the list as you type, instantly.

- You can type as many words as you like, separated by spaces. Corina will show only files that match *all* of the words you supply.
- This field is case-insensitive. The searches **`fire scar`**, **`FIRE SCAR`**, and **`fIrE sCaR`** are all equivalent.
- When you enter a new folder, anything you typed in this field will automatically be deleted.
- Terms you type into this field will match any column that is visible.

And of course, after you've typed some search terms to narrow down the list, you can still use the sorting function to sort the samples that remain.

The Trash

In the lower-right corner of the File Browser window, there's a little Trash icon. This is just like your Trash on Mac OS or your Recycle Bin on Windows.

- If you want to delete (one or more) files from the File Browser, simply select them and drag them to this icon. They'll be moved to your Trash.
- If you want to see what's in it, click it; this will open it with Explorer (on the PC) or in the Finder (on the Mac).
- If you want to delete the files in the trash/recycle bin permanently, click it to open it, and then choose Finder->Empty Trash (**shift-#-delete**) (on the Mac) or File->Empty Recycle Bin (on the PC) to empty it.
- If you want to recover a file you dragged to the trash, click the Trash to open it, and then drag the icon of the file back into the File Browser window. Alternatively, if dragging it to the trash was the last thing you did, you can undo it by choosing Edit->Undo Move to Trash.

```
FIXME:
-- packed tucson files
-- users will want to be able to read packed tucson files as if they were a folder of normal samples
-- users should be able to convert between "a folder of (tucson) samples" and "a packed tucson file"

-- need the new-new i/o system for this?
-- need a notation for this?  how about "packedfile.tuc#1" (#1, #2, ...)?  better yet, file.sep -- "
-- (number-of-sample is safe; id-number would probably not be, because there could be 2 files with 1
```

```
-- there probably aren't, in the ITRDB.  what if i enforced that there weren't on this end, too?  th
```

Exporting the Browser Data

Corina lets you export all of the metadata fields you're viewing in the browser to other programs. (For example, you could make a bargraph in Excel out of the start and end years of some samples.)

Procedure 2.1. Exporting the browser data:

- Choose Edit->Copy (**control-C**)

This will copy all of the data you see, as you see it, as plain text. Each field will be separated by a tab character, and each row will be on a new line. (You can paste it directly into a spreadsheet, like Excel.)

Printing the Browser Data

You can also print your current browser view, as well.

Procedure 2.2. To print out the browser view:

1. If you want to change the page setup options (if you want to change the margins, or print to a non-standard paper size, for example), choose File->Page Setup...
2. Choose File->Print... (**control-P**)

The printout will show:

- which folder you're viewing
- all of the fields you see
- all of the files you see
- if there are search terms, what they are
- the number of files/folders, just like the browser window shows
- your name and the date

Chapter 3. Editing Samples

Samples

The basic chunk of data in Corina is the *sample*. Everything in Corina is concerned with putting data into samples, manipulating samples to emphasize their useful data, and ultimately, determining where some sample fits in a chronology.

The term "sample" is perhaps slightly inaccurate. A Corina sample is more like one measurement of a sample. If you measure sample 6 twice, you will generally store the data in two samples, "6A" and "6C".

A sample consists of:

- Data, as one number per year (the width of a ring)
- A range, or the years it covers (like 1001 — 1036)
- Metadata (like whether it has pith)
- Weiserjahre (for a sum, how many samples contribute to each year)
- Elements (for a sum, which files were used to create it)

WRITEME: (***file/naming conventions)

To keep things somewhat organized, (what was i going to talk about? sites=folders?)

Creating a New Sample

Procedure 3.1. To create a new sample:

1. Choose File->New Sample... (**control-N**)
2. Type in a title for this sample, and press **return**.

Tip

Raw samples generally have titles with the site name, sample number, and reading letter. To help you from forgetting to type the sample number, Corina won't let you continue if the title doesn't have a number in it. If you really want to create a sample with no number in the title, type a number here and delete it later.

Entering or editing data is as simple as typing a number, and pressing **return** to advance to the next year. If you make a mistake, you can always back up to correct it. You can move the cursor by clicking on any value with the mouse, or by using the keyboard. The arrow keys move by one year (**left**/**right**) or decade (**up**/**down**), and **Page up**, **Page down**, **Home**, and **End** also work.

If you try to enter a value in the cell immediately after the last value of your sample, it will automatically extend the dataset. If you enter a value in a cell that already contains data, it will overwrite the old value with your new one. If ins/del***

If you have a measuring box connected to your computer's serial port, Corina can record its measurements directly.

Procedure 3.2. To measure a sample:

1. Create a new, empty sample with File->New Sample... (**control-N**)
2. Type a title, and press **return**.
3. Click on the cell where the first value will go, if it's not already selected: it's the second cell to the right of `1001`, below `1`.
4. Choose Edit->Start Measuring (**F1**)
5. Measure your sample. Pressing the trigger enters a value into the editor.
6. While measuring, you can still move the cursor with the arrow keys, e.g., if you want to re-measure a ring. Remember to flip the measuring box to non-measure mode while backing up.
7. When you're finished measuring, choose Edit->Stop Measuring (**F1**)
8. Save the sample.

Why can't I edit this sample?

Corina only lets you edit data by hand if it's raw — not indexed or summed. If the status bar has a number in square brackets, like "1863: 1129 [15]", then it's a summed file. To edit a summed file, you should edit the raw files that make it up, and re-sum it. Corina won't let you edit indexed files, either. (Check the Format field on the Metadata tab.) Instead, edit the raw file and re-index the sample.

Identifying Samples

Each sample needs a unique ID. Unfortunately, there are several different identification schemes.

Title	the title itself, consisting of the full name of the site, the sample number, and the reading number: "Zonguldak, Karabük 15C."
Filename	The name of the file on disk: "`ZKB15C.xxx`" (more on what "`.xxx`" is later).
ID	A 6-digit code for the sample: "167153".
Tape	The number written on the tape on the sample: "C-TU-ZKB-15"

Only two of these are really needed: the full title, and a shorter version, for example, suitable for writing on the sample itself. The ID number is leftover from Tucson punchcards, and serves no purpose today. The filename is differ-

ent from the tape number because MS-DOS limited filenames to 8 letters, a dot, and then 3 more letters. Hopefully in the near future, we'll decide to simplify the system by eliminating these unnecessary names.

The Metadata Page

A sample isn't just a bunch of numbers. That's what the metadata tab is for. On the metadata tab, you can enter... (***)

You should always fill out the metadata page before you save. (Corina warns you if you try to save a sample without entering any metadata.)

Metadata fields

Title	The title...
ID	ID number. These are typically 6 numeric digits, which is why they're becoming obsolete. For example, "ZKB-15C" would be "167153". (Zonguldak, Karabük is site 167.) But this starts to fail when you get more than 1000 sites, or 100 samples. These are used only for exporting a file to Tucson format.
Dating	Is the sample relatively or absolutely dated?
Unmeasured, beginning	Number of unmeasured rings at the beginning of this sample
Unmeasured, end	Number of unmeasured rings at the end of this sample
Type of Sample	The sample type: core, charcoal, or section.
Wood Species	The species of wood; use the Latin name
Format	The format of this data, either raw or indexed. (You will probably never need to change this yourself.)
Index Method	The algorithm used to index this sample. See Chapter 6. This is only set if Corina was used to index the sample; other programs which use the Tucson file format keep no record of this.
Sapwood Count	The number of sapwood rings. By convention, this *includes* unmeasured sapwood rings. For example, if a sample's last measured ring is 1236, and it has 3 unmeasured rings, and the first sapwood ring is 1230, then the sapwood count is 10.
Pith	Pith: present, present but undatable, or not present.
Terminal Ring	Bark, Waney-edge, near the end, or an unknown number of rings to the end
Continuous	Is the last ring: continuous, partially contiuous, or not continuous, over the outside edge of the sample? There's no real standard for this: one man's "partially continuous" is another man's "not continuous". The purpose of this field is an indicator of whether the last year of this sample is the last year of the tree's life. There's decent odds that a continuous outer ring is the terminal ring, even in the absense of bark, waney edge, or other signs.
Quality	Whether the sample has one unmeasured ring, or more than one unmeasured ring. "Quality" is a lousy name for it, but that's the convention.

Reconciled	Whether this sample has been reconciled or not. If you're measuring a new sample for the first time, say No. Later, after you reconcile two readings of this sample, you'll set this to Yes. (See the section called “Reconciling Readings”.)
Author	Your name. Corina sets this automatically for you. (It's the name of the person who *created* the sample. If somebody else edits it, it will still have your name on it.
Comments	Any extra notes you have that don't fit in any of these categories. You can type as much text as you want here. For example, if the piece had any fire scars, note them here. Also, note any cracks you had to measure around - or anything else that would help somebody else who wants to reconstruct what you did.

The Status Bar

At the bottom of each editor window is the *status bar*, which provides you with some useful information.

The status bar.

Next to the tree, you'll see some numbers:

```
1913: 30 [5] 4*1
```

This the year the cursor is on, and the data for that year. Here's how to interpret this:

Table 3.1. How to read the status bar

Text	Meaning
`1913:`	For the year 1913,
`30`	the average ring width was 30 (hundredths of a millimeter: 0.30 mm),
`[5]`	which is the average of 5 samples,
`4*1`	4 of which are bigger than in the previous year, and 1 of which was smaller.

If any of these terms is missing, it means this sample doesn't have that information. A raw sample, for example, will only have the year and ring width. A sample summed with Corina will have all of these terms. You might see the number of samples but not Weiserjahre data for Tucson files, which can't store those numbers. More information about this — such as the difference between '`*`' and '`/`' in the last term — can be found in the chapter on summing.

In the lower-right corner of each editor window, you'll see some text that looks like

The status bar, as it looks on a Mac.

```
mean sensitivity = 0.317
```

This is the *mean sensitivity*, which tells how sensitive or complacent the data is. (values***) It's essentially for-your-information only; you shouldn't be worried if it's too high or too low (but you probably shouldn't be too surprised if a complacent dataset doesn't crossdate as well).

Behind the Scenes

It's defined in [DPL] by:

Equation 3.1. Mean Sensitivity

ms = 1/(N-1) # 2|yi-yi-1| / (|yi| + |yi-1|)

In some instances, it can't be computed (e.g., if any two consecutive years are 0), and is reported as `N/A`.

There are other statistics you can view, as well. Press and hold the mouse button over the statistics, and you'll see a popup menu that looks like:

Table 3.2. Statistics Popup

mean sensitivity = 0.317
total radius = 149.44 mm
average ring width = 1.18 mm
number of years = 127
number of rings = 127
number of elements = N/A

If you choose any of these menuitems, the status bar will then display that statistic (and in any other editor windows you open, too).

Some of the other statistics may also be reported as `N/A`. Number of elements is N/A if it's a raw file. Total radius and average ring width are N/A if the sample is indexed.

Reconciling Readings

After each sample is read twice, you (or somebody else) *reconcile* the readings. Reconciled samples

- have the same number of years,
- have all trends the same, and
- the measurements for each ring are within 3% (of the smaller value)

Reconciliation is traditionally done on paper, though it can help to graph both samples on the screen for a quick visual comparison first. On the printouts, circle values that differ by more than 3%, and underline bad trends. Then remeasure each bad value. Corina can quickly check if a sample has met these criteria.

(There is ongoing debate about whether a trend of stays-the-same and a differing trend — increasing or decreasing — is acceptable.)

Procedure 3.3. To check if a sample is reconciled (correctly):

1. Open one reading with File->Open... (**control-O**).
2.

Choose Manipulate->Reconcile.

3. If Corina can't find the other reading, it will ask you to locate it.

4. A new window appears listing inconsistent trends and measurements, if there are any.

5. When you're done looking at it, close this window.

Corina thinks that the two measurements of a sample are the "A" and "C" readings, or the "B" and "D" readings, and that this is the last letter of the filename (before the filename extension, if you're on Windows).

When you've finished reconciling a sample on paper, here's a checklist...***

Procedure 3.4. To reconcile a sample on the computer, after you've reconciled it on paper:

1. Open the first ("A") reading with File->Open... (**control-O**).

2. Type in the correct data.

3. On the Metadata tab, set Reconciled to Yes.

4. Save the sample with File->Save (**control-S**).

5. Repeat for the second ("C") reading.

6. Change the extension of both files to `.REC` (in Windows Explorer, for example).

When reconciling by hand, you need to know what 3% of a value is; here's a table:

Table 3.3. List of 3% for Reconciling

Ring Width	3%	Ring Width	3%
1-33	1	201-233	7
34-67	2	234-267	8
68-100	3	268-300	9
101-33	4	301-333	10
134-167	5	334-367	11
168-200	6	368-400	12

Redating

The *dating* of a sample is what year it's dated to, and whether that range is absolute or relative. Changing these values, then, is *redating*.

There are two reasons to redate a sample. First, ... They also need to be dated correctly for making sums, which I'll talk about later.

The standard way to redate a file is with the Redate... menuitem.

Procedure 3.5. To redate a sample:

1. Open the sample with File->Open... (**control-O**).
2. Choose Manipulate->Redate... (**control-R**).
3. Type in either the new starting date or the new ending date; the other one will automatically be computed for you.
4. Click "Relative" or "Absolute" if you want to set that.
5. Click OK.
6. Save the sample.

There are other ways to do it, though. The Absolute/Relative setting can also be changed from the Metadata tab. And if you want to change the starting year of a sample, you can double-click on that year (the very top-left square) in the Data tab and change it directly — press **return** when you're done.

Printing Samples

It's often useful to have a hardcopy of data. Corina prints all data present for a sample, including data, metadata, weiserjahre, and elements. It also prints some appropriate summary information for the type of sample it is, like the total radius of a raw sample, the total number of rings in a master, or the number (and percentage) of significant years in a master.

To print a sample, select File->Print... (**control-shift-P**). This shows you a dialog that lets you set the margins, layout, etc., of the printout. If you just want to use the same settings as you did before (or the defaults, if you haven't printed yet), you can select File->Print One Copy (**control-P**). and Corina will print without showing you the dialog.

Chapter 4. Graphs

Introduction

Graphs give you a "feel" for data that you can't get just by looking at tables of numbers.

Most of the statistical tools provided by Corina aren't incredibly intelligent. It wouldn't be very hard to come up with some datasets that had great statistical scores across the board, but obviously didn't crossdate.***

How to Make a Graph

The ability to make graphs is integrated into virtually every part of Corina - so no matter what you're doing, it's easy to see a graph of it.

The simplest way to make a graph is to select some files in the browser and choose File->Graph.

Ways to make a graph include:

- In the browser, select some samples, and choose Graph->Graph (**control-G**) or right-click on them, and choose Graph.
- When indexing, click the Preview button.
- When crossdating, click the Graph button.
- When editing a sample, choose either Graph->Graph (**control-G**) or Graph->Graph Elements (**control-shift-G**).
- Adding files to an existing graph: drag and drop any file on the graph window to add it.
- By loading an old one: see the section called “Saving Graphs”.

When you make a graph of a summed file, you'll see two lines. One is the normal graph: the width of each ring. The second line is the number of samples that had data in that year.

If you graph an oak sample that has sapwood, the rings of sapwood will show up as a thicker line at the end of the graph. (Corina considers a sample to be oak if the species contains either "oak" or "quercus".)

Finally, when you move the mouse around on the sample, it also shows a white vertical bar in that year. The year is also printed at the top of the bar.

Scrolling

Once you're looking at a graph, it should be apparent that you can use the scrollbar at the bottom to scroll through the years. You can also use the keyboard to scroll:

Table 4.1. Graph window keyboard controls: Scrolling

Key	Command
left	Scroll left 10 years
right	Scroll right 10 years
Page Up	Scroll left 100 years
Page Down	Scroll right 100 years

Key	Command
Home	Scroll left to start
End	Scroll right to end

Selecting Samples

As with other programs, Corina lets you operate on one sample at a time. One graph at a time is the currently selected sample. The currently selected sample is drawn with a thicker line.

You can always just click on a graph to select it. Or use the keyboard:

Table 4.2. Graph window keyboard controls: selecting samples

Key	Command
Tab	Select next sample
Shift-**Tab**	Select previous sample
control-1, **control-2**, etc.	Select graph 1, 2, etc.

Moving Samples Around

You can move samples around on the graph using the mouse, too. Simply drag the graph to where you want it. It'll move smoothly up and down, and jump by whole years left and right; if you watch the title bar of the window, it'll show you what years it's dated to as you drag — for example, `Zonguldak, Karabük 10A (1001-1036) (at 1002-1036)`, if you've scrolled it right by one year. If you want to adjust it up and down without changing the years it's dated to, hold down the **Shift** key as you drag.

If you're a keyboard jock, there are keyboard shortcuts for almost everything you can do with the mouse:

Table 4.3. Graph window keyboard controls: moving samples around

Key	Command
up	Slide sample up
down	Slide sample down
+ or =	Nudge sample up (by 1 pixel)
-	Nudge sample down (by 1 pixel)
control-left	Slide sample left by 1 year
control-right	Slide sample right by 1 year
Space	Squish graphs together (see below)

If you had a lot of graphs to move around, doing it by hand could take a while. So Corina has are a couple commands that you can use to move all of the graphs at once:

- First, you can have all the baselines of your graphs set to zero. That is, they'll all be on the same y-axis. Select View->Make Baselines Zero. (This is the default for plotting samples with their indexes.)
- Second, you can spread out the baselines at regular intervals. The first graph will have its baseline at the bottom, the second one 1" above that, etc. Select View->Make Baselines Evenly Spaced. (This is the defaul for plotting

multiple samples.)

- Third, you can have Corina "look" at the part of the graphs that are showing, and fit them together as closely as possible. It doesn't just set all the baselines to the same place; it actually tries to make each graph fit together [1]. Select View->Squish Together Graphs (**Space**).

Scaling

You can change the scale of parts of the graph. The *horizontal* scale can be changed in the graph preferences.

The *vertical* scale of each graph is set separately. To change the vertical scale of the currently selected graph:

Table 4.4. Graph window keyboard controls: scaling

Key	Command
< or **,**	Scale sample down by 20%
> or **.**	Scale sample up by 25%

Printing Graphs

WRITEME: printing

Saving Graphs

If you get a bunch of samples put on a graph and want to save what you're working on, you can save the graph just as you would any other file, with File->Save As... (**control-S**).

It will save which samples you've chosen to graph, the scale of each, and where you've moved them. Only references to the actual samples are saved, so you can't delete the original samples, or send just the graph file to a friend. Graphs of indexes aren't samples, and can't be saved.

You can load them again with File->Open... (**control-O**).

Exporting Graphs

When you use File->Save As... (**control-S**), Corina saves which samples are in the graph, where they are, what scale is being used, what type of graph it is, etc. - in other words, it doesn't store an actual picture of the graph, but simply a way to reproduce it later. If you want to put a graph from Corina into another document, you need to *export* it.

Bargraphs

FIXME: make this a sect1 about other graph styles, with children sect2's for bargraphs, skeleton plots.

Corina can also make another type of graph from sample data: bargraphs. Bargraphs are similar to normal graphs (the x-axis is still "years"), but they only show what years each sample starts and ends, not the width of each ring.

They can't be used for verifying crossdates or indexes, of course, but they're good for seeing how a master chronology is put together.

Procedure 4.1. To make a bargraph:

[1] It does this by computing the minimum $\#^2$, similarly to how good indexing curves are found.

1. Create a graph just as you normally would, e.g., by choosing Graph->Graph Elements in the editor.

2. When the graph window appears, choose View->as Bargraph (**control-B**).

Bargraphs are colored by species. ***colors?

Chapter 5. Crossdating

Crossdating is the art of figuring out where (or rather, when) one sample fits relative to another sample. Corina has several algorithms to help you crossdate samples.

How Crossdating Algorithms Work

All algorithms work in pretty much the same way. There's a "fixed" sample, and there's a "moving" sample. Imagine you have printouts of their graphs on translucent paper. The fixed graph is taped to a table, and you can slide the moving sample left and right. (This is actually how it was originally done, on graph paper, with one inch per decade.) Start with the moving sample to the left of the fixed sample, overlapping it by 10 years. Look at how well the graphs match: this is the first score that's computed. Slide the moving sample to the right one year. This is the second score. Keep doing this until the moving sample overlaps by only 10 years on the right end of the fixed sample.

If you did this yourself, you'd end up with a list of scores, like this:

Table 5.1. Crossdating Scores, List

End year of moving sample	Crossdating score
1010	0.03
1011	0.56
1012	1.11
1013	0.82
1014	0.60

Since there are so many scores, that tends to take up a lot of space. Instead, we usually write them 10 to a row, like this:

Table 5.2. Crossdating Scores, Table

Year	0	1	2	3	4	5	6	7	8	9
1001										0.03
1010	0.56	1.11	0.82	0.60	0.34	2.90	0.53	0.75	0.49	0.37

This looks like how sample data is displayed. Just remember that the *year* for each data point here is the end-year of the moving sample.

That's all there is. You could do it all simply by moving graphs and eyeballing the crossdates. But there are hundreds of sites and millennia of chronologies you'll want to crossdate your samples against, so that would take a while. Corina has a few algorithms to find likely crossdates almost instantaneously. They aren't perfect, though, and they generally aren't as good as looking at the graphs. You'll still have to look and see if they make sense.

Sequences

Often you won't want to run just one crossdate. And usually you'll want to run more than one test between the same samples. So Corina lets you run *sequences* of crosses: N-by-1, N-by-N, 1-by-1, and 1-by-N. These are how many fixed and moving samples you want to crossdate. With 1-by-N, for example, you have one fixed sample you want to try crossing against several other samples. When you choose N-by-N, you choose only one set of samples: it crosses

every sample against every other sample.

How to Crossdate Samples

WRITEME: old way. sequences, 1-by-n, etc.

WRITEME: new way. kit, drag files, hit run.

WRITEME: new way #2: select, right-click, crossdate

WRITEME: going through sequences; next/prev; watch the title of the "score" column

WRITEME: the tabs; sigs, all, histo

WRITEME: the views: normal, tables, grids

WRITEME: graphs

WRITEME: maps

TODO: the following blurb came straight from a word processor. reformat it, and make it fit. [[task: write documentation for the "crossdatekit" feature, at least in the context of crossframe's edit menu]]

When you run a sequence of crossdates, you pick some samples to be fixed, and other samples to be moving. (In an "N-by-N" sequence, Corina treats it as if each of the samples is both fixed and moving, but doesn't show you duplicate crosses: if you've already seen A-vs-B, you won't also get B-vs-A.) This is how crossdating works, but there is a downside to this: sometimes you end up looking at a crossdate with a "fixed" sample you really want to be moving, or a "moving" sample you really want fixed.

You can use the options in the View menu to change which ranges are displayed in the "Significant Scores" tab, but that's not always good enough. The "All Scores" tab always shows the score for the end-year of the moving sample, no matter which option you've chosen in the View menu.

Now, you could just close the crossdate and start a new sequence with whatever samples you wanted in the correct position. But that would take a lot of time, and not be very pleasant. So Corina lets you change which samples are fixed and which are moving after you've started to run a crossdate sequence.

Let's suppose you're looking at a forest sample, and you want to crossdate it against some masters to see if it fits anywhere. It's open (or maybe you opened it from the Open Recent menu), so you choose Manipulate -> Cross against... and pick a few masters.

But now the single sample, being the first one, is called "fixed", and the masters are "moving". That's backwards. So, do this: * From the crossdate window, choose View -> Edit Fixed/Moving Lists (or press command-E) * The crossdate window disappears, and you're presented with a dialog that lists the fixed samples on the left, the moving samples on the right, and controls to add and remove files from either list, or move files between the lists. In this case, you just want to swap them all, so click "< Swap >", and the fixed and moving lists exchange places. * Finally, click Run and you're returned to the crossdate window, but the single forest sample is now the moving sample.

You can use this whenever you're running a sequence of crossdates which is almost-but-not-quite what you want. If you're running a 1-by-N and you realize you forgot one sample, press command-E, click "Add..." to add it, click "Run", and you're back. If you're running an N-by-N and realize that only one of them is really a "fixed" sample, press command-E, remove all but one from the "fixed" side, and click "Run".

Finally, note that the two lists in the dialog can have files dragged to them from anywhere. So, for example, if you're looking at a bunch of files in Windows Explorer or the Mac Finder, and think you'd like to crossdate <...>

The Algorithms

Now I'll describe each of the algorithms Corina can use to crossdate samples.

T-Score

The *t-score* is the classic crossdate. Everybody quotes t-scores: if you want to brag about how good a cross is, you tell them your t-score. Unfortunately, every dendro program seems to have a *slightly* different implementation of t-score, so the numbers you get from Corina might not be exactly comparable to the numbers from other programs.

The version Corina uses is based on the algorithms given in [Baillie73], though with some apparent bugs corrected. (In the following equations, x0, x1, x2, … are the data of the fixed sample in the overlap, y0, y1, y2, … are the data of the moving sample in the overlap, and N is the length of the overlap.)

Procedure 5.1. T-Score algorithm

1. Make each dataset bivariate-normal [http://mathworld.wolfram.com/BivariateNormalDistribution.html], by replacing each value with the mean of the 5 values around it, and then taking its natural logarithm. (This is what [Baillie73] does, and how they justify it; I'm simply using their result, and assuming it is correct. Statisticians are welcome to argue about this.)

   #### Equation 5.1. Student's T-Score prep work

   xi # (xi-2 + xi-1 + xi + xi+1 + xi+2) / 5

   xi # ln(xi)

   This is done to both the fixed and moving data.

2. The Student's-T computation looks like this:

   #### Equation 5.2. Student's T-Score

   sxy = # xi yi - N (xi - xavg) (yi - yavg)

   sxx = # xi2 - N (xi - xavg)2

   syy = # yi2 - N (yi - yavg)2

   r = sxy / # (sxx syy)

   t = r # ((N-2)/(1-r2))

The t-score is called a "parametric" algorithm, because it takes into account the magnitudes of the samples.***(huh?)

A t-score is considered "statistically significant" if it's greater than a certain value. Just what this value is varies with the length of the overlap between the samples: a 500 year overlap can have a t-score of 2.6 and pass, but an overlap of only 15 years would have to be higher, like 3.0. The values are listed in this table:

Table 5.3. Significant T-scores

Overlap between samples (N)	Minimum significant score (t)
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169
11	3.106
12	3.055
13	3.012
14	2.977
15	2.947
16	2.921
17	2.898
18	2.878
19	2.861
20	2.845
21	2.831
22	2.819
23	2.807
24	2.797
25	2.787
26	2.779
27	2.771
28	2.763
29	2.756
30	2.750
40	2.704
60	2.660
#	2.576

WRITEME: where's this data from? (PIK's table) -- add ref to biblio, and add link here.

In reality, your overlaps will always be at least 10 or 15 years, and hopefully more than 50. You don't need to know this table, but a t-score must be greater than 2.5 or 3.0 to be significant, depending on its overlap.

Click on the "Significant Scores" tab to see a list of all significant scores.

Trend

The *trend* is the simplest crossdate. For each sample, it computes the *trend* of each 2-year interval (1001-1002,

1002-1003, and so on). The trend of a 2-year interval is simply whether the next ring is larger, smaller, or the same. The trend score is the percentage of intervals in the overlap which are the same. For example, a 75% trend (a very good score, by the way) means that for 75% of the intervals in the overlap, both samples went up in the same years and down in the same years.

Other Names

You may hear this algorithm called by different names. The German name for this is *ufigkeitsko*-"*Gleichläeffizient*", or simply "*Gleichläufigkeit*" for short. It was first computerized by Eckstein in [Eckstein], so it has also been called "Eckstein's W." (German *Wert* = value, score.)

If one sample stays the same, and the other increases or decreases, Corina considers that to be halfway between a same-trend and different-trend, and gives it half a point.

Trend is a "non-parametric" algorithm, because it only takes into account if a given ring is bigger or smaller than the previous one, not by how much. To the trend, a drop of "100 1" looks exactly the same as a drop of "100 99".

Two completely random samples will have a trend of 50%, on average. So you'd expect a trend must be greater than 50% to be significant. According to [Huber70], a trend is significant if:

Equation 5.3. Significant Trends

$$tr > 50\% + 50/\#N$$

For example, a pair of samples with a 50-year overlap needs a 50 + 50#50 = 57.1% trend to be significant, but at a 400-year overlap need only a 50 + 50#400 = 52.5% trend.

In practice, however, this doesn't tend to work terribly well. Using this scheme, there are typically about three times as many "significant" trend scores as t-scores, and users want this narrowed down a bit more. So take #=3 and use:

Equation 5.4. Significant Trends, adjusted

$$tr > 50\% + 50\#/\#N$$

This gives about the same number of significant trend scores as t-scores.

Trends are also used in reconciliation. After they've been reconciled, both readings of a sample should have 100% trend.

D-Score

The D-score, or "Dating score," is a combination of the T-score and trend

Equation 5.5. D-Score Algorithm

$$D = (tr - 50\%) \times t$$

Corina considers 40 to be the theshold for significant D-scores.

Weiserjahre

All of the crossdates that have been mentioned so far only compare the ring widths. This works fine for raw sam-

ples, but when crossdating summed samples, there's a lot more information available, namely, the Weiserjahre data. Wouldn't it make sense to count a `[20] 19*1` ring more heavily than a `[1] 1/0` ring? 19 out of 20 samples think it's an increasing year, not just 1.

This is what the Weiserjahre cross does: for each possible overlap, it starts by counting the number of significant intervals of the master for that overlap. A "significant" interval is one with at least 3 samples, where at least 75% of them have the same trend. Then it computes the percent agreement (like the trend) between the master and the raw sample for only those significant years of the overlap. (Of course, for the trend of the master, it doesn't use the trend of the master; it uses the trend of the majority of its elements. They're usually the same, but not necessarily.)

(Another way to think about the Weiserjahre crossdate is: it's like a trend, but ignoring years where the sum has only 1 or 2 samples, or where there isn't an overwhelming trend in the sum. Also like the trend, the results are given as a percentage.)

Because the Weiserjahre crossdate is only applicable to masters crossed against raw samples, it's not turned on by default in Corina.

Procedure 5.2. To run a Weiserjahre crossdate:

1. Start to run a crossdate as you normally would. You'll see the T-score results.
2. Choose Edit->Edit Fixed/Moving Lists... (**control-E**).
3. The crossdate disappears, and the list of samples and algorithms for your crossdate appears. At the bottom, you'll see that the T-score, Trend, and D-score are turned on by default. Click the "Weiserjahre" checkbox to turn it on, too. (You can turn off any other algorithms you want here, as long as at least one is turned on.)
4. Click Run. Your crossdate window will appear again, and the Weiserjahre crossdate will be included. If you kept the T-score, trend, and D-score algorithms turned on, click Next 3 times to see the first Weiserjahre cross.

R-Value

The r-value, or *correlation coefficient*, is a crossdate which you'll almost never use. It's not terribly useful to dendrochronologists - but statisticians might want to know its value, so Corina makes it available.

If you go back and look at Procedure 5.1, the second-to-last line says "r = ...". That's the r-value. The t-score is defined in terms of the r-value and the overlap, N. An r-value can range from 0.0 (no correlation) to 1.0 (perfect correlation).

Because the R-value crossdate is not generally useful by itself, it's not turned on by default in Corina.

Procedure 5.3. To run an R-value crossdate:

1. Start to run a crossdate as you normally would. You'll see the T-score results.
2.

Choose Edit->Edit Fixed/Moving Lists... (**control-E**).

3. The crossdate disappears, and the list of samples and algorithms for your crossdate appears. At the bottom, you'll see that the T-score, Trend, and D-score are turned on by default. Click the "R-value" checkbox to turn it on, too. (You can turn off any other algorithms you want here, as long as at least one is turned on.)

4. Click Run. Your crossdate window will appear again, and the R-value crossdate will be included. If you kept the T-score, trend, and D-score algorithms turned on, click Next 3 times to see the first R-value cross.

Summary of Crossdating Algorithms

If you've just read about all of the different algorithms for crossdating, and don't have a lot of experience with running crossdates, you're probably reeling in shock at this point. There's quite a bit of information here, and you're not sure what you need to know to use Corina effectively. (A lot of it is there purely for reference value, I'll admit.) This Cliff Notes version is:

T-Score	The standard crossdate - always run this. Scores greater than 2.5-3.0 are good.
Trend	Another standard crossdate - computes the percentage of years with the same trend (going-up- or going-down-ness). Scores greater than 60%-70% are good.
D-Score	A combination of the T-score and trend; often better than t-score/trend at segregating good scores from bad ones.
Weiserjahre	An algorithm for crossdating summed samples (masters) against single samples; kind of like a trend-for-Weiserjahre-data.
R-Value	A score which statisticians might ask you for. You'll probably never use it on your own (though it's used by Corina when computing the t-score, so you already are, in a sense).

Other Views

WRITEME: other views of seqs, saving/printing, how to toggle, ...

Tables

Corina provides other ways to look at a bunch of crossdates. For example, if you have a 1-by-N sequence (or an N-by-N sequence), you can look at it in a table. -- what a table is, why you'd want it -- what you need (1-by-n, all dated correctly) -- how to do it (view->...) / also, how to change back -- fixed sample is a popup -- printing, saving, exporting (clipboard?) to word -- (does it show the currently-selected algorithms? it should... -- note that this is how to change the columns) -- (can you click the header to change the sort? how's that change the sequence?) -- (can you right-click the header to change the algs? i suppose so -- this changes the seq.alg) -- (can you drag to rearrange? yeah, this seems reasonable.) -- (be sure to include sample row which has N=0 overlap, and point out what it looks like) -- (double-click graphs that pair, right?) -- (do i have a "Graph All" button? it would be nice.) -- (are sig scores hilited? they should be.) ...

Table 5.4. Crossdating Table for ZKB-9

Sample	Range	T-Score	Overlap	Trend	D-Score
ABC-1	1001-1050	3.45	50	77.2%	93.8

Sample	Range	T-Score	Overlap	Trend	D-Score
DEF-7	1001-1050	3.45	50	77.2%	93.8

Grids

Just as it's easier to see at a glance how a couple of samples crossdate by looking at highest t-scores in the summary tab, sometimes you want to see at a glance how well a whole set of samples crossdate with each other — an entire site, for example. Grids...

...as tables are 1-by-n views, grids are n-by-n views. put all of the fixed samples down the left(?) side, and the moving samples across the top(?), and in each cell of the grid, that's the crossdate between them. but since A x B is the same as B x A, the grid is only half of a complete rectangle -- the bottom triangular half.

-- what's in each grid cell (selected algs) -- sig scores hilited -- what constitutes sig here? -- double-click to graph; also "Graph All" button? -- there is no "grid.png" -- either make one, or make a real table here -- how to save (just .xdate?), print (n-by-n pages), export (word?) -- (batch mode: deal with xdate files: create, output tables/grids as HTML, etc.)

Graphing

WRITEME

Mapping

WRITEME

Saving Crossdates

WRITEME -- .xdate extension? -- any view (normal/table/grid) -- how (cmd-S)

Printing Crossdates

WRITEME -- any view (pick?) -- how (cmd-P)

Chapter 6. Indexing

The Problem

Trees tend to put on big rings when they're young, and smaller rings when they get older. (People do, too: you grew a lot more the first year you were alive than the tenth.) Some trees put on very large rings, while others put on very small rings. These variations in growth can make it difficult to crossdate samples.

After all, you don't care about the absolute width of a ring ("Ring #34 is 0.36mm wide") as much as you care about its relative width ("Ring #34 is only 36% of normal").

This is what indexing is for. Indexing is a manipulation you can perform on your data to make it easier to crossdate.

Procedure 6.1. Indexing in a nutshell

1. You open a sample (raw data)
2. You ask Corina to index it
3. Corina shows you some possible curves
4. You pick a curve (based on its graph, statistical scores, and your expectation of how the tree is growing)
5. Corina converts each year's ring width to a ratio of actual growth to expected growth for that year
6. You save the sample (indexed data) to a new file

WRITEME: (why we need it, when to use it)

Units

Indexing changes the units of a dataset. A raw sample has units of *hundredths of a millimeter* (0.01 mm). An indexed sample has units of *parts per thousand* (0.1%, or ‰).

This doesn't cause a problem with crossdating. The t-score normalizes all samples as part of its test, and the trend only cares if the values are increasing or decreasing. (The other crossdates are based on these.) For more information, see Crossdating.

It does cause a problem with summing, however, since summing needs to take the average. (What's the average of 1mm and 75%?) Therefore, the samples in a sum must be either all raw, or all indexed. For more information, see Summing.

How to Index a Sample

Indexing a sample in Corina is straightforward.

Procedure 6.2. To index a sample:

1. Open the sample with File->Open... (**control-O**)
2. Choose Manipulate->Index... (**control-I**). (If it's dimmed, that means the sample is already indexed. Open the original raw data and re-index that. This is why you should always keep your raw data!)
3. Click on an index. Take a look at how the curve compares to your data by clicking Preview; close the graph when you're done looking.
4. When you've decided which index to use, select it, and click OK
5. Save the indexed sample with File->Save As... (**control-shift-S**). You should usually use the same filename, but ending with `.IND` to indicate that it's indexed.

***how to pick: read on...

Things that can go wrong:

- If the Index menuitem is dimmed, that means the sample is already indexed. Open the original raw data and index that. (Always keep your raw data!) If you know it's raw data and for some reason Corina thinks it's indexed, go to the metadata tab and change the "Format" field to "Raw".
- (if it's a bad index)

Tip

If you want to index several samples at once, use the file browser. Select all the samples, and choose Manipulate->Index....

Exponential

By far the most common index you'll use is the exponential. 9 times out of 10 this will be the best choice. And there's a good reason: this matches how you would expect a tree to grow. Trees start out growing quickly, and gradually slow down.

If you're not sure which to use, you'll probably never get in trouble for choosing an exponential index. You'll use this one almost all the time.

This index tries to fit an equation of the form

Equation 6.1. Exponential Curve

y = a + be-px

to your data, searching for the best values of a, b, and p.

Note

This is sometimes called a "negative exponential" index, because the exponent is negative. (Corina doesn't require that the exponent is negative, but if it's not, using this index probably isn't such a good idea; it means the tree is generally getting bigger, not smaller.)

The least-squares algorithm used comes from [CLR]; the matrix solving function comes from [vanLoan].

Sometimes the exponential index does a lousy job. If a tree is living in a crowded area and the trees around it get cut down, suddenly it has much better growing conditions, so it might grow faster as it gets older, instead of slower. If you tried to use an exponential curve on a tree like this, it would exaggerate this growth, and useful data would get flattened out.

The result is you're looking at the growing conditions of this one tree, so it's not going to crossdate as well.

Or imagine a tree with a fire scar that has a few very large rings. An exponential index wouldn't take much notice of this, because most of the sample is still shaped like an exponential curve, but when you applied it they would be grossly out of proportion. For these types of samples, there are other indexing algorithms available.

Polynomial

Another way to index a sample is to use a polynomial. Corina tries to fit a polynomial to your data:

Equation 6.2. Polynomial Curve

$$y = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_2 x^2 + a_1 x + a_0$$

(You decide what degree polynomial, n, to use, and Corina automatically finds the best values of a0, a1, …, an to fit your data.)

WRITEME: examples of a polynomial curve on some data

WRITEME: where the algorithm came from

Horizontal Line

A special case of polynomial to use is a horizontal line, equal to the average value. Why would you want to do this? Not for crossdating: dividing each value by the same value doesn't change the shape of the curve, only its magnitude. Remember*** (LINK?) that every element in a sum must use the same units, either raw or indexed. If you have a sample you wouldn't otherwise want to index, and you want to put it in a sum with other indexed files, you could use a horizontal index.

WRITEME: y = x_{avg}

WRITEME: algorithm, or at least link to ref

Adaptive

Adaptive is the "last-resort" index. If an exponential doesn't work, and a high-degree polynomial doesn't work, adaptive might be the way to go. It's simply the average of the 11 surrounding years:

Equation 6.3. Adaptive Index

indi = 1/11 (datai-5 + datai-4 + … + datai+4 + datai+5)

As far as I can tell, it was first used for dendro by [Pohl95] in the original Corina.

> **Note**
>
> This index was originally called *floating average*, probably in reference to the fact that the index curve "floats" around, not following any explicit y=f(x)-type formula. But people tended to call it *floating*, and then *floating-point*, which means something very different. You might still hear people calling this index by these other names.

High-Pass Filter

The high-pass index is a more general case of the adaptive index. Instead of simply taking the average of 11 values, it takes a weighted average. It's an example of a "high-pass" filter because *high*-frequency signals can *pass* through, but low-frequency signals are filtered out.

The default is "1-2-4-2-1", meaning:

Equation 6.4. High-Pass Index

indi = 1/10 (datai-2 + 2#datai-1 + 4#datai + 2#datai+1 + datai+2)

(The 1/10 comes from 10 = 1+2+4+2+1.)

This comes from [Cook81], who used it as a discrete filter before moving to a cubic spline.

Note that almost half (4/10) of the computed index value is simply its old value. The high-pass index is nearly the same as the input, so the #² values are usually the lowest. But don't choose this index just because of the low #².

Cubic Spline

Cubic splines are technically high-pass filters, as well, but they're a very specific type.

A cubic spline is a curve made by piecing together a bunch of cubic (3rd degree polynomial) functions.

A cubic spline, fit to some data

Of course, there's more than one way to construct a cubic spline through a dataset. The algorithm Corina uses has a parameter, `s`, which controls how tightly the spline fits the data. A lower value fits the data more tightly; a higher value fits the data more loosely. `s=0` fits the data exactly, while `s=1` is simply a line. A good starting point for dendro data seems to be around `s=1e-16`.

Figure 6.1. A cubic spline, s=10-14

Figure 6.2. A cubic spline, s=10-16

Figure 6.3. A cubic spline, s=10-18

It was first used for dendro by [Cook81], using an algorithm from [Reinsch67].

You can change the s-value used for the cubic spline in the preferences. (In the future you will be able to adjust the shape of the spline directly.)

You might use a cubic spline in the same cases you'd use a high-pass filter: when the sample doesn't generally follow an exponential or polynomial curve very well. For example, if it has a fire scar or something that causes a large spike you want to eliminate.

The #² and # Values

Corina can't tell you which indexing curve to use. You have to decide yourself, generally based on how they look. But Corina does provide a couple of statistics which may help you decide: the #² test, and the correlation coefficient (#).

If you don't have any reason not to, use the exponential index.

The #² test

#² is defined as:

Equation 6.5. Definition of #²

#² = # (curvei - datai)² / N

(One way to think of #²: it's the average difference between the indexing curve and your data, with each term squared so keep it positive.)

Variants

At least one book I've seen says #² is this sum, and at least one says it's merely # (curvei - datai)². I suppose either one could be considered correct. I think it's easier to deal with if #² is independent of the length of the sample, so that's what I'm using for now.

Example 6.1. What's a good value?

Suppose you have a sample that's 200 years long, and at each year the index is about 30 (hundredths of a millimeter) off from the sample.

#² = 1/200 #200 30² = 200 # 900 / 200 = 900
This isn't an unusual value. It will tend to be lower for complacent samples, or when using indexing curves that follow the data very closely.

As you can see from this, the square root of the #² value is approximately the average difference between the actual data and the indexing curve.

Correlation Coefficient, or

The correlation coefficient, #, is defined by:

Equation 6.6. Correlation Coefficient

$z1 = \# (datai - dataavg)^2$

$z2 = \# (datai - dataavg)^2$

$z3 = \# (datai - dataavg)^2$

$\# = z3 / \#(z1\ z2)$

Sound familiar?

Corina uses the correlation coefficient in crossdating, too. There, it's called the r-value.

What's a good #? #=1 means "perfectly correlated", or, the indexing curve matches your data exactly. (#=-1 is a perfect inverse correlation, but those never happen -- RIGHT?) #=0 is no correlation at all. Closer to 1 is generally better. The # is listed as simply a "-" if it's undefined (z1 or z2 is zero, in the above equation),

It is possible to take this too far. You don't want $\#^2=0$. If you had a curve like that, it would index your data to a perfectly flat line, which is useless. An index is a type of filter you apply to your data, and filters *remove signal from your data*. Usually you remove low-frequency (very broad) trends, and preserve the high-frequency (year-to-year) signal, which helps when crossdating samples of different ages. But you have to be careful you aren't removing the signal you're trying to see.

Regional Growth Curves, or Proxy Data

-- here's what it is... ...[Briffa92]... -- here's why you'd want to do it... (ok, i give up, i have no idea why)

-- Here's what the computer does:

- it takes a sum of raw samples: you supply this; it's typically a sum of other samples from the same site or region
- that sum is used to compute the indexing curve

In Corina the "Regional Growth Curves" are called "Proxy Data," because one dataset (the sum) takes the place of the sample's own data when computing the indexing curve.

Here's how to do it:

Procedure 6.3. How to use proxy data:

1. Open the sample
2. Choose Manipulate->Index... (**control-I**).
3. Click the "Use Proxy Data" checkbox; the popup menu becomes active. It contains the entries:

- This sample, itself. When this is selected, it uses your sample for the index, so this is the same as not using proxy data option.
- All of the sums in the same folder as this sample, because these are the most likely proxy data to be used. (Currently, it does this simply by listing all files which end with `.SUM`; in the future, it should actually list all sums, regardless of name.
- The option is "Other...", which lets you choose any sample for the proxy data, in case you want to use a master in a different folder, or a non-summed sample.

4. Choose your proxy data — you'll get a warning if it doesn't cover at least the years covered by your sample. The #² values are automatically updated. (They're going to be higher than normal, because the indexing curves are being computed to a different dataset.)

5. Click Preview to view it and OK to apply as you normally would

Chapter 7. Summing

Master Chronologies

Summing is how you take individual samples and construct chronologies; it's an average of several samples.***

WRITEME: terminology: sum/master - doesn't belong here, but where?

WRITEME: on the need to redate samples first

The data of a master is the average (mean), at each year, of each element that has data for that year. Their units, then, must match, so you can't have both raw (hundredths-of-a-millimeter) and indexed (parts-per-thousand) elements in the same sum: if one sample is indexed, they must all be indexed. (If you really don't want to index an element, take a look at the Horizontal index.)

A sum also has *count*, which is also one number per year. It's the number of elements that have data for that year.

A sum also has *Weiserjahre* data. Weiserjahre data for a year is the number of samples whose data are increasing or decreasing for that year. Weiserjahre is commonly shown as `a/b`, where there are `a` elements increasing and `b` elements decreasing. The `/` means that this is not a significant interval. A *significant* interval is one with at least 4 samples, and at least 75% of the trends in agreement; they're shown as `a*b`.

Note

The sum of the two Weiserjahre values won't always equal the count, for two reasons. The first interval of a sum always has Weiserjahre `0/0`, because there was no previous year to compare to, but count 1. Also, it's possible the data between 2 years stayed the same, and Weiserjahre only counts increases and decreases.

The status bar, at the bottom of every editor window, shows the data, count, and Weiserjahre data for the current year. When you graph a sum, it will display both the data and count, as well.

WRITEME--range: (union), no gaps

You can cause elements to be summed by Corina in two ways: by creating a new sum, or re-computing an existing sum.

Making a New Sum

Procedure 7.1. How to create a new sum:

1. Choose File->New Sum...
2. For each element you want to have in the sum, locate it, select it, and click Add
3. Click OK
4. A new editor window will appear with your sum; on the Metadata tab, enter a title for this sum
5. Enter any other metadata for this sum, such as comments

6. Choose File->Save As... (**control-shift-S**); use an `.SUM` extension for your filename

Rebuilding a Sum

WRITEME: re-summing

WRITEME: why you'd re-sum: data changed in elements, disabling elements, add/rem elements

Procedure 7.2. How to re-sum a master:

1. Open the sum with File->Open... (**control-O**)
2. Choose Sum->Re-Sum
3. Save the sum with File->Save (**control-S**)

There's one more thing to watch out for when making a sum. When you select a summed sample as an element of a sum, it won't just use its data: it will add each of the elements that make up that sum. ***but only 1 level of indirection: sums of sums of sums won't go all the way down!

Cleaning

The opposite of summing is *cleaning*. Cleaning takes a sum and destroys all evidence that it's a sum: the count, Weiserjahre, and elements are removed.

Why would you want to do this? Remember that when you use a sum as the element of a new sum, it doesn't use that sum's data, but rather each of the elements of that sum. Cleaning prevents this. If you have 3 samples which you know are all from the same tree, for example, you should sum them and clean this sum; otherwise, this tree would count 3 times in any sum made with this data.

Procedure 7.3. To clean a sum:

1. Open the sum with File->Open... (**control-O**)
2. Choose Sum->Clean
3. Save the sum with File->Save As... (**control-shift-S**)

The current convention is to end sums with "`.SUM`," and cleaned versions ending with "`.CLN`," so use "Save as..." instead of "Save" to save your new sum. This way there's always a clean version available, and also an original sum,

in case you want to change the elements. If any of the elements are changed, remember to re-sum and re-make the cleaned file.

Chapter 8. File Formats

!!! - Another Fine Mess...

In the beginning there were punchcards [http://www.fireinthevalley.com/fitv_pictures_m6.html]. People in Tucson [http://www.ltrr.arizona.edu/] used them to store tree-ring data. Later, punchcards went out of style, but (***why there are so many file formats)

WRITEME: - how corina deals with them

(BASICALLY 3 types: tucson and variants, other dendro programs' types, and types for interfacing with non-dendro statistical programs.

- Corina uses Corina format natively, and its features map perfectly to Corina's***(kept up-to-date), so you should use this for almost all of your work in Corina
- Every dendro program ever written knows Tucson format, so if you're giving data to somebody using another program, he'll probably want Tucson, and if you're receiving data from somebody using another program, he'll probably send Tucson. The [ITRDB] uses Tucson exclusively, as well.
- If you're moving data between Corina and a non-dendro program, like a graphics or statistical program (say, Excel), they'll only understand the plain 2-column format
- All the other formats you'll only need if somebody sends you data in their own format, which is to say, rarely, if ever

How Corina Handles Files

Corina always saves in Corina format. (why)

(how to override, with export -- see below)

Corina loads...

WRITEME: what formats corina supports

Exporting

Because Corina always saves files in Corina format, if you want to save data a format for another dendro program to read, you'll need to export it. That's what the Export dialog is for.

Procedure 8.1. To Export a Sample to Another Format:

1. Choose File->Export...
2. Choose the format you want from the popup menu. When you select a new format, the text box in the middle shows a preview of what the output file will look like.
3. Click OK.

4.
The standard file chooser appears, and you can pick a name and location for your file.

***WRITEME: how do i know which format to use?

Getting data in and out

This section describes a number of situations, and the easiest way to get data from point A to point B.

Removed:

This section was temporarily removed because it may be causing problems with PDF creation.

Tucson

Tucson is a direct descendent of the original punchcard format. (It's sometimes called "decadal" format, though that may also refer to any format with 10 data values per line.) This means that every program can read and write it, but it also means it has very few features.

Because it originally had so few features, every dendro program extends it just a little, usually in undocumented ways. Corina tries to interpret the data as best it can, but might not read all of the metadata, for example.

Samples that start before the year 1:

Tucson files can't handle data going before the year 1. Some labs add 8000 to the dates of all samples to temporarily avoid this problem. Corina will first try to save the sample as it's dated, then tries adding 8000; if both of those fail, it saves the sample starting at year 1001. Be sure to check files you export to Tucson format if you're dealing with samples dated to before year 1.

Tucson "raw" files simply store the name and ID number of the file, the years it covers, and the width of each ring:

Example 8.1. Tucson raw format

```
Kalkim Forest 10BA                                                          ABSOL
917102  1617   414   376   471
917102  1620   592   350   180   238   336   432   465   418   424   468
917102  1630   419   509   539   512   397   403   348   316   378   381
917102  1640   362   414   333   318   352   269   401   410   380   314
917102  1650   281   222   329   333   209   234   242   262   214   228
917102  1660   157   179   206   211   188   247   190   127   217   296
917102  1670   273   212   261   213   200   167   158   143   999
```

The word "ABSOL" or "RELAT", depending on whether the sample is absolutely or relatively dated. The first letter starts in the 81st column.
Datasets always end with the fake value 999.

Summed files

WRITEME: tucson summed format; no native indexed-but-not-summed; 800 rule

Extra fields

Some Tucson files may have extra fields on the end with additional statistics. They hold:

- number of years
- first order autocorrelation
- standard deviation
- mean sensitivity
- mean index value
- sum of indices
- sum of squares of indices
- max of series

Corina doesn't save these fields, and it ignores them when loading Tucson files. A couple of them are already displayed automatically (number of years, mean sensitivity).

Packed Tucson files

The [ITRDB] uses what I call "packed" Tucson files. The folks at Tucson thought: a Tucson file is just a bunch of lines, each beginning with the sample's ID number. So we don't need to keep them in separate files: we can simply smash a bunch of Tucson files together without losing any data[2]. Since the primary interface to the ITRDB is anonymous FTP, they wanted to minimize the number of files available. Their 6-digit ID numbers don't allow many samples per site, at Cornell we only use packed Tucson files when submitting data to or downloading data from the ITRDB.

Bug:

In the future, Corina will allow you to pack and unpack Tucson files from the file browser. Currently, you have to unpack them by hand. If you want to pack some files, make a new sum from all of them, and export them; "Packed Tucson" will be one of the format options available.

Procedure 8.2. To pack Tucson files together to submit to the ITRDB:

1. Select all of the files in the browser. (They'll need to all be in the same folder - since one folder represents one site, and a packed file should only contain samples from one site, this shouldn't be a problem.)
2. Choose File->Pack Files
3. A new file, called "Untitled Packed File.tuc"(??)(.crn?) will appear, and be selected. You should rename it to an appropriate name before uploading it.

Procedure 8.3. To unpack Tucson files you've downloaded from the ITRDB:

[2]Assuming your ID numbers are unique.

1. Select the file in the Corina browser.

2. Choose File->Unpack File

3. A new folder will be created, with the same name as your file (e.g., "blah.crn" => "blah/" -- what if it has no extension? ...f?). Inside it will be all of the samples...

Two-Column

Two-column data holds the least data (it doesn't save any metadata), but it's also the simplest, so it's great for transferring data to and from statistical or graphing programs which can't read dendro files. When you use Edit->Copy (**control-C**) in the editor, it puts your data on the clipboard in two-column format.

Actually, "two-column" is a misnomer. It's as many columns as you have data. If you're exporting a raw sample, it's two columns: year and data. A summed file is three columns: year, data, and count.

Example 8.2. Two-column format

```
1617 414
1618 376
1619 471
1620 592
1621 350
1622 180
1623 238
1624 336
```

Corina

Of all of the file formats Corina supports, this format is best-supported and has the most features. Unless you're just trying out Corina and still have all of your data in another format, you'll normally store all of your data in this format.

The top of a Corina file holds all of the metadata. For a list of all the metadata, that section of the manual. Notes:

- The labels are just as you see them; they're all uppercase for backwards-compatibility, but Corina will accept either case. As you can see, it's a semicolon, a tag, a space, and some text.
- Corina always writes the metadata in this order, on these lines, for backwards-compatibility, but will accept tags in any order, in any number of lines.
- Since semicolons are the start of a new tag, semicolons aren't allowed in the text of any field. Empty fields are also not allowed.

***list tag names, and valid values for each (;PITH N,P,?)

***on bad value, corina asks user.

Note:

In the following example, the symbol # is used to indicate a space which otherwise wouldn't be visible. For example, the line

```
;ELEMENTS#
```

means a line containing a semicolon, the word ELEMENTS, and a space. I'll only use this character when a space wouldn't otherwise be visible (like at the end of a line), or when it's important to show how many spaces there are (like when you need exactly 3 spaces in the middle of a line).

Example 8.3. Corina format

```
Kalkim Forest 10BA

;ID 917102;NAME Kalkim Forest 10BA;DATING A;UNMEAS_PRE 1;UNMEAS_POST 1
;FILENAME G:\DATA\FOREST\KLK\KLK10BA.REC
;TYPE S;SPECIES ALSP;FORMAT R;SAPWOOD 0;PITH N
;TERMINAL v;CONTINUOUS R;QUALITY +
;RECONCILED Y

;DATA#########
 1617                                                 414   376   471
                                                        [1]   [1]   [1]
 1620   592   350   180   238   336   432   465   418   424   468
          [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]
 1630   419   509   539   512   397   403   348   316   378   381
          [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]   [1]
***cross -1/+1 year!
***last line
***9990

;ELEMENTS#
G:\DATA\file1.rec
G:\DATA\file2.rec
*G:\DATA\file3.rec
G:\DATA\file4.rec

;weiserjahre
 1011   0/1      1/0      1/0      0/1      0/1      1/0      1/0      0/1      0/1###
 1020   1/0      0/1      0/1      1/0      1/0      1/0      0/1      1/0      0/1      1/0###
 1030   0/1      0/1      1/0      1/0      0/1      1/0      0/1      1/0      0/1      0/1###
 1040   0/1      1/0      1/0      0/1      0/1      0/1      1/0      1/0      0/1      1/0###

~ Don Knuth
```

The first line of the file contains the title. This is repeated a second time later in the file. (When loading a file, Corina ignores this first title line, and reads the title from the ;NAME tag.) The idea was probably to make it easy (for both people and programs) to identify a file quickly.

The "data" tag starts the data section. For historical reasons, the word "DATA" is followed by 9 spaces, though Corina doesn't require this.

The start year of the sample; this ***

Data values, one per year. The rightmost digit of each value should line up vertically. Each column of data is 6 digits wide. Units are hundredths of a millimeter (0.01 mm) for raw files, and parts-per-thousand (0.1%) for indexed files.

Below each data value is the "count", or how many elements of the sum had data that year. It's surrounded by square brackets. Even raw files have count: it's simply always 1.

The last line is un-indented by 3***? characters.

After the last value, there's a 9990 value. Historically, this marked the end of the sample, but it's no longer needed.

A master holds a list of the files which were summed together to create it. The ELEMENTS tag indicates the start of this section. Raw files don't need an ELEMENTS section.

The filenames of the elements which make up this master follow the ELEMENTS line, one filename per line. They should be complete filenames, including any folders the file is in e.g.,

"G:\DATA\FOREST\KLK\KLK10AB.REC", and not simply "KLK10AB.REC".
If any filename line starts with an asterisk (*), it indicates an "inactive" element. You can temporarily remove an element from a sum by deactivating it, in the elements tab.
The "weiserjahre" tag marks the start of the Weiserjahre section. For backwards-compatibility, this tag (unlike the others) is lowercase. *** spacing! (ick!)
A tilde ("~") indicates the last line of the file. Following that is the author of this sample.

Bug:

Corina should be able to store semicolons in text - perhaps escape them somehow (";;"?). Disallowing semicolons is a dumb restriction.

Bug:

Corina should handle empty fields properly, too. It won't save any new files this way, but it shouldn't fail if it sees a file with ";SAPWOOD ;" - it's obvious what this means.

Heidelberg

I believe this format was created by Frank Rinn; I don't know that it has a name, so I call it the "Heidelberg" format. This may be the default format for his [TSAP] program.

Corina's support for this format is minimal: it will load and save raw data, but not metadata, and it assumes all files are summed.

Example 8.4. Heidelberg format

```
HEADER:
DateEnd=1998
Length=382
DATA:Chrono
  414    0    0    0  376    0    0    0  471    0    0    0  592    0    0    0
  350    0    0    0  180    0    0    0  238    0    0    0  336    0    0    0
  432    0    0    0  465    0    0    0  418    0    0    0  424    0    0    0
  468    0    0    0  419    0    0    0  509    0    0    0  539    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
```

Now, an explanation:

Example 8.5. Heidelberg format, with annotations

```
HEADER:
DateEnd=1998
Length=382
DATA:Chrono
  414    0    0    0  376    0    0    0  471    0    0    0  592    0    0    0
  350    0    0    0  180    0    0    0  238    0    0    0  336    0    0    0
  432    0    0    0  465    0    0    0  418    0    0    0  424    0    0    0
  468    0    0    0  419    0    0    0  509    0    0    0  539    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
```

The line HEADER: indicates that this is a Heidelberg file.
The year of the last data value.
The number of data values.

The data section. (Are there other kinds of data?)
Each year has 4 numbers: ring width, number of samples, number of increasing samples, and number of decreasing samples. (For raw files, Corina simply uses 0 for the last 3 of these.) Each is right-aligned in 5-character-wide columns.
The end of the file is marked by four zeroes. Also, every line of data is the same width, so if the last line has fewer than 4 years of data, extra zeroes are added to make it the same width as the other lines.

Hohenheim

WRITEME

Example 8.6. Hohenheim format sample

```
+
.                                                       382  1617  1998
 414 376 471 592 350 180 238 336 432 465
 418 424 468 419 509 539 512 397 403 348
 316 378 381 362 414 333 318 352 269 401
 410 380 314 281 222 329 333 209 234 242
 262 214 228 157 179 206 211 188 247 190
 127 217 296 273 212 261 213 200 167 158
```

TSAP

I don't know where this TSAP format came from. I don't think it's the default format of TSAP files, but I'm not sure. I found some files whose first line is `TSAP-MATRIX-FORMAT`, so here you go. They all had the extension `.OUT`, so I suspect it may be TSAP saving in a simple format for exporting to other programs.

Since this doesn't appear to be a native format for even TSAP, there's probably no reason to save files in this format. If you run across a file that looks like this, though, you'll be able to open it normally.

A file in this format looks like:

Example 8.7. TSAP Matrix sample

```
TSAP-MATRIX-FORMAT

    Year,       100 Val        100 Nos        100 Nois       100 Nods
    1617,            414,             1,             0,             0
    1618,            376,             1,             0,             0
    1619,            471,             1,             0,             0
    1620,            592,             1,             0,             0
    1621,            350,             1,             0,             0
```

The year; this format uses a zero-year system, i.e., what TSAP calls -5 is really 6 BC, not 5 BC as in Corina.
The width of this ring. ("Value")
The number of elements that have data for this year. ("Number of Samples")
The number of samples increasing this year. ("Number of Increasing Samples")
The number of samples decreasing this year. ("Number of Decreasing Samples")

I've only ever seen summed files in this format; I don't know how raw files are stored, if differently. (Corina exports raw samples to TSAP Matrix format by pretending they're a sum consisting of one sample.)

Bug:

If the first line is corrupt, as seems to often happen, it won't load properly. For example, `/^C^E Val / ^C^E Nos /^C^E Nois/^C^E Nods`

Ranges-Only

This is an output-only format, and only usable for summed files that have elements. It saves each element's title, and with its starting year, ending year, and length, separated by tabs, one element per line. It doesn't save any ring-width data. You might use this format, for example, if you wanted to make a bargraph in a statistical program or a spreadsheet.

Bug:

Corina doesn't add a header line, or write the length - yet.

Example 8.8. Ranges-only sample

```
Title                              Start  End    Length
Zonguldak, Karabuk 1A IND          1857   1985   129
Zonguldak, Karabuk 3A IND          1761   1951   191
Zonguldak, Karabuk 4A IND          1699   1978   280
```

Spreadsheet

The spreadsheet format is also output-only, and also only used for summed files with an Elements tab. It saves one line per year, with each column holding the data from one element. It's sort of like 2-column format, but for any number of samples. If you wanted to export all the data from a master to a spreadsheet like Excel, this is the format to use.

Example 8.9. Spreadsheet format sample

```
Year ALTO DE LAS MESAS EL ASIENTO, ACONCAGUA (STANDARD) AUCHNALCAS SAN GABRIEL (STANDARD)
1011 1346
1012 1278
1013 1536
1014 1983
1015 1774
1016 1611
1017 1637
```

Chapter 9. Preferences

Rationale

Corina allows each user to set preferences, to control the appearance and behavior of the program. This came about for various reasons:

System configuration	Some aspects of our particular lab/installation aren't relevant to anybody else, like the folder that datasets are stored in. It would be foolish to make these a permanent part of Corina, because we don't want to discourage other people from using Corina. (Example: data directory.)
Taste	People have strange tastes. (Example: graphpaper color.)
Bugs in Java	Sun's implementation of Java has a number of bugs, especially in Swing on Windows, and especially before version 1.4 (and possibly after that, as well). For example, it would ignore the system settings for colors and fonts, so Corina has preferences to override these in some cases. (Example: menubar font.)
Bugs in Corina	Truth be told, Corina has bugs, and some of them are easier to work around in the short term by adding preferences. Some experimental algorithms have paramaters that users might conceivably want to tweak, and it's simpler to add an entry to the preferences screen than add a proper control to change it. (Example: cubic spline s-value.) Eventually, either a good default value should be used, or a proper control (discoverable, and documented) should be added.

Procedure 9.1. To access the preferences dialog:

1. If you're on a Mac, choose Corina->Preferences...
2. If you're on Windows or Linux, choose Edit->Preferences...

All changes you make to your preferences should take effect as soon as you change them, and also remain in effect for future sessions.

Editor Preferences

Background color	WRITEME
Text color	WRITEME
Font color	WRITEME
Draw Gridlines	WRITEME
Serial Port	WRITEME

Crossdate Preferences

WRITEME WRITEME

Graph Preferences

WRITEME WRITEME

Advanced Preferences

Override User Name — In some situations, Corina might not be able to figure out your name correctly. (Corina uses your name for things like printouts.) If your name isn't listed correctly, that usually means your system isn't set up properly. But if you can't change it, or don't know how, you can set your name (for Corina only) by using this feature.

The Gory Details

Note:

Most users won't need to read this section. Only read this if you need to know where Corina stores user preferences, and how; for example, if you want to move your preferences from one computer to another.

Corina stores user preferences in a single plain-text file.

The Corina preferences file is stored:

on Windows	in your home folder, with the name `Corina Preferences`
on Mac	in your home folder, in the `Preferences` folder inside the `Library` folder, with the name `Corina Preferences`
on Unix	in your home folder, with the name `.corina`

XXX the format ... field=value, unicode, java escapes, XXX For complete technical description, see the API documentation for `java.util.Properties` [http://java.sun.com/j2se/1.3/docs/api/java/util/Properties.html].

The first time a user runs Corina, it checks for a preferences file. If none exists, it creates a default one. There is currently no way to create a system-wide preferences file (though you can put a sample Corina preferences file in the new-user-skeleton on your system, so new users get a pre-made preferences file).

Chapter 10. The Atlas

Corina includes an Atlas for managing your sites. The Atlas consists of:

- a map, which shows you where your sites are, and
- a list of sites, which lets you add, remove, edit, and search your sites.

They're assembled side-by-side in one window for convenience.

Showing the Map

To show the map, choose: File->(New) Atlas...

Editing Site Info

To edit the info for a site, find it in the list of sites and choose Site->Get Info... (**control-I**). You'll be presented with a window letting you edit all the info for that site. Most of them should be self-explanitory, but a few notes:

- "Code" is the alphabetic code for this site, like "ZKB"; "ID" is the numeric code for this site, like 167.
- You can set the location either by dragging the site on the map, or by typing in a latitude and longitude here (for example, "41°12'N 32°37'E"). If you can't type a degree sign (°) on your keyboard, you can use an asterisk (*) instead.
- The "Country" popup lists all of the countries which have been used for other sites so far. If you need to select a country not in the popup, the last entry is "Other...", which lets you select any country.

Introduction?

--WRITEME

Displaying Sites on a Map

WRITEME

Exporting Maps

For the times when you want to use a map in another document, Corina lets you export your maps. You can export a map to:

- Illustrator, for a poster
- a web page editor, for a web page
- PowerPoint, for a presentation
- Word, for a report
- and probably many other uses I haven't thought of

You Might Not Need to Read This Section

You don't need to export maps to print them: just choose File->Print... (**control-P**). Exporting is just for putting maps into other documents.

To Illustrator

Adobe Illustrator is a vector graphics program, which means you can draw line art without ever getting "jaggies". In addition to its own file format, it has good support for SVG, an open file format for vector graphics. Corina also supports SVG, so putting a map from Corina into an Illustrator document is really easy.

Procedure 10.1. Exporting a map to Illustrator

1. In Corina, create the map you'd like to export
2. In Corina, export the map to SVG with Export->SVG..., and pick a filename which ends with `.SVG`
3. In Illustrator, open the SVG file you just created, with File->Open... (**control-O**)

You need Illustrator version 9 or newer to load SVG files.

Two other vector-art programs which you might have (which compete with Illustrator) are Macromedia Freehand and Corel Draw. Freehand 10 doesn't support SVG. (They're the guys who wrote Flash, another vector graphics format used by all the cheesey animations on the web. I wouldn't hold my breath on them supporting SVG.) Corel Draw 11 *might* support SVG. I can't tell by reading their web page, so try it. Corel does support exporting SVG, and has their own SVG viewer, so it's quite possible that Corel Draw does or will soon allow you to import SVG.

To a Web Page

Web pages are meant to be viewed in a browser on a screen, and screens are low-resolution devices (compared to printers), so exporting to PNG for a web page is fine.

A common way to put images on web pages is to have a small thumbnail of your image in the body of your text, which is itself a link to a larger version. So you'll need two versions of each map. Good sizes might be 300x200 and 600x400.

Procedure 10.2. Exporting a map for a Web Page

1. In Corina, create the map you'd like to export
2. In Corina export the map to a thumbnail PNG, sized 300x200, with Export->PNG..., and pick a filename which ends with `.PNG`
3. In Corina export the map to a large PNG, sized 600x400, with Export->PNG..., and pick a filename which ends with `.PNG`

4. Once you have the images, you'll need to reference them from an HTML file. A simple version will look something like this:

```
<a href="map-large.png" alt="Map (large)">
  <img src="map-small.png" width="300" height="200" align="left"/>
</a>
```

Be sure to use "width" and "height" attributes, and be sure they're correct. "Align left" tells the web browser to wrap your text around the thumbnail.

Even your large map won't look very good when printed out. If you want to provide a high-resolution map that users can print out, you should also include a link to a PDF. (Mac users can choose Print...***, and click "Save as PDF..."***. PC users will need to buy Adobe Acrobat to be able to do this, or export an SVG and save it from Illustrator.)

To a PowerPoint Presentation

Microsoft PowerPoint can only import bitmaps like PNG, not vector art like SVG, but they also need to scale the image to fit on the screen or to print. In other words, this is the worst of both worlds.

The best solution I've found is to use large PNG bitmaps, and scale them down. It won't look nearly as good as a normal printout, or a document made in Illustrator, but it's the best that PowerPoint can do.

Procedure 10.3. Exporting a map to PowerPoint

1. In Corina, create the map you'd like to export
2. In Corina export the map to PNG with Export->PNG..., and pick a filename which ends with `.PNG`
3. In PowerPoint, create a new slide for your map, if you want it on its own slide. A blank slide should work fine.
4. In PowerPoint, insert your map image using Insert+Picture->From File...

You need Microsoft PowerPoint version 97, 2000, or newer for the PC, or version 98 or v.X or newer for the Mac, to import PNG files. You can also use Apple's presentation application, Keynote. All versions of Apple Keynote can import PNG.

To a Word Document

Like PowerPoint, Microsoft Word can only import bitmaps like PNG. Putting a map in a Word document is very similar to putting it in a PowerPoint presentation.

If you have a PC, you need Word 97 or 2000 or newer for PNGs (Word 6.0 and Word 95 are too old). If you have a Mac, you need Office 98 or Word:mac v.X.

Procedure 10.4. Exporting a map to Word

1. In Corina, create the map you'd like to export
2. In Corina export the map to PNG with Export->PNG..., and pick a filename which ends with `.PNG`
3. In Word, insert the PNG file you just created, with Insert+Picture->From File...

Of course, if you really wanted high quality publishing, you wouldn't be using Word; you would be using something PostScript-based, or which could import SVG files, like Adobe InDesign, or perhaps FrameMaker, TEX, or DocBook.

Appendix A. References

These are sources used by Corina or this book.

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Appendix B. Graphics File Formats

- why i'm writing this: - there are lots of formats, everybody's confused, it applies to parts of corina

read this if: - you're trying to decide whether to use "Export PNG..." or "Export SVG..." in corina

Types of graphics files

- big 2: bitmap and vector formats -- examples: a png and an svg, at 1x, and scaled 10x WRITEME

Bitmap File Formats

- like a big screen door - want to make it bigger? you won't get any more detail.

Examples of bitmap file formats are PNG, TIFF, and JPEG.

-- examples: a tiff and a jpeg (?)

Table B.1. Bitmap Graphics Filetypes

Format	Filename Extensions	Number of Colors	Transparency	Compression
PNG	`.png`	Millions	Full	Yes
TIFF	`.tiff` or `.tif`	Millions	Full	No
JPEG	`.jpeg` or `.jpg`	Millions	None	Yes (lossy - use for photographs only)
GIF	`.gif`	256	Limited (transparent/opaque only)	Yes
Adobe Photoshop	`.psd`	Millions	Full	No
Microsoft Windows Bitmap	`.bmp`	??	None	No

JPEG's compression deserves special mention. It uses a special form of compression which is excellent for photographs, or other images with gradients or continuous tones. The downside is that if you put an image into JPEG format, and then look at it again, it won't be exactly the same image (it's "lossy"). WRITEME

For more information on JPEG, see Photo.net's JPEG page [http://www.photo.net/learn/jpeg/], or ... -- NOTE: have list of references for this appendix only?

GIF is an older format. Due to lack of features, and some possible licensing issues, its use is declining. There's no reason to use it any longer. Use PNG instead.

The Photoshop format is similar to TIFF, in that it's an uncompressed bitmap, but it also stores layers and other Photoshop-specific features. If you're working with an image in Photoshop, you pretty much need to use this format, but you'll convert it to a different format for publication, like JPEG or PNG; it's proprietary, so most other programs will not be able to read it.

Another format you might see is "Windows Bitmap". Windows creates these (for example, when you take a screenshot), but that's about all they're good for. They offer no compression, no transparency, and many programs (including many web browsers) can't view them. Avoid.

when to use bitmaps. when not to use bitmaps. (should this really be here?)

- how to deal with them: photoshop handles pretty much anything

Vector File Formats

- like instructions on how to draw something on graph paper

Table B.2. Vector Graphics Filetypes

Format	Filename Extensions	Common Uses
SVG	`.svg`, `.svgz` (compressed)	Standard interchange for vector graphics, possibly replacing EPS; vector graphics on the web
PostScript	`.ps`, `.ps.gz` (compressed)	Printed documents
Encapsulated PostScript (EPS)	`.eps`	Figures, graphs, or clip art
PDF	`.pdf`	Printed documents
Illustrator	`.ai`	Drawings
Flash	`.swf`	Web graphics, especially with animation and sound

Your screen has about 100 dots per inch (DPI). Your printer is maybe 300 or 600 DPI. , but a vector image file can be scaled to that level and it'll still look even smoother than it does on your screen.

WRITEME - any of these let you "embed" a bitmap in a vector file - if you put a bitmap in a vector file, it's still a bitmap. - e.g., if you put a PNG in an illustrator file, it'll still be pixels. it won't scale.

WRITEME: - how to deal with them: illustrator is decent

Graphics in Microsoft Office[3]

why: lots of people use office, despite its flaws. word and powerpoint, especially. so even if you never use these programs yourself, chances are other people will, so you'll need to know what formats to generate/share files.

bitmaps: newer versions should support png, tiff, gif, and jpeg. they might not support full transparency, but since paper is white it doesn't really matter. just remember that if you put a bitmap in your word document or powerpoint presentation and it looks ok on the screen it might not look so smooth on paper or on a projection screen.

vector: even newer versions might not support most (or any) of these formats, which is unfortunate. if you're stuck with office, you may have no choice but to use a bitmap format, which won't look very good.

[3] **This generally applies to any relatively modern office-like software, not just Microsoft Office.**

Appendix C. Troubleshooting / Help!

This section will consist of questions and answers. If you get stuck, chances are somebody else has been stuck on the same problem. (If this happens enough, maybe it's the sign of bad design. Or maybe there's a good reason for it.)

If you can't find the answer in the manual, two useful documents to read before asking for help are:

- How to Report Bugs Effectively [http://www.chiark.greenend.org.uk/~sgtatham/bugs.html], and
- How To Ask Questions The Smart Way [http://www.tuxedo.org/~esr/faqs/smart-questions.html]

WRITEME: where to go for help: search the manual, look on the web page, check the mailing lists, ask on the mailing lists.

WRITEME: general strategies (remove Corina Prefs folder, try it as a different user, download the latest version and try that, reboot, ...

WRITEME: if you've found a bug, what to do.

Graphics

Q:.
My graph is way off the top of the screen. Why's it so big?

A:.

Miscellaneous

Q:.
The menubar font is too small / big -- that's not a q!.

A:.
This is a bug in Sun's Java for Windows, versions 1.2 and 1.3. Corina has a workaround for it: under Preferences..., in the Advanced tab, you can set a new menubar font.

Appendix D. Glossary

This is a glossary of terms used by Corina.

Glossary

chronology
: ...

clean
: to make a master look like a single sample by removing its count, Weiserjahre, and elements

count
: the part of a sample that ...

crossdating
: ...

D-score
: "Dating score". A combination of the T-score and trend.

element
: in a master, the list of samples that make it up

index
: ...

master
: another name for a sum, usually ...

mean sensitivity
: ...

reconciling
: With two readings of one sample, comparing and correcting (by re-measuring the actual piece, where needed) to work out any inconsistencies. After reconciliation, all trends should match, and all readings should be within 3%.

redating
: ...

re-sum
: to re-compute a sum...

sample
: ...

sum
: ...

SVG
: an open file format for vector graphics; "Scalable Vector Graphics"; similar in function to EPS ("Embedded PostScript")

T-score
: ...

trend

...

Weiserjahre

the incr/decr...

a crossing algorithm ...

Appendix E. Files

This appendix lists all of the files used by Corina, where they live, and why they exist.

Don't Read This Section

You don't need to read this section unless you're interested in how Corina stores preferences, or want to move your preferences from one system to another.

User Preferences

Corina stores your preferences in your home directory.

on Mac OS X	Your home is usually `/Users/joe` (if your login is "joe"). To go to your home, switch to the Finder and choose Go->Home (**shift-#-H**).
on Windows 95/98/ME, "single user"	Windows 95 doesn't normally have a concept of "home", so `C:\WINDOWS\` is used as your home.
on Windows 95/98/ME, "multiple users"	If you have Windows set up in "multiple users" mode, your home is your "profile" directory, such as `C:\WINDOWS\PROFILES\joe\` (if your login is "joe").
on Windows NT/2000	The Windows NT home is your "profile" folder, which is usually at `C:\WINNT\PROFILES\joe\` (if your login is "joe").
on Unix/Linux	Your home directory is the directory where your shell starts out. It's usually something like `/home/joe` (if your login is "joe"). If you're not sure, you can find out by typing **`echo ~`**.

Still Not Sure Where Home Is?

If you want to know where Corina thinks your home is, choose Help->About Corina... (it's under the Corina menu on the Mac) and click System Info...; look for the property `user.home` in the left column.

Corina stores your preferences is a file in your home called "Corina Preferences".

The first time you run Corina, it creates a default preferences file for you. If you ever get really stuck (e.g., Corina won't start, and you think your preferences file is to blame), you can delete your preferences file; the next time you run Corina, it will give you a new one.

The preferences are stored in plain text (Unicode [http://www.unicode.org/], using Java Unicode escapes (see the Properties API [http://java.sun.com/j2se/1.3/docs/api/java/util/Properties.html] for a description).

There is no site-wide preferences file for Corina. If you want all users at a particular site to have the same default preferences, put it in `/etc/skel`, or the equivalent on your system.

Data Files

Corina usually assumes you have one folder for your data, and a bunch of folders in it for each site.

```
DATA
+-ABC
+-DEF
+-GHI
  +-GHI1.IND
```

```
+-GHI2.IND
+-GHI3.IND
```

At the top of your data folders you can have a file called `Site DB`...

In each folder you visit in Corina, a file called ".Corina_Cache" gets created. (It stores a copy of the metadata for all the files in that folder, but you don't need to know that.) It's automatically created and updated, and if it's not there Corina creates a new one. It's only there to make browsing faster. If you delete one of them, no harm is done; it'll just be a little slower the next time you browse that folder.

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Version 1.2, November 2002

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Appendix G. Index

An index of terms used in this manual.

Index

Symbols

H

O

T

W

A

C

D

E

F

G

I

M

P

Q

R

S