Stratify Tutorial

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Introduction

The aim of the freeware program *Stratify* is to lay out the Harris diagram automatically, taking all the available information on chronology and groupings into account. This tutorial will show how *Stratify* works: You will learn to enter stratigraphic units and relationships, to change the data, to detect inconsistent or contradictory relationships, and to lay out the Harris diagram including phases and groups. For this tutorial, basic knowledge of stratigraphic principles is required as published in the following references:

Harris, E., 1989, Principles of Archaeological Stratigraphy. 2nd ed. (London 1989).

Roskams, S., 2001, Excavation. Cambridge Manuals in Archaeology (Cambridge 2001).

Data Entry and Change I

In this chapter you will create a new project based on a hypothetical section (Fig. 1). The section is taken for practical reasons, but: Sections are <u>not</u> the ideal basis for reconstructing the stratigraphic sequence, instead single context plans should be used for recording the stratigraphic sequence.

Some numbers of stratigraphic units are missing in the section drawing, and some question-able relationships will be entered during this tutorial. Please bear in mind that the main aim of this tutorial is to teach *Stratify* and not to teach stratification.

Basic *Stratify* Concepts: Context, Excavation

Stratigraphic units and their relationships are the fundamental components from which the stratigraphic sequence and the Harris diagram are constructed. Stratigraphic units are called <u>contexts</u> in *Stratify*.

Each context must have a unique <u>name</u> to ensure that the Harris diagram, error lists, or reports are unambiguous. Most stratigraphic excavations use only one numbering system, but in some situations additional letters are helpful. For example graves may be labeled G1, G2 etc., or a layer which is found to consist of two parts may be split into contexts 12a and 12b (12 being the original name of the layer).

Several adjacent excavations may be analysed in one *Stratify* project. Both the <u>excavation name</u> and the context name are combined to provide a unique identifier for each context in the project.

▢ Create a New Project

Create a new project in *Stratify*:

> *File | New project*
> Project File: Hypothetical.syp
> Term File: *.db
> Excavation: Hypothetical

Entry of a project file name and an excavation name is mandatory.

On confirming the dialogue by clicking on the OK button, *Stratify* will show two empty lists side by side. On the left hand side, the unit list and on the right hand side, the relationship list is displayed. The unit list will store the contexts. The unit list and the relationship list are separated by a splitter which can be moved to the right or left by dragging it with the mouse (click and while the mouse button is pressed, move the mouse). If you increase the breadth of

the unit list by moving the splitter to the right, the breadth of the relationship list is reduced accordingly.

Fig. 1 – Hypothetical section

Enter a Context

Add a new context to the unit list:

Units | New   or

The *Stratify* fields for describing contexts are based on several excavation recording sheets for stratigraphic data that have been published.

It is mandatory that the fields *Excavation* and *Unit name* are filled before saving the new context.

Field entries:

Unit name:	001
Unit type:	top soil
Description:	sand (40%), silt (60%); occasional lenses of organic material
Excavation method:	shovel
Location:	section 11
Phase:	modern
Excavation date:	12/12/2004
Excavator:	Jane Bond

Note that the *Excavation date* must be entered in the standard short date format preset in your operating system. With the <F6> function key you may enter the current date.

Press the *Next older* button to enter context 002.

Enter the *Unit name* and some other fields, use the F5 key to copy field values from the context entered before, i.e. 001.

Activate the *Relations* sheet: The relationships belong to one of three categories:
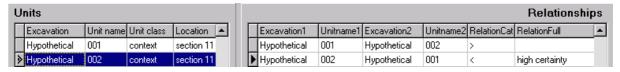
- Earlier than: The current context is earlier than the contexts in the list, i.e. these contexts appear above the current context in the Harris diagram.

- Other relations: List of contexts that are contemporary with or equal to the current context; list of work areas or groups to which the unit belongs ("part of" relationships). These relations will be explained in more detail in the section "Stratigraphic Relationships".

- Later than: The current context is later than the contexts in the list, i.e. these contexts appear below the current context in the Harris diagram.

Note that 002 is earlier than 001, this was entered automatically (*Next older* button).

In the "Earlier than" relationship table double-click the row designating "002 is earlier than 001" and enter a *Relationship comment*: "high certainty".

Save the data in the unit entry form (OK button).

The unit list now contains two entries: 001 and 002.

Units					Relationships						
Excavation	Unit name	Unit class	Location		Excavation1	Unitname1	Excavation2	Unitname2	RelationCat	RelationFull	
Hypothetical	001	context	section 11		Hypothetical	001	Hypothetical	002	>		
Hypothetical	002	context	section 11		Hypothetical	002	Hypothetical	001	<	high certainty	

The list of relationships consists of two entries as well: 001 is later than 002, and 002 is earlier than 001. Note that when saving a new relationship, *Stratify* enters the opposite relationship automatically.

Changing Context Data

To change the data of context 001, double-click the appropriate row in the unit list, or select the context by clicking on the row and choose the tool button or press F3 or select *Units* / *Edit* from the main menu. Then the unit entry form appears showing the data entered for the currently selected context. You may change and add data as described above.

At the bottom of the unit entry form four arrow buttons are displayed. Using these buttons you can move to the first, the previous, the next and the last context in the list. This allows you to easily correct contexts with consecutive numbers.

Save the changes using the OK button.

Defining Several Contexts at a Time

You may want to create a large number of contexts in one step rather than typing in a list of consecutive numbers and other repetitive data. If some of the data fields are the same for all units to be generated, first create a new model unit using the *Units* / *New* menu item.

Field entries of the model unit:

Unit name:	003	
Excavation method:	shovel	
Location:	section 11	
Phase:	modern	
Excavation date:	12/12/2004	! enter the appropriate date format
Excavator:	Jane Bond	

Select *Units | Consecutive numbers* from the main menu:

       First unit number: 4
       Last unit number: 27
       Number of digits: 3
       Name of model unit: 003

Confirm the creation of 24 units.

Enter appropriate *unit types* for some of the contexts (i.e. change the context entries):

layer	002, 003, 006, 007, 009, 010, 011, 012, 013, 015, 016, 017, 024, 025, 026, 027
pit fill	004, 018, 020, 021, 022
pit interface	005, 023
wall	008
surface	014

Add a Relationship

Stratify supports two different ways to add a new relationship:

(a) Unit entry form:

Add the relationship context 002 is later than context 003:

- Double-click context 003 in the unit list, activate the *Relations* sheet.
- Press the *Add* button, to the left of the first relation list (Earlier than).
- For the *Second Unit* enter the *Unit name* 002.
- Confirm all dialogues by pressing the OK button.

(b) *Relations | Add* or press F5 or the 🔳 tool button

- Click on context 004 in the unit list.
- Choose *Relations | Add* or press F5 or the 🔳 tool button
- For the *Second Unit* enter the *Unit Name* 003.
- *Relation category*: <   ! date of 004 < date of 003
- Confirm the dialogue by pressing the OK button.

Add the relationship between 004 and 003 once again. On trying to save this relationship, the following warning is issued:
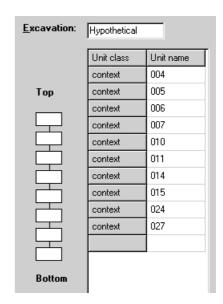
⬛ Creating Chain-Like Relationships

Sometimes it is convenient to enter a chain of "later than" relationships, i.e. if the first context listed is later than the second, the second later than the third, and so on. For the hypothetical section, the following chain of relationships can be entered:

004 > 005 > 006 > 007 > 010 > 011 > 014 > 015 > 024 > 027

Select *Relations | Chain* or the corresponding toolbar button ⬛.

Enter the context names in the list, starting in the first row with 004, 005 is in the second row and so on. Create new rows by pressing the <Tab> key in the last row of the list. After entering the last context in the chain (027), press the OK button. Check that the new relations were entered by looking at the relationship list in the main *Stratify* window.

Excavation:	Hypothetical	

	Unit class	Unit name
	context	004
	context	005
	context	006
	context	007
	context	010
	context	011
	context	014
	context	015
	context	024
	context	027

Enter an additional chain of "later than" relationships:

003 > 009 > 012 > 013 > 017 > 026 > 027

Stratigraphic Relationships

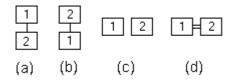The Harris diagram visualises the time relationships that may exist between two contexts 1 and 2:

Fig. 2 - (a)   1 is later than 2
          (b)   1 is earlier than 2
          (c)   1 and 2 are contemporary
          (d)   1 and 2 are equal.

Each relationship category is designated by a symbol:

Symbol	Explanation
>	later than
<	earlier than
=	equal to
-	contemporary with
p	part of

Edward Harris does not differentiate between equal and contemporary relations. In *Stratify*, a <u>contemporary</u> relation is based on dating evidence other than stratigraphy. For example, all the postholes belonging to a building are often considered to be contemporary. The relationship comment field may be used to store a short note explaining why two contexts are set contemporary.

<u>Equal</u> relations should be established only where two or more context numbers refer to one stratigraphic unit, for example the two context numbers of a wall that has been observed in two different trenches.

<u>Part of</u> relationships play an important role for the definition of groups and are explained in the chapter "Working with Groups".

Enter the relationships 015 = 016 = 017, 024 = 025 = 026, and 007 – 009:

(a) Using the unit entry form:

- Edit context 015,

- activate the *Relations* sheet and

- press the *Add* button to the left of the second relation list (Other relations).

- Enter the two relations 015 = 016 and 015 = 017. Save the entries.

- Check the *Relations* sheet of context 016:
  The relationships 016 = 015 and 016 = 017 were entered automatically.

(b) Direct entry of the relationship:

- In the unit list click on context 024.

- Select *Relations* | *Add* or F5 or the ⊞ tool button.

- Add the equal relationship to context 025 (symbol: =) and confirm the dialogue.

- In the same way enter the relationship 024 = 026.

(c) Enter the contemporary relationship 007 – 009 by a method of your choice.

☑ Create a Harris Diagram

Create a Harris diagram for the hypothetical data set by selecting *Diagram* | *Layout and check* from the main menu or by pressing the corresponding toolbar button ☑. Deactivate "Check that periods do not overlap" and confirm the other default settings in the <u>layout and check dialogue</u> by pressing the OK button and wait until the Harris diagram is shown in a separate window.

Compare your result to the diagram layout on the right. Return to the main *Stratify* window by closing the diagram window. Add all missing relationships so that the layout result looks similar to the diagram in Fig. 3.

Experiment with different box shapes and border delineations of the boxes. Right-click a context box on the screen and choose the border style option.

If you want to change the colour of the box fills as well, increase the number of colours which are displayed by selecting *Preferences* | *Number of colours* | *65536 colours* first.

Compare: 007 and 009 were set contemporary, 015, 016, and 017 are equal: The earlier than/later than relationships of 015, 016, and 017 all moved to the first context in the list of equal relationships. Context 015 has no direct relationship to 018.
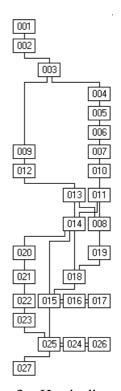

Fig. 3 – Harris diagram

It is likely that 018 was created after 014, this will lead to another chronological sequence and to a different Harris diagram, but stratigraphic issues are not the main point of this tutorial.

Press the ⓘ button to toggle to unit information mode (or select *View* | *Show unit information* from the menu of the Harris diagram window). When clicking on a context box, a window with the unit data will be shown. Only non-blank fields will be listed.

Data Entry and Change II

Backups / Copies

To backup the project data, select *File | Save project copy as* from the main menu. The standard dialogue box for saving files appears. Enter the project file name HypoBackup.syp.

A *Stratify* project consists of several files, the names of these files start with the project file name, i.e. all the files HypoBackup.syp, HypoBackup_unit.db, HypoBackup_unit.px and so on belong to the project. Details concerning the *Stratify* data base structure and files can be found in the help file .

Erase a Relationship

Erase the relationship "007 is contemporary with 009" by clicking on the appropriate entry in the list of relationships, select *Relations | Remove* or the corresponding toolbar button.

Replace the contemporary relationship between contexts 007 and 009 with an equal relationship as described above.

Create the Harris diagram for this data set (by selecting *Diagram | Layout and check* or ✔) and compare the result to the diagram created previously.

Try to erase the relationship 024 = 025:
You are asked to reassign the equal relationship to 026, as this context can no longer be equal to both 024 and 025 (this implies: 024=025, but this relationship is to be erased).
Two lists are displayed side by side. The first list shows those contexts which are equal to the first context (024), while the second list contains the contexts which are equal to the second context (025). Each context may be in one of the lists only. Initially, all contexts (in this case only 026) are shown in the first list. If you want to move a context to the second list, select the context and click on the > button. The < button undoes this move. With the >> button, all contexts are moved from the first to the second list, the << button moves all contexts from the right-hand list to the left-hand list.

Do not erase the relationship (press the *Cancel* button).

Split a Context

In the section drawing (Fig. 1) context 019 consists of 4 parts. Therefore we split 019 into four contexts named 019a, 019b, 019c, and 019d.

First rename context 019 to 019a by editing the context in the unit entry form.

Afterwards mark context 019a in the unit list and choose *Units | Split* from the menu.

A copy of the unit entry form for context 019a is displayed. Change the *Unit name* to 019b.

Save the new context and check the relationships by inspecting the relationship list on the right-hand side of the window: Both 019a and 019b have identical relationships.

Create contexts 019c and 019d in the same way.

Merging contexts is the opposite of splitting contexts. In general, merging contexts is only sensible when the context name that disappears is not used in any paper, plan or data base. In most cases the creation of equal relationships between identical contexts with different numbers should be prefered.

Copy a Context

As was shown above, splitting a context does not only copy the context but also its relationships. If you want to copy a context without the relationships, use *Units | Copy* instead.

In fact, a context is missing in Fig.1: the interface of the pit which is filled by 018. Create this context by copying 018. The new context is named 018i.

Add the following relationships: 018i is earlier than 018 but later than 015 and 016.

Working with Groups

Creating Groups (and Work Areas)

The contexts 019a, 019b, 019c, and 019d belong together, and therefore it is reasonable to create a group consisting of these contexts.

Mark the four contexts: Click on 019a in the unit list, and mark the other three contexts by keeping the <Ctrl> key pressed while clicking on the appropriate rows in the list.

Afterwards choose *Units | Combine*.

Create a group (see field *Unit class*) with *Unit name* G019.

Have a look at the relationships of 019a in the "Other relations" category: The relationship to group G019 is designated by a "p" in the relationship category field, "p" is the symbol for "part of".
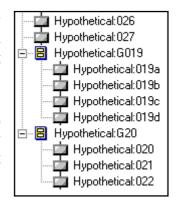
Form another group named G020 including the pit fill layers 020, 021, and 022.

In a similar way, work areas can be created. Work areas are groups that are only used for lists and do not influence the Harris diagram layout.

Group Hierarchy

You may create a hierarchy of groups, i.e. groups A and B may form group C. Start at the bottom of the group hierarchy and successively add groups at higher hierarchy levels by combining low level groups (mark the groups and choose *Units | Combine*).
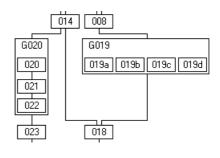

The group hierarchy can be displayed in a similar way like the MS Windows Explorer shows the hierarchy of directories. Use *Configure | Show group hierarchy* to switch to the hierarchy display. Return to the standard *Stratify* interface by choosing *Configure | Show unit list.*

Harris Diagram with Groups

The Harris diagram created by *Stratify* will show groups if the option *Show groups* is activated in the check and layout dialogue.

In the group layout, you may decide to hide the details of a group, i.e. to contract the group to a black box. By contraction the members of this group and their relationships are ignored during layout, and the group box is of the same size as a context box showing the group name only.

Choose *Groups | Select all top level groups* to mark all groups which are not part of other groups.

Contract these groups by selecting *Contract marked groups* from the *Groups* menu.

To undo the contraction procedure, choose *Groups | Restore all details*.

To select a group, you may also choose *Mark for contraction* from the menu which appears after right-clicking the group name in the Harris diagram. Note that for selecting a group for contraction or for changing the colour or border style, you have to position the mouse pointer precisely over the group label, the box itself is not good enough.

Working with a Term File

The term file allows you to store for each text field in the unit entry form a list of terms and their explanations or descriptions. Thus, the term table helps to avoid misspellings and may assist first-time users in choosing a term.

When installing *Stratify*, a sample directory with a sample term file called Sampleterms.db is created. You may create a new term file or link an existing term file to the currently open *Stratify* project.

Choose *Configure | Terms | Create or load term file* to add the link to the sample term file to the project. The standard dialogue for opening files is displayed. Choose Sampleterms.db from the Sample directory.

The term list window will be displayed. For each entry in the term file, the *Target field* and the *Term* must be entered, the *Abbreviation,* the *Description* and the other fields are optional.

By Selecting *New* from the term list window menu, enter two new terms for the (target) field *Unit type*: "skeleton, human" and "skeleton, animal".

Change the entry "skeleton" by clicking on this term and selecting the menu item *Change* (alternative: double-click the term).

Add the *Description*: "Use this term only if you cannot decide if the bones stem from a human or an animal."

Close the term list window by selecting *Exit*.

Note that the term list toolbar button ![icon] has become active. You may reopen the term list window by pressing this button or by choosing *Configure | Terms | Show term list.*

Open the unit entry form for context 018i. In the *Unit type* field press <F4> (or right-click the field and select *Term lookup*). A list of terms that were defined for the unit type appears. Choose "pit, unspecified" from the list by double-clicking the term.

In a similar way enter the *Unit type* "stone" for contexts 019a, 019b, 019c, and 019d. The term "stone" is not yet defined, you may define it "on the fly" by choosing *New* from the term window menu. Enter the *Abbreviation* "st".

In the field *Unit type* of context 019b, type in "st" and move the cursor to another field. The abbreviation "st" will be converted to the full term "stone". Enter the *Unit type* "stone" for contexts 019c and 019d using the term file lookup or the abbreviation method. Save the results in the unit entry forms.

🖌 Thematic Display of the Harris Diagram

As was shown above, the border style and colour of a context box in the Harris diagram can be set in the Harris diagram window by right-clicking a context box. In the unit entry form a *Border style* field with a drop-down list allows you to set the border style as well. With the 🌈 button you may choose the appropriate colour for each context. This procedure is tedious, if the colour selection is based on a certain rule (like: all walls are red, all pit fills are green). In addition, if you want to change the rule (for example: colours are based on phases) you have to rework the whole context data set.

For this reason, *Stratify* allows you to assign colours and border styles to context boxes similar to a thematic map in a geographical information system. Any unit field can be selected for thematic display. One field may control the border style of the boxes, another may determine the box background colour. For example, you may configure a layout where the box background colour depends on the *Period* and the border styles are determined by the entries in the field *Visibility*.

Select *Units | Thematic style* from the main menu. Choose the field *Unit type* from the list of fields. A list of all field entries is shown (including "blank" if at least one entry in the field is blank) along with examples of the style for these entries.

Right-click a box in order to change its style. Change colours and border styles of the entries as you wish.

Save the result and create another Harris diagram.

On selecting *Preferences | Thematic unit style* or the corresponding toobar button 🖌 *Stratify* switches to thematic display. Both the menu option and the toolbar button toggle between thematic and non-thematic display.

The default values for thematic display can be set in the term file. For example, you may assign a grey colour (use the colour selection button 🌈) to the term "stone" in the term list and the border style "clear". Select *Units | Thematic style* from the main menu again with field *Unit type*. The "stone" entry will be depicted as set in the term list.

Note that you can save the legend of the thematic style settings in this dialogue. Choose the format you are intending to use for saving the diagram for the legend as well (see also chapter "Saving and Exporting Layout Results").

Periods and Phases

The so-called <u>multilinear, or floating sequences</u> may lead to a Harris diagram that displays two nearly contemporary contexts on widely different levels, although no stratigraphic relationship was omitted. Periods or phases, groups and contemporary relationships help to restrict the "floating" of the multilinear sequences.

Stratify provides two fields for entering dating information: *Period* and *Phase*. One of the fields may be used to record preliminary dating information, the other may store the post-excavation interpretation which takes the finds analysis into account.

Please enter the following data in the *Period* fields of the contexts:

IV : 001, 002, 003, 004, 005, 006
III: 007, 009, 010, 011, 012, 013, 014
II: 008, 015, 016, 017, 018, 018i, 019a, 019b, 019c, 019d, 020, 021, 022, 023
I: 024, 025, 026, 027

Create a thematic display of the periods. It is possible that context boxes of different periods are on the same level in the diagram.

Select *Diagram | Layout and check* or ✔. Mark the *Check that periods do not overlap* option in the layout and check dialogue and create the Harris diagram.

Stratify will display the boundaries of the periods as horizontal lines across the full width of the Harris diagram.

You may combine group and phase layout. Create another Harris diagram by checking both options *Check that periods do not overlap* and *Show groups.*

For the combined display of groups and periods it is necessary that each group belongs to one period (phase) only. In fact the periods become the top level groups in the group hierarchy.
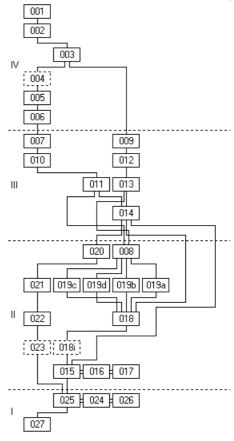

Fig. 4 – Harris diagram with phases

Use *Configure | Show group hierarchy* to switch once again to the hierarchy display. Activate the *include periods* option so that the periods are indicated by a special symbol in the hierarchy (P).

Return to the unit list display.

Create another backup of this project by selecting *File | Save copy as* from the main menu.

As phase or period layout requires that all contexts belong to a phase or period, it may be helpful to first assign all contexts to a "blank" phase and then start at the bottom to create "phase 1", "phase 2" and so on (suggestion by Andrew Wilson, Institute of Archaeology, Oxford). The "blank" phase assignment can be done by using a model unit when creating units with consecutive numbers, or by choosing *Units | Set default* from the main menu.

Saving and Exporting Layout Results

Display a Harris Diagram Created Previously

Creating a large Harris diagram may take some time, and after returning to the main menu, you may want to see it once again without going through all the check and layout procedures again. You may display the previously created Harris diagram by selecting *Diagram | Display Harris diagram* from the main menu or the corresponding toolbar button ⊞.

The Harris diagram layout is stored in specific layout files for each project. Only if these layout files are present the option to display the diagram created previously is enabled.

Please note that this procedure shows the layout as stored in the layout files, any changes in the unit or relationship lists, which took place after the layout, will not affect the layout files. Therefore, a message box will inform you on the creation date of the layout files and indicate whether groups or periods/phases were taken into account when generating the layout. If you confirm that you want to see the layout, the Harris diagram window will appear. With group layout, this option will show the groups with full details, any contractions created previously are ignored. When more than 1000 contexts are in the data set, the layout will be monochrome (black and white) irrespective of the number of colours selected when creating the layout.

💾 Saving the Harris Diagram Image

You may save the Harris diagram as a low resolution raster image file by selecting *File | Save as* from the diagram window menu (or the 💾 toolbar button). The file format is bitmap (*.bmp), which is uncompressed. Increasing the number of colours will increase the picture file size.

The resolution of the bitmap image is low, the picture width and height (pixel numbers) are displayed after choosing *File | Diagram info* from the diagram window menu.

The boxes used for displaying contexts become larger, if you choose a larger font (*Preferences | Font* or the corresponding toolbar button 🅵). By this trick, the resolution is increased somewhat.

Exporting the Harris Diagram Image

Select *File | Export* to save the Harris diagram to another format. *Stratify* is able to export JPEG images, i.e a compressed raster image format where the quality can be set by the user. Various vector formats like HPGL (Hewlett Packard Graphics Language), SVG (Scalable Vector Graphics), DXF (AutoCAD), and MIF (MapInfo Interchange Format) are supported. With the appropriate program to manipulate files of these formats, you are able to print the Harris diagram in high resolution and to change line width or style. For details concerning the export formats and known problems please refer to the *Stratify* help file.

Note that if thematic layout is selected in the Harris diagram window, thematic layout will be exported. In this case it is recommended to export the legend to the same format by pressing the *Save Legend* button in the thematic style assignment window.

Checks

Queries: Filter Menu Option

You may use filtering operations to check and correct your data set.

Find a Field Entry

For example, you may detect during thematic style assignment that a spelling mistake is present for at least one field entry.

Let us simulate this situation by entering the *Unit type* "post hole" (instead of "posthole") for one of the contexts (OK you should have used a term file…).

The list of terms used in field *Unit type* created for thematic display shows that the term "post hole" is used for at least one of the contexts.

To find the context(s) with this field entry, select *Filter | Other unit field* from the main menu.

Choose the field name *Unit type* from the list.

A list of entries in the field *Unit type* is shown. Select the term "post hole".

The unit list is filtered, i.e. only units with *Unit type* field entry "post hole" are shown. After correcting the term, nothing is left in the unit list.

Return to the normal (unfiltered) unit list display by selecting *Filter | None* from the main menu.

If several "post hole" entries have to be corrected the option *Units | Search/Replace* may be more appropriate.

Find all Blank Field Entries

In order to create a phase layout, it is essential that for each context the *Phase* field is filled.

To identify the units with no entry in field *Phase*, select *Filter | Other unit field* from the main menu.

Choose the field name *Phase* from the list.

A list of entries in the field *Phase* is shown including " blank" and " not blank" at the beginning of the list. If the entry " blank" is not shown, the field is filled for all units. Select the entry " blank".

The list of units is then restricted to those with blank field entries.

Note: If you want to fill all blank field entries with a default value, select *Units | Set default* from the main menu.

Combining Filter Conditions

As we have seen before, it is not necessary to assign a phase to a group, as this is done automatically during phase layout. Therefore it seems reasonable to restrict the list further to all units that are contexts.

Select *Filter | Unit class* from the main menu.

Choose "context".

Select the option "All filter conditions must be fulfilled (AND)".

The unit list will now show all units that are contexts and with a blank entry in field *Phase*.

Have a look at the status line at the bottom of the window: The status line indicates the filter conditions: "Filter: Phase is blank and UnitClass = 'context'".

Restore the normal (unfiltered) unit list display by selecting *Filter | None*.

All Members of a Group

The members of a group are not listed in the *Relations* sheet of the unit entry form for this group. So how do we find out which members belong to the group without creating a Harris diagram?

Mark group G020 in the unit list (click in the appropriate row).

Select *Filter | Part of current unit* to get a list of units that are part of G020.

Counting

When your project consists of hundreds of units, you may be interested to know how many units were entered and how many still fulfill a certain error condition (like a blank field entry). Choose *Units | Count* to get these numbers.

Simple Relationship Checks

You may check if you forgot to enter any relationships for some contexts by selecting *Filter | Unrelated*, "context", "No".

Find all contexts which do not have any "earlier than"-relationship, i.e. there is no context that is stratigraphically earlier than the context listed by selecting *Filter | Top contexts*.

Similarly, find all contexts without "later than"-relationship by selecting *Filter | Bottom contexts*.

All Contexts Earlier than a Specified Context

Reset the display of the unit list by choosing *Filter | None* from the main menu. Mark context 018i in the unit list. Select *Filter | Show earlier contexts*. The result depends on whether or not equal and contemporary relations are taken into account. Therefore, this decision is required first. The unit list then displays only those contexts that are earlier than context 018i.

If equal and contemporary relations are taken into account, the resulting unit list contains contexts 015 and 024, whereas these two contexts are missing in the result list which does not take equal and contemporary relationships into account.

Inconsistent or Contradictory Relationships

Harris diagram layout fails if inconsistent or contradictory relationships are present in the project.

Simple Contradictory Relationships

A typical contradictory relationship is that 018 is at the same time earlier and later than 018i.

Try to add the relationship: 018i later than 018.

Stratify tests whether a relationship between the two contexts does already exist. If so, the new relationship is not stored, and an error message is shown.

Therefore, you will not be able to store the relationship 018i is later than 018.

Cycles Resulting from Bad Later Than Relationships

But the relationship 018i is later than 008 is a contradictory relationship which is not detected on entry.

By adding this relationship a cycle is created: 008 > 019a > 018 > 018i > 008

The problem is that *Stratify* is not able to detect which of the relationships in the cycle is not correct. Normally, only by cross-checking the excavation documentation the erroneous relationship(s) can be detected.

The check for cycles is a mandatory part of Harris diagram layout. After adding the relation "018i is later than 008" select *Diagram | Layout and check*.

Note that the *Check for cycles* option is activated by default.

After pressing the OK button, no Harris diagram is created, but an error report is shown instead. The error report lists the contexts that form the cycle.

In this tutorial, we are in the happy situation that we know which of the relationships is wrong, and therefore we erase the relationship between 018i and 008.

A context may be involved in more than one cycle. All <u>relevant cycles</u> are listed in the check and layout report.

What is a relevant cycle? Consider the pretzel in Fig. 5. The pretzel consists of three relevant cycles, each of the cycles encloses exactly one hole of the pretzel.

But other cycles are present as well: Any two of the relevant cycles may be combined to form another cycle, and the outline of the pretzel is a cycle as well, it consists of the three relevant cycles.

This example illustrates that complicated nets of cycles exist and that it is helpful if only the relevant and not all cycles are listed in the error report.

Fig. 5 - pretzel

Cycles Resulting from Bad Contemporary Relationships

In a similar way, incorrect contemporary relationships may cause cycles.

Set contexts 008 and 018i contemporary.

This is an extract from the error report created by *Diagram | Layout and check*:

```
Cycle no. 1:
  Hypothetical:008 (relationships: 4 earlier, 2 later, 1 contemporary)
> Hypothetical:019a (relationships: 1 earlier, 1 later)
> Hypothetical:018 (relationships: 1 earlier, 5 later)
> Hypothetical:018i (relationships: 2 earlier, 1 later, 1 contemporary)
- Hypothetical:008 (relationships: 4 earlier, 2 later, 1 contemporary)
```

The report lists all the relationships involved in the cycle. Any of the relationships may be incorrect, but often the error can be found when checking the contexts with many relationships, therefore the number of relationships for each context is given.

Correct the data by erasing the relationship between 018i and 008.

Other Checks

Many other check options are available in the *Layout and check* dialogue of *Stratify*. One group of checks focuses on the optional coordinates of the contexts, in addition the detection of contradictions between the dates (years) of the contexts and the stratigraphic relationships is supported by several checking procedures. For more details please refer to the help file.

Some Configuration Issues

Use *Configure | Configure fields* to select which fields are displayed in the unit list and in the unit entry form.

First set the *Project composition* to *Single excavation* and confirm the settings by the OK button. Then the excavation columns in the unit and relationship lists will disappear. Moreover, in dialogue forms, any *Excavation* field is readonly and set to the excavation name of the project. For example, try to edit the *Excavation* field in the unit entry form or the form for entering chain-like relationships.

Select *Configure | Configure fields* once again from the main menu.

Stratify will show a table listing all the fields in the unit data base (with the exception of *Excavation*, *Unit name*, and *Unit class*). In the *List view* column an X indicates that the corresponding field is shown in the unit list, whereas an X in the *Form view* column means that the corresponding field is shown in the unit entry form. To change the field configuration,

double-click the appropriate cell in the table. Alternatively, you may type in the character "x" or delete an X by pressing the backspace key.

Change the unit field display configuration according to your wishes and check the results in the unit list and unit entry form.

Terms only

Select *Configure | Configure fields* once again from the main menu.

Activate the *Terms only* option for the field *Unit type* and confirm the configuration dialogue by pressing the OK button.

Change the field *Unit type* for a unit: Type in "animal skeleton".

This term is not defined in the term file, therefore, the cursor will remain in this field when you try to leave the field - until a valid term is entered.

But you may add a new term to the term list whenever appropriate, so that the *Terms only* option is not quite as restrictive as you may think in the first place.

The configuration settings are saved to the project file, and for this reason they are active on reloading the project.

Working with two or more Excavations in one Project

We want to combine two excavations, the hypothetical one just created and GroupTest.syp, a test data set which comes along with each *Stratify* installation.

First let us get acquainted with GroupTest.syp and repeat some of the things we learned before.

Close the hypothetical project (*File | Close project*).

Open the GroupTest project.

Check: Number of units in the project?

Check: The project composition was set to *Single excavation*

Check: No term file is linked to the project.

Check: How many group hierarchy levels are present (without creating a Harris diagram)?

Check: Is the *Phase* field filled for every unit?

Try: *Filter | Contexts without group*

Try: Create a combined group and phase Harris diagram layout.

Combining two Excavations

Now we assume that GroupTest and Hypothetical are two excavations with a common boundary. In this situation, it is sensible to create a combined project. Add the Hypothetical project data to the GroupTest data:

> *File | Add project*   => Create backup: GroupTestBack.syp
> Name of *Stratify* project file for adding: Hypothetical.syp

Check: The project consists of two excavations with different names, therefore the single excavation mode is no longer eligible.

Setting the Default Excavation Name

Open the unit entry form for a new context (*Units / New*).

Note that the field *Excavation* is already filled with the default value: "Testgl"

If you want to enter many more contexts for excavation Hypothetical or a third excavation, you should set the default value to another excavation name.

Choose *Configure / Change excavation*
A list of excavation names that are used in the project is shown, in addition the entry ** New Excavation ** will allow you to enter a new excavation name.

Choose the excavation name "Hypothetical".

Open the unit entry form for a new context (*Units / New*) once again and check the *Excavation* field.

Harris Diagram for two Excavations

Create the Harris diagram of the combined data set (no groups or phases/periods).

Note that it is hardly possible to detect that two completely different data sets are shown side by side. If a context number is used in both excavations, both context boxes will be displayed in the same way.

Select *Preferences / Excavation:name* from the Harris diagram window menu.

Now the excavation name is displayed in each context box before the context name. The context boxes are fairly large.

An alternative is the use of excavation abbreviations. Excavation abbreviations are stored in the term file.

For this reason, we load the term file used before (*Configure / Terms*, Sampleterms.db).

Enter two new terms:

Target field	Term	Abbreviation
Excavation	Hypothetical	H
Excavation	Testgl	T

Display the Harris diagram once again by selecting *Diagram / Display Harris diagram* from the main menu or the toolbar button 🔲.

Select *Preferences / Excavation abbreviation:name* from the Harris diagram window menu. Now the excavation abbreviations are displayed in the context boxes, for example H:001 means context 001 of excavation Hypothetical, T:202 means context 202 of excavation Testgl.

Note: The *Stratify* project now consists of two unrelated context sets. If you want to test whether all the contexts in your data set are connected by stratigraphic relationships, activate the "check for connected components" option in the layout and check dialogue.

🔍 Finding a Context in a Large Harris Diagram

If you want to focus on a context or group in the Harris diagram, use the 🔍 button in the Harris diagram window toolbar or the *Find* menu item. *Stratify* prompts for the unit name and

positions the horizontal and vertical scroll bars of the window so that the unit becomes the center of the window.

If the project consists of two or more excavations, you may enter the excavation name and the unit name, separated by a colon (no blanks), for example "Hypothetical:018". If the unit name is unique or if you want to find the first occurrence of a unit name, then it suffices to enter the unit name only. In case a matching unit name is found, *Stratify* positions the horizontal and vertical scroll bars of the Harris diagram window so that the unit becomes the center of the window. When the context box is located at one of the borders of the Harris diagram then the context box will be displayed in the window but not necessarily in the center.

Additional *Stratify* Features

This tutorial has presented many but by no means all of the *Stratify* features. Some additional important functions are:

- Printing of reports (short and long format, HTML-tables and -forms) and the Harris diagram (*File | Print* or *File | HTML report*).

- Importing and exporting CSV, DBase, and Paradox unit files with (or without) lists of relationships (*File | Import* or *File | Export*).

- Linking photos and drawings to the unit data base (*Configure | Configure link to images*).

- Projection layout: This layout technique takes the spatial positions of the contexts into account. The method is based on the center coordinates of the contexts, which may be calculated by a GIS (*Diagram | Layout and Check | Use coordinates to determine horizontal context sequence*).

- Estimation of absolute dates for the contexts on the basis of given absolute date intervals for part of the contexts (*Units | Estimate center year*).

- Search and replace of field entries in the unit data base, setting default values for a field, erasing all entries from a field (*Units | Search/Replace, Units | Set default, Units | Blank field*).

- Simulation of stratigraphic data sets (*File | Simulate*).

Details concerning these topics and all other *Stratify* features presented in this tutorial can be found in the help file texts or the manual, which consists of the help file texts.