

# Presenting data

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## 1 Examples and glossing with `linguex`

### 1.1 Introduction

- `linguex` is a package that can be used for example numbering, indentations, indexed brackets, and grammaticality judgements. After you have learned how to do examples in L<sup>A</sup>T<sub>E</sub>X using this package, you will never think of using Word again!
- The instructions in this tutorial build on the official documentation, available at: <http://texdoc.net/texmf-dist/doc/latex/linguex/linguex-doc.pdf>.

### 1.2 Example numbering and bracket notations

#### 1.2.1 Example numbering

- Basic commands for introducing examples:
  - `\ex.` → introduces the example environment
  - `\a.` → introduces the first level of embedding
  - `\b.` → continues the numbering
- Caveat: the order in which packages are loaded might cause unexpected crashes and/or dysfunction of some commands. In case this happens, check where `linguex` is in relation to other packages. Sometimes you might need to move it up or down in the preamble until it is happy.
- A simple example with two levels of embedding:

```
\ex. This is an example sentence.  
  \a. This is the first level of embedding (a.k.a. example a.).  
  \b. This is still the first level, but a new sentence (a.k.a. example b.).
```

- (1) This is an example sentence.
  - a. This is the first level of embedding (a.k.a. example a.).
  - b. This is still the first level, but a new sentence (a.k.a. example b.).

- For additional levels of embedding add a new `\a.` command:

```
\ex. This is an example sentence.
  \a. This is the first level of embedding.
  \b. This is still the first level, but a new sentence.
    \a. This is the third level of embedding (a.k.a. example (i)).
    \b. Still the third level (a.k.a. example (ii)).
```

- (2) This is an example sentence.
- a. This is the first level of embedding.
  - b. This is still the first level, but a new sentence.
    - (i) This is the third level of embedding (a.k.a. example (i)).
    - (ii) Still the third level (a.k.a. example (ii)).

- To close the `\ex.` environment, it is necessary to leave an empty row below the example. This closes all levels of embedding.
- To close a particular level of embedding and return to the previous one, use the `\z.` command (an example adapted from the documentation):

```
\ex. {\it Binding:}\
A binds B iff:
  \a. A c-commands B;
    \a. A does not dominate B;
    \b. B does not dominate A, and
    \c. The first branching node that dominates A also dominates B.
  \z.
  \b. A and B are co-indexed.
  \z.
```

- (3) *Binding:*  
A binds B iff:
- a. A c-commands B;
    - (i) A does not dominate B;
    - (ii) B does not dominate A, and
    - (iii) The first branching node that dominates A also dominates B.
  - b. A and B are co-indexed.

### Task 1:

1. Open the file `dgfs-presenting data-practice.tex` and insert your name, email address and university in the title.
2. Find the section “Task 1 – basic examples”.
3. Write an example sentence “I am bored.” in your mother tongue.
4. At the first level of embedding write in your mother tongue “Today is a sunny day.”, as example a.
5. At the same level write “I wish it would snow.”, as example b.
6. At the second level of embedding write “Linguistics is awesome!”, as example (i).
7. At the same level write “I’m a L<sup>A</sup>T<sub>E</sub>Xpro.”, as example (ii).

### 1.2.2 Grammaticality judgements and comments in the line of the example

- Use the usual symbols \*, ??, %, # in front of the example sentence, making sure you leave an empty space after the `\ex.` command. The symbol will be prefixed to the sentence automatically.
- If you want to add a comment after an example sentence (e.g. the language sentence is in, or reference), use the command `\hfill{comment text}` as in the following:

```
\ex. *What do you think who saw? \hfill{(English)}
```

(4) \*What do you think who saw? (English)

### 1.2.3 Bracket notations

- Labelled bracket notations can be added to examples using the `\exi.` environment. It will automatically create subscripts and labels, with a few tricks.
- `\exi.` identifies where words are by looking at space characters and angled brackets “[ ]”. If a word immediately follows a bracket, the word will be subscripted.
- A standard example looks as follows (Note: for special characters, subscripts etc. on words in examples, math mode commands can be used. e.g. To get a ‘ $t_j$ ’, use the command `t$_j$.`):

```
\exi. [CP Who$_i$ do [TP you think [CP that [TP Bill [VP invited t$_i$ to the party?]]]]]
```

(5) [CP Who<sub>i</sub> do [TP you think [CP that [TP Bill [VP invited t<sub>i</sub> to the party?]]]]]

- Additional options available for formatting examples with angled brackets:
  1. additional blanks (6-b);
  2. protecting material from being prefixed by putting it inside a group (6-c);
  3. protecting material from being indexed (6-d)
  4. wrong indexing [+N,-V] and missing indexing after `\hfill` (6-e);
  5. enforcing indexing by empty groups {} (6-f):

```
\exi.
\ a. *?[[NP Fritz ][ snores ]]S
\ b. *?[ [NP Fritz ] [ snores ] ] S
\ c. {*?}[ [NP Fritz ] [ snores ] ]S
\ d. *{[+N,--V] Fritz {NP} [VP snores ]
\ e. [[+N,--V] Fritz ][VP snores ] \hfill [NP Structure]
\ f. [{+N,--V] Fritz ][VP snores ] \hfill{} [NP Structure]
```

(6) a. \*?[[NP Fritz ][ snores ]]S  
 b. \*?[ [NP Fritz ] [ snores ] ] S  
 c. \*?[ [NP Fritz ] [ snores ] ]S  
 d. \*[[+N,-V] Fritz ]NP [VP snores ]  
 e. [[+N,-V] Fritz ][VP snores ] [NP Structure]  
 f. [+N,-V] Fritz ][VP snores ] [NP Structure]

### 1.3 Glosses

- Glosses require the package `cgloss4e`, but it is not necessary to load it separately once `linguex` is loaded.
- For an example with one sentence and no additional levels of embedding, use the command `\ex(i)g..`
- Use the `\` command after the example sentence to place the gloss in a new line. Use the same sign after the line containing the gloss. If necessary, write your translation in the following line. (Do not forget to leave an empty line after the example.)

```
\exig. Das ist ein Satz auf Deutsch.\
this is a sentence in German\
‘This is a sentence in German.’
```

(7) Das ist ein Satz auf Deutsch.  
 this is a sentence in German  
 ‘This is a sentence in German.’

- For examples with multiple sentences, just add a ‘g’ to the command that starts a new example, e.g. `\ag.`, `\bg.`, `\cg..` In this case the environment is a simple `\ex(i)`, without the ‘g’.
- **Labels** to glosses can be added with the usual changes in the text format.
- Additional spaces between words in the glosses can be added using the command `{ }` (as sometimes we need to tell L<sup>A</sup>T<sub>E</sub>X to skip a certain word in the example or not to gloss a labelled bracket as a separate word).

```
\exi.
\ag. Hans mag Maria.\
John.{\sc nom.sg} like.{\sc 3.sg} Mary.{\sc acc.sg}\
‘John likes Mary.’
\bg. *[CP Wen$_i$ [C$’$ liebt$_j$ [IP [NP seine$_i$ Mutter ] [VP t$_i$ t$_j$ ]]]]\
{} who {} loves {} {} his mother\
‘Who loves his mother?’
```

(8) a. Hans mag Maria.  
 John.NOM.SG like.3.SG Mary.ACC.SG  
 ‘John likes Mary.’  
 b.  $*[_{CP} Wen_i [C' liebt_j [IP [NP seine_i Mutter ] [VP t_i t_j ]]]]$   
 who loves his mother  
 ‘Who loves his mother?’

#### Task 2:

1. In the `dgfs-presenting data-practice.tex` file find the section Task 2 - brackets and glossing.
2. Part 1: Create an example out of the given sentence and add bracket notations indicating the CP, TP, vP and any NPs.
3. Part 2: Create an example with two sentences in the practice file and add glosses and translations to them.

## 2 Cross-referencing

### 2.1 Basic commands

- Remember how you used to number all the titles/subtitles/examples/tables/figures etc. manually, and then had to insert cross-references in the same way and it took ages? And you had to repeat the whole process in case you inserted any changes? L<sup>A</sup>T<sub>E</sub>X creates all references automatically and updates them after any changes. All you need to do is add labels to objects and then insert references in the text using two simple commands.
- The basic command for inserting labels on objects is the simple `\label{name}` next to the item you want to label. This command remains in your code.
- The basic command for referring to the labelled item is `\ref{name}`. This string prints out as the number that is assigned to the object.
- As the command for labelling is the same for all objects, it is a common practice to insert additional marking depending on the object you want to label:<sup>1</sup>
  - for (sub(sub))sections → `\label{(sub)sec:section name}`.  
So, if I want to refer to section 3 of this handout, I will first write `\label{sec:tables}` next to the section title, and then in the later text use the command `\ref{sec:tables}`.
  - for chapters → `\label{chap:chapter name}`
  - for figures → `\label{fig:figure name}`
  - for tables → `\label{tab:table name}`
  - for enumerated list item → `\label{lst:list item name}`
- Use the command `\pageref{name}` to print out the number of the page where your object is. E.g. in this handout, glosses are explained on page 4 (`\pageref{subsec:glosses}`).
- For additional information and examples, visit:  
[http://en.wikibooks.org/wiki/LaTeX/Labels\\_and\\_Cross-referencing](http://en.wikibooks.org/wiki/LaTeX/Labels_and_Cross-referencing)

### Task 3, part 1:

1. In the `dgfs-presenting data-practice.tex` file find the table in the section **Task 3 - labelling and cross-referencing**.
2. Part 1: Introduce labels on all previous sections and subsections.
3. Complete the text in the Part 1 of the task by inserting references that refer back to the previous sections.

### 2.2 Cross-referencing with examples

- Use the same command `\label{example name}` right next to the command `\ex(i).`, `\a.`, `\b.` to insert a label on the example.
- Use the command `\ref{example name}` to refer to a particular example.
- E.g. "We discussed examples with labelled brackets in (5)." (`\ref{labelled brackets}`)

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<sup>1</sup>It is not obligatory to use these prefixes, as L<sup>A</sup>T<sub>E</sub>X will recognise them and insert numbers just according to the command, but they make the code much more readable, so they can make your life much easier.

- The following commands help refer to the immediately preceding/following examples:
  - immediately preceding example → `\Last`
  - example before that → `\LLast`
  - example even before that → `\LLLlast`
  - the next example → `\Next`
  - example after that → `\NNext`
- The commands above will only refer to the first level of embedding. If you want to refer to one of the sentences within a given example, an optional argument needs to be inserted next to the command: `\Last[a]`. (e.g. "We showed a combination of glossing and labelled brackets in (8-b)." (`\Last[b]`))
- This does not hold for the `\ref{}` command, as it will show the number+level automatically. (e.g. "We introduced levels of embedding in (2-a). (`\ref{levels}`) )
- Adopted from: <http://texdoc.net/texmf-dist/doc/latex/linguex/linguex-doc.pdf>.

### Task 3, part 2:

1. In the `dgfs-presenting data-practice.tex` file find the section Task 3 - labelling and cross-referencing.
2. Part 2: Introduce labels on all previous examples.
3. Complete the text in the Part 2 of the task by inserting references that refer back to the previous examples.

## 3 Tables

### 3.1 Introduction

In academic writing, tables are a very common tool. Developing table-making skills in L<sup>A</sup>T<sub>E</sub>X can help produce more professional papers, with an explicit, clear and neat presentation of data. Tables can be made with a combination of `table` and `tabular` environments.

- A very simple code for a very simple table would look like this:

```
\begin{center}
\begin{tabular}{c c c }
cell 1 & cell 2 & cell 3 \\
cell 4 & cell 5 & cell 6 \\
cell 7 & cell 8 & cell 9
\end{tabular}
\end{center}
```

- Giving the following output:

cell 1	cell 2	cell 3
cell 4	cell 5	cell 6
cell 7	cell 8	cell 9

- Let us go through it step by step.

## 3.2 Introducing vertical and horizontal lines

### 3.2.1 Vertical lines

- The `tabular` environment is a bit more flexible and it can help typeset tables with optional horizontal and vertical lines. L<sup>A</sup>T<sub>E</sub>X determines the size of the cells automatically.
- The first line of the environment looks as follows: `\begin{tabular}[pos]{table spec}`
- The argument `table spec` defines the alignment in the cells and defines the number of columns (inferred automatically depending on the number of arguments).
- e.g. In the table above, there were three arguments `{ c c c }`, which told L<sup>A</sup>T<sub>E</sub>X to form 3 columns with centred text.
- Symbols that are available to define table columns:
  - `l` → left-justified column
  - `r` → right-justified column
  - `c` → centred column
  - `|` → vertical line
  - `||` → double vertical line
- The optional parameter `[pos]` allows specifying the position of the table with respect to the surrounding text. It is often unnecessary and it only becomes relevant if the table does not form a paragraph on its own. The following letters can be used: `b` – bottom, `c` – center, `t` – top.
- Use `&` to separate columns in the table between cells, and `\\` to start a new row.

#### Task 4:

1. In the `dgfs-presenting data-practice.tex` file find the table in the section `Task 4 & 5 - simple tables`.
2. Write the code for a simple table like the one in the introduction.
3. Add vertical lines between the columns and at table borders.
4. Add double vertical lines between columns.

### 3.2.2 Horizontal lines

- Use the command `\hline` to insert horizontal lines.
- To introduce double horizontal lines, just repeat the command twice: `\hline\hline`

#### Task 5:

1. Add horizontal lines in the table you created in Task 4.
2. Add a double horizontal line between the first and second row.

### 3.2.3 Formatting tables

#### Partial lines

- It is possible to draw partial horizontal lines using the command `\cline{i-j}`, where  $i$  is the number of the column where the line starts, and  $j$  the number of the column where the line ends.
- The following code gives the output below:

```
\begin{tabular}{|c|c|c|}\hline
cell 1 & cell 2 & cell 3 \\ \cline{2-2}
cell 4 & cell 5 & cell 6 \\ \cline{1-2}
cell 7 & cell 8 & cell 9 \\ \cline{2-3}
\end{tabular}
```

cell 1	cell 2	cell 3
cell 4	cell 5	cell 6
cell 7	cell 8	cell 9

- Cells from different columns can be merged using the command `\multicolumn{number of columns}{|c|}{content of the cell}`. This will require loading the package `multicol`.
- The following code gives the output below:

```
\begin{tabular}{|l|l|l|l|l|l|}\hline
\multicolumn{2}{c}{cells 1 and 2} & \multicolumn{3}{c}{cells 3, 4, 5} \\ \hline
cell 6 & cell 7 & cell 8 & cell 9 & cell 10 \\ \hline
cell 10 & cell 11 & cell 12 & cell 13 & cell 14 \\ \hline
cell 15 & \multicolumn{3}{c}{cells 16, 17, 18} & cell 19 \\ \hline
\end{tabular}
```

cells 1 and 2		cells 3, 4, 5		
cell 6	cell 7	cell 8	cell 9	cell 10
cell 10	cell 11	cell 12	cell 13	cell 14
cell 15	cells 16, 17, 18			cell 19

- Similarly, cells from different rows can be merged using the command `\multirow{number of rows}*{content of the cell}`. This will require loading the package `multirow`.
- The following code gives the output below:

```
\begin{tabular}{|l|l|l|l|l|l|}\hline
cell 1 & cell 2 & cell 3 & cell 4 & \multirow{2}{*}{cells 5 and 10} \\ \cline{1-4}
cell 6 & \multirow{3}{*}{cells 7, 11, 16} & cell 8 & cell 9 & \\ \cline{1-1}\cline{3-5}
cell 10 & & cell 12 & cell 13 & cell 14 \\ \cline{1-1}\cline{3-5}
cell 15 & & cell 17 & cell 18 & cell 19 \\ \hline
\end{tabular}
```

cell 1	cell 2	cell 3	cell 4	cells 5 and 10
cell 6	cells 7, 11, 16	cell 8	cell 9	
cell 10		cell 12	cell 13	cell 14
cell 15		cell 17	cell 18	cell 19

**Task 6:**

1. In the `dgfs-presenting data-practice.tex` file find the table in the section Task 6 – formatting tables.
2. Merge cells 3, 4 and 5 using `\multicol`.
3. Merge cells 21, 22, 23 and 24 using the same command.
4. Merge cells 7, 12 and 17 using `\multirow`. (Hint: make sure you use `\cline{i-j}` for horizontal lines.)

**Other formatting options**

- It is possible to specify a font format for a specific column by adding `>\format` before declaring the alignment. e.g. `\begin{tabular}{>\bfseries}l c >\itshape}r }` will give a three-column table with bold left-aligned text in the first column, normal centred text in the second, and italic right-aligned text in the third column. (For this to work the `array` package is necessary.)
- In case that tables contain a lot of text, L<sup>A</sup>T<sub>E</sub>X does not wrap it automatically. In order to control text wrapping, the following commands can be additionally used as arguments of the command `\begin{tabular}`:
  - `p{width}` → paragraph column with text vertically aligned at the top
  - `m{width}` → paragraph column with text vertically aligned in the middle
  - `b{width}` → paragraph column with text vertically aligned at the bottom
- Additionally, the command `\newline` starts a new line in the text in a paragraph column.
- Consider how text wrapping works in the following example (adopted from <http://en.wikibooks.org/wiki/LaTeX/Tables>). Without specifying width for the last column, the following table gives the output below:

```

\begin{center}
\begin{tabular}{|l|l|l|l|}\hline
Day & Min Temp & Max Temp & Summary \\ \hline
Monday & 11C & 22C & A clear day with lots of sunshine.
However, the strong breeze will bring down the temperatures. \\ \hline
Tuesday & 9C & 19C & Cloudy with rain, across many northern regions.
Clear spells across most of Scotland and Northern Ireland,
but rain reaching the far northwest. \\ \hline
Wednesday & 10C & 21C & Rain will still linger for the morning.
Conditions will improve by early afternoon and continue
throughout the evening. \\ \hline
\end{tabular}
\end{center}

```

Day	Min Temp	Max Temp	Summary
Monday	11C	22C	A clear day with lots of sunshine. However, the strong breeze will bring down the temperatures.
Tuesday	9C	19C	Cloudy with rain, across many northern regions. Clear spells across most of Scotland and Northern Ireland, but rain reaching the far northwest.
Wednesday	10C	21C	Rain will still linger for the morning. Conditions will improve by early afternoon and continue throughout the evening.

- Specifying the width for the last column helps break the text into paragraphs and wrap it so that it fits on the page. This is achieved by defining the width of the last column with the command `p{5cm}`.

```

\begin{center}
\begin{tabular}{|l|l|l|p{5cm}|}\hline
Day & Min Temp & Max Temp & Summary \\ \hline
Monday & 11C & 22C & A clear day with lots of sunshine.
However, the strong breeze will bring down the temperatures. \\ \hline
Tuesday & 9C & 19C & Cloudy with rain, across many northern regions.
Clear spells across most of Scotland and Northern Ireland,
but rain reaching the far northwest. \\ \hline
Wednesday & 10C & 21C & Rain will still linger for the morning.
Conditions will improve by early afternoon and continue
throughout the evening. \\ \hline
\end{tabular}
\end{center}

```

Day	Min Temp	Max Temp	Summary
Monday	11C	22C	A clear day with lots of sunshine. However, the strong breeze will bring down the temperatures.
Tuesday	9C	19C	Cloudy with rain, across many northern regions. Clear spells across most of Scotland and Northern Ireland, but rain reaching the far northwest.
Wednesday	10C	21C	Rain will still linger for the morning. Conditions will improve by early afternoon and continue throughout the evening.

- More information and useful tips on how to draw and format tables can be found here: <http://en.wikibooks.org/wiki/LaTeX/Tables>, as well as here: <https://www.sharelatex.com/learn/Tables>.

## 4 Importing graphics

- To be able to import graphics into documents, load the package `graphicx`.
- This package makes it possible to insert graphics in JPG, PNG, PDF or EPS (requires the package `epstopdf`) format and to compile the document with the simple ‘`pdflatex`’.
- The basic command for inserting graphics: `\includegraphics[options]{filename}`.
- It is not necessary (and it is better not) to specify the extension of the file. This way, L<sup>A</sup>T<sub>E</sub>X will decide on the best format and compile accordingly.
- Optional arguments:
  - `width=xx` → specifies the width of the image to `xx`
  - `height=xx` → specifies the height of the image to `xx` (specifying only one of those will scale the image and maintain the ratio)
  - `keepaspectratio=true/false` → if true, it will scale the image according to both width and height

- `scale=xx` → scales the image by a scale factor (e.g. 0.5 for half size or 2 for double)
- `angle=xx` → specifies the angle by which you want to rotate the image
- `trim=l b r t` → trims the image by ‘l’ to ‘b’– bottom, ‘r’– right or ‘t’ – top
- `clip=true` → must be set like this for the ‘trim’ option to work
- `page=x` → if an image file is a PDF file, you may specify which page from the PDF file to use
- `resolution=xx` → specifies the resolution

- In order to insert more options, just separate them with a comma.

## Illustration

- To insert an image without any adjustments: `\includegraphics{llama}`<sup>2</sup>
- Since the image is too big, it needs to be adjusted first: `\includegraphics[width=3cm]{llama}`



- The width of the image can be set with respect to to the local environment:
  - `\includegraphics[width=\linewidth]{llama}` adjusts the image to the line width,
  - `\includegraphics[width=\textwidth]{llama}` adjusts the image to the text width,
  - `\includegraphics[height=\textheight]{llama}` adjusts the image to the text height.
- To scale the image down and rotate it, use the options like the following:
  - `\includegraphics[scale=0.2, angle=45]{llama}`



- In order to determine the position of the image relative to the surrounding text, it is necessary to treat it as a figure, which allows for additional formatting (see: [http://en.wikibooks.org/wiki/LaTeX/Floats,\\_Figures\\_and\\_Captions](http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions)).
- Most of the information in this section is adopted from [http://en.wikibooks.org/wiki/LaTeX/Importing\\_Graphics](http://en.wikibooks.org/wiki/LaTeX/Importing_Graphics), where you can find additional information and useful tips and examples.

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<sup>2</sup>Image taken from <http://lingllama.tumblr.com/page/12>