

Commands and Environments*

Boris Veytsman

February 2009

Simple Commands

Complex Commands

Declarations

Environments

New Commands

Fragile Commands



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1. Simple Commands

Two kinds of commands in L^AT_EX:

1. \ and *one* symbol. Most accents: \^, \' , \‘, \" are like this.
2. \ and a sequence of letters: \TeX, \LaTeX, \today. Commands *cannot* include numbers or symbols!

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2. `\` and a sequence of letters: `\TeX`, `\LaTeX`, `\today`. Commands *cannot* include numbers or symbols!

How do we know that a command of the second type ends? Is `\LaTeX` the command `\L`, and the word `aTeX`? Or the command `\La` and the word `TeX`?

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Solution: a command continues until a non-letter symbol! `\LaTeX` is a command (it gives L^AT_EX), `\LaTeXe` is *another command* (it gives L^AT_EX 2_ε).

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Whitespace problem. A space ends a command and is *not* typeset. But in T_EX many spaces is the same as one space!

Exercise 1. What does this line typeset?

```
\TeX live is a popular distribution.
```



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Whitespace problem. A space ends a command and is *not* typeset. But in T_EX many spaces is the same as one space!

Exercise 1. What does this line typeset?

```
\TeX live is a popular distribution.
```

Answer: all spaces will be eaten!

T_EXlive is a popular distribution.



We need a non-letter to end a command. A popular choice—an empty group¹
`{}`:

```
\TeX{} is very popular among mathematicians.
```

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¹More about groups later

We need a non-letter to end a command. A popular choice—an empty group¹
{}

```
\TeX{} is very popular among mathematicians.
```

Exercise 2. Typeset the following sentence:

T_EXperts are the people who know T_EX well. If you cannot hire a
T_EXpert, sometimes a T_EXnician will do.

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Exercise 3. Describe what will be typeset in the following examples:

1. `\LaTeX3`
2. `\LaTeX 3`

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Exercise 3. Describe what will be typeset in the following examples:

1. `\LaTeX3`

2. `\LaTeX 3`

Some other useful commands: `\today` gives February 17, 2009, `\ldots` gives
..., etc.

¹More about groups later

2. Complex Commands

2.1. One Argument

Example: the command

```
\textbf{This text is bold}
```

It gives:

This text is bold

Here `\textbf` is a command, and “This text is bold” is its argument. `{}` group the argument together.

There are other font-changing commands: `\textit{This text is in italics}` *This text is in italics*, etc. (see the documentation² for the full list).

An interesting command `\emph{...}` (emphasis) makes the argument *italics inside upright text*, or upright *inside italics*.

²Tobias Oetiker et al., The Not So Short Introduction to L^AT_EX 2_ε, Or L^AT_EX 2_ε in 141 Minutes, May 2008, <http://ctan.tug.org/tex-archive/info/lshort>.



Exercise 4. Typeset the following file:

fonts.tex

```
\documentclass{article}

\begin{document}

\textbf{I am bold.}
\textsc{I am in small caps.}
\emph{I am emphasized \emph{and} emphasized.}
\textsf{I am sans serif.}
\textit{I am in italics.}
\textnormal{I am normal (font).}
\textsl{I am slanted.}
\texttt{I am in typewriter font.}

\end{document}
```

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Another example: footnote.

```
Sometimes we want to make footnotes.  Some footnotes are rather  
silly\footnote{Just do not make them too silly.}.
```

gives (note the numbering!)

Sometimes we want to make footnotes. Some footnotes are rather
silly³.

³Just do not make them too silly.



Another example: footnote.

```
Sometimes we want to make footnotes.  Some footnotes are rather  
silly\footnote{Just do not make them too silly.}.
```

gives (note the numbering!)

Sometimes we want to make footnotes. Some footnotes are rather
silly³.

Yet another example: sectioning.

```
\section{Introduction}
```

This makes a section: typesets section heading, adds a number, makes an
entry in the table of contents.

³Just do not make them too silly.



2.2. The Meaning of Grouping

The braces {} delimit the argument. But they *do not make the argument!*

Example: what happens if we forget braces?

```
\textbf This text is bold
```



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```
\textbf This text is bold
```

The answer is surprising:

This text is bold

Without braces the argument of `\textbf` is the letter “T”!

Some T_EXperts omit braces with one-letter argument. Do not do this.



2.2. The Meaning of Grouping

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\textbf This text is bold
```

The answer is surprising:

This text is bold

Without braces the argument of `\textbf` is the letter “T”!

Some T_EXperts omit braces with one-letter argument. Do not do this.

Exercise 5. Suppose we omitted the opening brace:

```
\textbf This long text  
should be  
bold}
```

What will happen? At which line will L^AT_EX find an error?



Almost anybody omits braces with *accents*: we type `t\^ete-\'a-t\^ete` instead of `t\^{e}te-\'{a}-t\^{e}te`

But in the case of multiple accents this would not work. The name of the author of pdfT_EX is Hàn Thệ Thành. How do we typeset Thệ?

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But in the case of multiple accents this would not work. The name of the author of pdfT_EX is Hàn Th_ế Th_ành. How do we typeset Th_ế?

Exercise 6. What's wrong with `Th\'\^e`? Try to typeset this and check the error log. Explain the error.

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Exercise 6. What's wrong with `Th\`{\^e}`? Try to typeset this and check the error log. Explain the error.

Exercise 7. What is the right way to typeset Th_ế?

Answer⁴: `Th\`{\^e}` or `Th\`{\^{e}}`



⁴You need to use package `fontenc` for this to work.

2.3. Several Arguments

Some commands have several arguments.

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2.3. Several Arguments

Some commands have several arguments.

Example: `\setlength`. The paragraph indentation is kept in the variable `\parindent`, and the distance between the paragraphs is in the variable `\parskip`. `\setlength` is used to change these variables. It has two arguments: what to change, and how to change.

Book design: paragraphs are separated by indentations:

```

\setlength{\parindent}{0.2in}
\setlength{\parskip}{0in}

```



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Exercise 8. Write commands for letter design: no paragraph indentation, 0.2 inches between paragraph.



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Another example: I can write “See **TUG Site**”, and it becomes clickable. Here is how⁵:

```
See \href{http://www.tug.org}{TUG Site}
```

⁵You need package `hyperref` for this to work



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Exercise 8. Write commands for letter design: no paragraph indentation, 0.2 inches between paragraph.

Another example: I can write “See **TUG Site**”, and it becomes clickable. Here is how⁵:

```
See \href{http://www.tug.org}{TUG Site}
```

Exercise 9. How many arguments has the command `\href`? What are their meanings?

⁵You need package `hyperref` for this to work



2.4. Optional Arguments

The command `\section{Title}` creates a section with the given Title. But what is the title is too long?

```
\section{Further Adventures of Dick, Containing Truthful Account of  
His Meetings With Many Illustrious People, as Found in His Diary}
```

It would be annoying in the table of contents!



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2.4. Optional Arguments

The command `\section{Title}` creates a section with the given Title. But what if the title is too long?

```
\section{Further Adventures of Dick, Containing Truthful Account of
        His Meetings With Many Illustrious People, as Found in His Diary}
```

It would be annoying in the table of contents!

It turns out that `\section` has *another argument*, which is optional. Optional arguments in \LaTeX :

1. Precede the obligatory arguments.
2. Denoted by square brackets [...]



2.4. Optional Arguments

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```

It would be annoying in the table of contents!

It turns out that `\section` has *another argument*, which is optional. Optional arguments in L^AT_EX:

1. Precede the obligatory arguments.
2. Denoted by square brackets [...]

```
\section[Further Adventures of Dick]{Further Adventures of Dick,
        Containing Truthful Account of His Meetings With Many Illustrious
        People, as Found in His Diary}
```

Optional argument, if present, sets the entry in the table of contents



Another example of a command with optional argument: `\l`. Normally it makes a line break, but we can set the distance between the lines:

```
This is the first line\l[1in]  
This is the second line
```

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```
This is the first line\l[1in]  
This is the second line
```

This is the first line

This is the second line



2.5. Starred Commands

Sometimes we want to have two related commands. Example: we want some sections to be unnumbered (*Acknowledgements*). Usually a *starred version* exists:

```
\section{Introduction}  
...  
\section*{Index}
```

Another starred command: `\``*`. This means “break line, but do not break page” (useful for verse).



3. Declarations

Declarations are special class of commands. They change something *to the end of current group*.

Example: `\Large`: everything from now on will be typeset in large text. Note the difference between command with argument and declaration:

```
{\Large This text is large,} and this is not.
```

```
\textbf{This text is bold.} and this is not.
```

This text is large, and this is not.

This text is bold. and this is not.



3. Declarations

Declarations are special class of commands. They change something *to the end of current group*.

Example: `\Large`: everything from now on will be typeset in large text. Note the difference between command with argument and declaration:

```
{\Large This text is large,} and this is not.  
  
\textbf{This text is bold.} and this is not.
```

This text is large, and this is not.

This text is bold. and this is not.

L^AT_EX has the following size declarations:

tiny, footnotesize, small, normalsize, large, Large, huge, Huge.



4. Environments

Environments start from `\begin{name}` and end with `\end{name}`.

Examples: `center` environment:

```
\begin{center}
  This text is centered.
\end{center}
```

gives

This text is centered.

There are similar `flushleft` and `flushright` environments.



There are several important *list-making environments*:

An itemized list:

```
\begin{itemize}  
\item First item  
\item Second item  
\item Third item  
\end{itemize}
```

gives

- First item
- Second item
- Third item



An enumerated list:

```
\begin{enumerate}  
\item Something  
\item Something other  
\item Something yet other.  
\end{enumerate}
```

gives

1. Something
2. Something other
3. Something yet other.



A description list:

```
\begin{description}  
\item[ACS:] American Chemical Society  
\item[AMS:] American Mathematical Society  
\item[APS:] American Physical Society  
\end{description}
```

note the optional argument of the `\item` command.

This gives

ACS: American Chemical Society

AMS: American Mathematical Society

APS: American Physical Society



Exercise 10. Find the error in the following file:

item.tex

```
\documentclass{article}

\begin{document}

This \item is very important.

\end{document}
```

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5. Making New Commands & Environments

Sometimes you may need new commands. It is very easy in L^AT_EX.

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5. Making New Commands & Environments

Sometimes you may need new commands. It is very easy in L^AT_EX.

Simple command:

```
\newcommand{\BV}{Boris Veytsman}  
This text was written by \BV.
```

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5. Making New Commands & Environments

Sometimes you may need new commands. It is very easy in L^AT_EX.

Simple command:

```
\newcommand{\BV}{Boris Veytsman}  
This text was written by \BV.
```

This text was written by Boris Veytsman.



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5. Making New Commands & Environments

Sometimes you may need new commands. It is very easy in L^AT_EX.

Simple command:

```
\newcommand{\BV}{Boris Veytsman}  
This text was written by \BV.
```

This text was written by Boris Veytsman.

Command with argument:

```
\newcommand{\makebig}[1]{\textbf{\Large #1}}  
We learned \makebig{a lot!}
```

Note #1—this means argument!



5. Making New Commands & Environments

Sometimes you may need new commands. It is very easy in L^AT_EX.

Simple command:

```
\newcommand{\BV}{Boris Veytsman}  
This text was written by \BV.
```

This text was written by Boris Veytsman.

Command with argument:

```
\newcommand{\makebig}[1]{\textbf{\Large #1}}  
We learned \makebig{a lot!}
```

Note #1—this means argument!

We learned **a lot!**



Some people use the “old fashioned T_EX way” to create new commands:

```
\def\makebig#1{\textbf{\Large #1}}
```

If you do this, you probably know what you are doing!

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You can define new environments as well:

```
\newenvironment{largecentering}{\begin{center}\large}{\end{center}}  
\begin{largecentering}  
  This is large!  
\end{largecentering}
```

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You can define new environments as well:

```
\newenvironment{largecentering}{\begin{center}\large}{\end{center}}  
\begin{largecentering}  
  This is large!  
\end{largecentering}
```

This gives:

This is large!



Advantages and disadvantages of defining new commands:

1. Easier for authors (+)
2. More difficult to debug (-)
3. Sometimes new commands conflict with the house styles (-)

Different publishers have different policies.

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6. Fragile Commands

L^AT_EX writes and reads many files. For example, when typesetting `\section` it writes section title to the table of contents. Some commands are *fragile* and can break:

Wrong

```
\section{Introduction}\footnote{Written with my friend A.U.~Thor}}
```

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6. Fragile Commands

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Wrong

```
\section{Introduction}\footnote{Written with my friend A.U.~Thor}}
```

This works:

```
\section{Introduction}\protect\footnote{Written with my friend A.U.~Thor}}
```

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Wrong

```
\section{Introduction}\footnote{Written with my friend A.U.~Thor}}
```

This works:

```
\section{Introduction}\protect\footnote{Written with my friend A.U.~Thor}}
```

or this:

```
\section[Introduction]{Introduction\footnote{Written with my friend  
A.U.~Thor}}
```



References

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