Natural Sciences Citations and References (Author–Year and Numerical Schemes)

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This paper describes package natbib
version 8.31b from 2010/09/13.

Abstract

The natbib package is a reimplementation of the LaTeX \cite command, to work with both author–year and numerical citations. It is compatible with the standard bibliographic style files, such as plain.bst, as well as with those for harvard, apalike, chicago, astron, authordate, and of course natbib.

In contrast to the packages listed above, the natbib package supports not only the various author–year bibliography styles, but also those for standard numerical citations. In fact, it can also produce numerical citations even with an author–year bibliographic style, something that permits easy switching between the two citation modes. To this end, replacements for the standard LaTeX .bst files are also provided.

It is possible to define the citation *style* (type of brackets and punctuation between citations) and even to associate it with the name of the bibliographic style so that it is automatically activated. Citation styles can be defined for local .bst files by means of a configuration file natbib.cfg.

It is compatible with the packages: babel, index, citeref, showkeys, chapterbib, hyperref, koma and with the classes amsbook and amsart. It can also emulate the sorting and compressing functions of the cite package as well as the multiple citation (and merging) functions of Thorsten Ohl's mcite package. (The natbib package, however, is not compatible with either cite or mcite themselves.)

Note that the citeref package (for adding citation page numbers in the bibliography) must be loaded after natbib. (The hyperref package with the option pagebackref also provides this feature, but with hyperlinks.)

The code for merged numerical bibliography entries, emulating the mcite package, has been commissioned by the American Physical Society and provided by Arthur Ogawa

`\citet{jon90}`	)	Jones et al. (1990)
`\citet[chap.~2]{jon90}`	)	Jones et al. (1990, chap. 2)
`\citep{jon90}`	)	(Jones et al., 1990)
`\citep[chap.~2]{jon90}`	)	(Jones et al., 1990, chap. 2)
`\citep[see][]{jon90}`	)	(see Jones et al., 1990)
`\citep[see][chap.~2]{jon90}`	)	(see Jones et al., 1990, chap. 2)
`\citet*{jon90}`	)	Jones, Baker, and Williams (1990)
`\citep*{jon90}`	)	(Jones, Baker, and Williams, 1990)

The starred versions can only list the full authors if the `.bst` file supports this feature; otherwise, the abbreviated list is printed.

In standard LaTeX, the `\cite` command can only take a single optional text for a note after the citation; here, a single optional text is a post-note, while two are the pre- and post-notes. To have only a pre-note, it is necessary to provide an empty post-note text, as shown above.

More complex mixtures of text and citations can be generated with the all-purpose `\citetext` command in Section 2.4.

Multiple citations may be made by including more than one citation key in the `\cite` command argument. If adjacent citations have the same author designation but different years, then the author names are not reprinted.

`\citet{jon90,jam91}`	)	Jones et al. (1990); James et al. (1991)
`\citep{jon90,jam91}`	)	(Jones et al., 1990; James et al. 1991)
`\citep{jon90,jon91}`	)	(Jones et al., 1990, 1991)
`\citep{jon90a,jon90b}`	)	(Jones et al., 1990a,b)

These examples are for author{year citation mode. In numerical mode, the results are different.

`\citet{jon90}`	)	Jones et al. [21]
`\citet[chap.~2]{jon90}`	)	Jones et al. [21, chap. 2]
`\citep{jon90}`	)	[21]
`\citep[chap.~2]{jon90}`	)	[21, chap. 2]
`\citep[see][]{jon90}`	)	[see 21]
`\citep[see][chap.~2]{jon90}`	)	[see 21, chap. 2]
`\citep{jon90a,jon90b}`	)	[21, 32]

The authors can only be listed if the `.bst` file supports author{year citations. The standard `.bst` files, such as `plain.bst` are numerical only and transfer no author{year information to LaTeX. In this case, `\citet` prints "**(author?)** [21]."

`\cite` In the original versions of `natbib`, the traditional `\cite` command was used for both textual and parenthetical citations. The presence of an empty optional text in square brackets signalled parenthetical. This syntax has been retained for compatibility, but is no longer encouraged.

This means that \cite (without notes) is the same as \citet in author{ year mode, whereas in numerical mode, it is the same as \citep. The starred version, as well as the one or two optional notes, may also be used.

It is possible to have multiple citations sorted into the same sequence as they appear in the list of references, regardless of their order as arguments to the \cite commands. The option sort is required for this feature. See Section 2.16.

Some publishers require that the first citation of any given reference be given with the full author list, but that all subsequent ones with the abbreviated list. Include the option longnamesfirst to enable this for natbib. See Section 2.18.

2.4 Extended Citation Commands

\citealt
\citealp
\citetext
\citenum

As an alternative form of citation, \citealt is the same as \citet but *without parentheses*. Similarly, \citealp is \citep without parentheses.

The \citenum command prints the citation number, without parentheses, even in author{year mode, and without raising it in superscript mode. This is intended to be able to refer to citation numbers without superscripting them.

Multiple references, notes, and the starred variants also exist for these, except for \citenum.

\citealt{jon90}	)	Jones et al. 1990
\citealt*{jon90}	)	Jones, Baker, and Williams 1990
\citealp{jon90}	)	Jones et al., 1990
\citealp*{jon90}	)	Jones, Baker, and Williams, 1990
\citealp{jon90,jam91}	)	Jones et al., 1990; James et al., 1991
\citealp[pg.~32]{jon90}	)	Jones et al., 1990, pg. 32
\citenum{jon90}	)	11
\citetext{priv.\ comm.}	)	(priv. comm.)

The \citetext command allows arbitrary text to be placed in the current citation parentheses. This may be used in combination with \citealp. For example,

```
\citetext{see \citealp{jon90}, or even better \citealp{jam91}}
```

to produce (see Jones et al., 1990, or even better James et al., 1991).

\citeauthor
\citeyear
\citeyearpar
\citefullauthor

In author{year schemes, it is sometimes desirable to be able to refer to the authors without the year, or vice versa. This is provided with the extra commands

\citeauthor{jon90}	)	Jones et al.
\citeauthor*{jon90}	)	Jones, Baker, and Williams
\citeyear{jon90}	)	1990
\citeyearpar{jon90}	)	(1990)

There also exists a command \citefullauthor which is equivalent to \citeauthor*.

If the full author information is missing, then \citeauthor* is the same as \citeauthor, printing only the abbreviated list. This also applies to the starred versions of \citet and \citep.

If the author or year information is missing (as is the case with the standard LaTeX .bst files), these commands issue a warning.

Note: these commands may also be used with numerical citations, provided an author{year .bst file is being employed.

Note: all \cite.. commands have the same syntax, allowing multiple citations and up to two notes (there are, however, no starred \citeyear or \citenum variants). It does not really make much sense to add notes to \citeyear and \citeauthor, especially with multiple citations; however, this can be done, there will be no error message, but the results are sometimes strange. For example, in numerical mode, the notes are fully ignored, while in author{year mode, only the post-note is accepted. Multiple citations in \citet are also not recommended (nor are they in my opinion meaningful), but if they are used with notes, the pre-note will appear before each year, and the post-note only after the last year. These are admittedly bugs, but the effort to remove them is not justified by the questionable usefulness of these features.

In summary, notes are only intended for \citep but they may also be used with \citet in author{year mode, with single citations. In any other situation, the results are unpredictable.

\Citet
\Citep
\Citealt
\Citealp
\Citeauthor

2.5 Forcing Upper Cased Name

If the first author's name contains a von part, such as \della Robbia", then \citet{dRob98} produces \della Robbia (1998)", even at the beginning of a sentence. One can force the first letter to be in upper case with the command \Citet instead. Other upper case commands also exist.

when	\citet{dRob98}	)	della Robbia (1998)
then	\Citet{dRob98}	)	Della Robbia (1998)
	\Citep{dRob98}	)	(Della Robbia, 1998)
	\Citealt{dRob98}	)	Della Robbia 1998
	\Citealp{dRob98}	)	Della Robbia, 1998
	\Citeauthor{dRob98}	)	Della Robbia

These commands also exist in starred versions for full author names.

Note: the coding for the upper casing commands is tricky and likely buggy. It operates on the names that are stored in the \bibitem entry, and works even if old style font commands are used; however, LaTeX 2" commands will

cause it to crash. Thus

```
\bibitem[{\it della Robbia}(1998)]{dRob98}      is okay, but
\bibitem[\textit{della Robbia}(1998)]{dRob98}   crashes.
```

2.6 Citation Aliasing

\defcitealias
\citetalias
\citepalias

Sometimes one wants to refer to a reference with a special designation, rather than by the authors, i.e. as Paper I, Paper II. Such aliases can be de ned and used, textual and/or parenthetical with:

```
\defcitealias{jon90}{Paper~I}
\citetalias{jon90}              )   Paper I
\citepalias{jon90}              )   (Paper I)
```

These citation commands function much like \citet and \citep: they may take multiple keys in the argument, may contain notes, and are marked as hyperlinks.

A warning is issued if the alias is used before it is de ned, or if an alias is rede ned for a given citation. No warning is issued if an alias is de ned for a citation key that does not exist; the warning comes when it is used!

See Section 2.7 for an alternative means of citing with a code name.

2.7 Authorless and Yearless References

What does one do about references that do not have authors? This has long bothered me but I do have a suggestion. Standard Bib TEX styles make use of a KEY eld in the entries to be used for alphabetizing when the authors or editors are missing. The author{year styles go even further and insert the KEY eld in place of the authors. One can imagine giving a code designation for the work at this point. For example,

```
@MANUAL{handbk98,
  title = {Assembling Computers},
  year = 1998,
  organization = {MacroHard Inc.},
  key = "MH-MAN"
}
```

With plain, the key text MH-MAN is used only to order the reference, but with plainnat and other author{year styles, it is used in place of the authors. One can then refer to it as \citeauthor{handbk98} to get MH-MAN or as \citetext{\citeauthor{handbk98}} for (MH-MAN), a parenthetical citation.

This can be greatly simpli ed if the bibliography style leaves the date blank in the \bibitem entry, as

```
\bibitem[MH-MAN()]{handbk98}
```

for then natbib suppresses the date, preceding punctuation, and the braces for \citet. This means that \citet and \citep behave automatically like the two examples above. The date still may appear in the text of the reference.

The natbib bibliography styles have been modified accordingly to omit the date from the \bibitem entry when missing authors and/or editors are replaced by key text.

Similarly, if the year is missing, it will be left blank in the \bibitem entry; thus citing such a work will only produce the authors' names.

Note: there are many other possibilities with this feature. One can even produce citations like those of the alpha bibliography style, by placing the citation code in place of the authors in the \bibitem entry and leaving the year blank. A second code (or maybe even the authors themselves) could be placed where the full author list normally appears, to be printed with the starred version of the \cite commands. For example,

```
\bibitem[MH-MAN()MacroHard Inc.]{handbk98}
```

2.8 Extra Features in the plainnat Family

The special .bst files for natbib mentioned in Section 2.1 have a number of extra fields compared to the original files:

- ISBN for the ISBN number in books,
- ISSN for the ISSN number in periodicals,
- URL for the Internet address of online documents,
- DOI the *Digital Object Identifier* now being used by many journals as a more robust alternative to URL,
- EID *electronic ID*, a substitute for page numbers for online journals that also appear in print; also known as the *sequence number* within the paper volume.

Both the DOI and URL tend to be very long, causing ugly line breaks or sticking out into the margin. This can be avoided by loading the url package by Donald Arseneau, which allows text to be broken at punctuation marks without a hyphen. This package is automatically detected by natbib and appropriate commands redefined. URLs are printed in typewriter font, DOI in roman. Without the url package, these numbers are never broken.

As pointed out in Section 2.7, the KEY field is treated differently by plainnat than in plain. Whereas the latter uses this field only to alphabetize entries without authors, plainnat actually inserts it in place of the author, both in the reference text and in the citation label (\bibitem entries). Furthermore, the year is left empty in \bibitem so that \citep prints only the \author" text, which is now the KEY. This should be some code designation for the work.

2.9 Selecting Citation Punctuation

\setcitestyle The above examples have been printed with the default citation style. It is possible to change this, as well as to select numerical or author{year mode, by means of the \setcitestyle command, which takes as argument a comma-separated list of keywords. (This command is new to version 8.)

Citation mode: authoryear or numbers or super (corresponds to fourth argument of \bibpunct).

Braces: round or square or open={*char*},close={*char*} (corresponds to rst and second arguments of \bibpunct).

Between citations: semicolon or comma or citesep={*char*} (corresponds to third argument of \bibpunct).

Between author and year: aysep={*char*} (corresponds to fth argument of \bibpunct).

Between years with common author: yysep={*char*} (corresponds to sixth argument of \bibpunct).

Text before post-note: notesep={*text*} (corresponds to optional argument of \bibpunct).

Defaults are authoryear, round, comma, aysep={;}, yysep={,}, notesep={, }

Example 1, \setcitestyle{square,aysep={},yysep={;}} changes the author{year output of

```
\citep{jon90,jon91,jam92}
```

into [Jones et al. 1990; 1991, James et al. 1992].

Example 2, \setcitestyle{notesep={; },round,aysep={},yysep={;}} changes the output of

```
\citep[and references therein]{jon90}
```

into (Jones et al. 1990; and references therein).

Note:

parameters not speci ed remain unchanged;

the order of the keywords is unimportant;

the punctuation between author and year applies only to author{year citations, not numerical;

the yysep punctuation comes between years when multiple citations have the same, non-repeated authors; a space is always inserted as well; if the years too are same, the citation is printed as '2007a,b', without a space; to include a space, add it with yysep={,~};

for numerical citations with common authors, e.g, `\citet{jon90,jon91}` produces 'Jones et al. [21, 22]' with the punctuation between the numbers; a space is automatically included for numbers, but not for superscripts.

a single character does not really need to be in `{ }`, other than a comma; `yysep=;` is acceptable;

`\bibpunct` The older command for setting the citation style is `\bibpunct`, which takes one optional and six required arguments:

1. the opening bracket symbol, default = (
2. the closing bracket symbol, default =)
3. the punctuation between multiple citations, default = ;
4. the letter 'n' for numerical style, or 's' for numerical superscript style, any other letter for author{year, default = author{year;
5. the punctuation that comes between the author names and the year
6. the punctuation that comes between years or numbers when common author lists are suppressed (default = ,);

The optional argument is the character preceding a post-note, default is a comma plus space. In rede ning this character, one must include a space if one is wanted.

The above `\setcitestyle` examples can be achieved with

```
\bibpunct{[}{]}{,}{a}{}{;} and
\bibpunct[,~]{(}{)}{,}{a}{}{;}.
```

2.10 Prede ning a citation style

`\bibstyle@xxx`
`\citestyle` If a particular set of citation punctuations is commonly used, it is possible to store it in the local `natbib.cfg` and to recall it with `\citestyle{`*name*`}`. The de nition is done by creating a command `\bibstyle@`*name*, which sets the desired citation style.

For example, the American Geophysical Union (AGU) demands in its publications that citations be made with square brackets and separated by semi-colons. There is an `agu.bst` le to accomplish most of the formatting, but such punctuations are not included in it. Instead, `natbib` has the de nition

```
\newcommand{\bibstyle@agu}{\bibpunct{[}{]}{;}{a}{,}{,~}}
```

which allows this set to be selected with the command

```
\citestyle{agu}
```

There is an additional feature to such predefined styles: `natbib` attempts to execute `\citestyle` at the beginning of the document with the name of the bibliography style, as given by the `\bibliographystyle` command (and stored in the `.aux` file). This means that a citation style can be directly associated with a `.bst` file. Such implicit styles are immediately overwritten by any explicit style specifications, such as package options, or by `\setcitestyle`, `\bibpunct`, or `\citestyle` commands.

Predefined citation styles are contained within the `natbib` code for the following bibliography styles:

`plain` etc. (the 4 base styles): square braces, numerical, commas

`plainnat` etc.: square braces, author{year, commas

`agu` (American Geophysical Union): square, author{year, semi-colon

`egu` (European Geosciences Union): round, author{year, semi-colon

`agms, dcu, kluwer` (Harvard set): round, author{year

`cospar` (Committe on Space Research): slashes, numerical, comma

`nature` (Journal Nature): superscripts

There are others but they are mainly for my personal convenience. The above represent most of the major variations and can be used as required. The automatic association with other bibliography styles can only be achieved by putting the definitions into the local `natbib.cfg`.

Note that the predefinitions for `plain` and `plainnat` specify square braces, thus changing the normal `natbib` default of round parentheses.

The style defining commands may contain more than just `\bibpunct` or `\setcitestyle`. Some numerical citation scheme require even more changes. For example, Nature not only uses superscripted numbers for citations, it also prints the numbers in the list of references without the normal square brackets. To accommodate this, `natbib` contains the style definition

```
\newcommand{\bibstyle@nature}%
    {\bibpunct{}{}{,}{s}{}{\textsuperscript{,}}%
     \renewcommand\bibnumfmt[1]{##1.}}
```

The redefined `\bibnumfmt` command specifies how the reference numbers are to be formatted in the list of references itself.

2.11 Priority of Style Commands

The citation style (punctuation and mode) can be selected by means of the `\setcitestyle`, `\bibpunct`, `\citestyle` commands or via `\bibliographystyle{`*bst*`}` with a prede ned `\bibstyle@`*bst*. They can also be selected by package options (Section 5). What happens if there are several con icting selections?

The lowest priority is assigned to the `\bibliographystyle` command, since this is implicit and not transparent to the user. The package options have the next priority. Finally, any selection by `\setcitestyle`, `\bibpunct` and/or `\citestyle` overrides those of the other methods.

2.12 Other Formatting Options

`\bibsection` The list of references normally appears as a `\section*` or `\chapter*`, depending on the main class. If one wants to redesign one's own heading, say as a numbered section with `\section`, then `\bibsection` may be rede ned by the user accordingly.

`\bibpreamble` A preamble appearing after the `\bibsection` heading may be inserted before the actual list of references by rede ning `\bibpreamble`. This will appear in the normal text font unless it contains font declarations. The `\bibfont` applies to the list of references, not to this preamble.

`\bibfont` The list of references is normally printed in the same font size and style as the main body. However, it is possible to rede ne `\bibfont` to be font commands that are in e ect within the `thebibliography` environment after any preamble. For example,

```
\renewcommand{\bibfont}{\small}
```

`\citenumfont` Numerical citations may be printed in a di erent font. De ne `\citenumfont` to be a font declaration like `\itshape` or even a command taking arguments like `\textit`.

```
\renewcommand{\citenumfont}[1]{\textit{#1}}
```

The above is better than `\itshape` since it automatically adds italic correction.

`\bibnumfmt` The format of the numerical listing in the reference list may also be changed from the default [32] by rede ning `\bibnumfmt`, for example

```
\renewcommand{\bibnumfmt}[1]{\textbf{#1}:}
```

to achieve **32**: instead.

`\bibhang` The list of references for author{year styles uses a hanging indentation format: the rst line of each reference is ush left, the following lines are set with an indentation from the left margin. This indentation is 1 em by default but may be changed by rede ning (with `\setlength`) the length parameter `\bibhang`.

\bibsep The vertical spacing between references in the list, whether author{year or numerical, is controlled by the length \bibsep. If this is set to 0 pt, there is no extra line spacing between references. The default spacing depends on the font size selected in \documentclass, and is almost a full blank line. Change this by rede ning \bibsep with \setlength command.

2.13 Automatic Indexing of Citations

\citeindextrue \citeindexfalse If one wishes to have the citations entered in the .idx indexing le, it is only necessary to issue \citeindextrue at any point in the document. All following \cite commands, of all variations, then insert the corresponding entry to that le. With \citeindexfalse, these entries will no longer be made.

The \bibitem commands in the thebibliography environment will also make index entries. If this is not desired, then issue \citeindexfalse before \bibliography or \begin{thebibliography}.

Of course, \makeindex must also be issued in the preamble to activate indexing, as usual. Otherwise, no indexing is done at all.

Make sure that the document has been processed at least twice after the last Bib TEX run before running the makeindex program.

\NAT@idxtxt The form of the index entries is set by the internal \NAT@idxtxt, which can be rede ned by hackers if wanted (in the natbib.cfg le please). By default, it prints the short author list plus date or number in the current parenthesis style and citation mode.

The natbib package can also be used with the index package of David M. Jones. The order in which the packages are loaded is not important.

\citeindextype In that package, multiple index lists may be made by means of a \newindex command. For example, it may be desirable to put all the citation indexing into a separate list. First that list must be initiated with, e.g.,

```
\newindex{cite}{ctx}{cnd}{List of Citations}
```

and then the automatic citation indexing associated with this list with the natbib command

```
\renewcommand{\citeindextype}{cite}
```

See the documentation for index.sty for details.

2.14 HyperTEX Compatibility

The natbib package is compatible with the hyperref package of Sebastian Rahtz and Heiko Oberdiek. , for use with LATEX ! HTML conversions,

pdfTEX, pdfmark. The compatibility is of a mutual nature: both packages contain coding that interact with that of the other.

There is a special option to the hyperref package: breaklinks which allows the link text to be split over to the next line, avoiding many overfull line messages. By default, the link text is restricted to be on one line. For numerical citations, this may be desirable, but for author{year ones with long link texts, it is not.

2.15 Multiple Bibliographies in One Document

The natbib package is compatible with the chapterbib package of Donald Arseneau and Niel Kempson, which makes it possible to have several bibliographies in one document. The usual application is to have bibliographies in each chapter of a book, especially if they have been written by di erent authors.

The chapterbib package works in a very natural way for the author; only the editor who puts all the chapters together into one book has to do some extra work.

The package makes use of the \include command, and each \included le has its own bibliography. For large books, it makes very good sense to take advantage of this feature in any case.

To review the use of \include, recall that the main le

```
\documentclass{...}
\includeonly{ch2}
\begin{document}
  \include{ch1}
  \include{ch2}
  \include{ch3}
\end{document}
```

will process only the le ch2.tex as though the les ch1.tex and ch3.tex were also present. That is, all counters, especially the page and section numbers, as well as cross-referencing de nitions, will function as if the whole document were processed. The trick is that each \included le has it own .aux le containing these de nitions, and they are all read in every time, even if the corresponding .tex le is not. The .aux les also contain the citation information for BibTEX, something that the chapterbib package exploits.

If \usepackage{chapterbib} has been given, the keys in each \cite and \bibitem command are associated with the current \included le and are distinguished from the identical key in a di erent le. Each of these les must contain its own \bibliography and \bibliographystyle commands. One processes BibTEX on each le separately before processing it under LATEX (at least twice).

2.15.1 Special Considerations for natbib and chapterbib

The order in which the chapterbib and natbib packages are loaded is unimportant.

The chapterbib package provides an option sectionbib that puts the bibliography in a \section* instead of \chapter*, something that makes sense if there is a bibliography in each chapter. This option will not work when natbib is also loaded; instead, add the option to natbib. (The sectionbib option can always be given, but it only has meaning for the book and report classes, or for classes derived from them.)

Every \included file must contain its own \bibliography command where the bibliography is to appear. The database files listed as arguments to this command can be different in each file, of course. However, what is not so obvious, is that each file must also contain a \bibliographystyle command, with possibly differing arguments.

As of version 8.0, the citation style, including mode (author–year or numerical) may also differ between chapters. The \setcitestyle command as well as \bibpunct and \citestyle can be issued at any point in the document, in particular in different chapters. (And this is the only time it would make sense to do so.)

2.16 Sorting and Compressing Numerical Citations

Another package by Donald Arseneau, cite.sty, reimplements the entire (numerical) citation system such that one can control the punctuation and citation format, all of which is done by natbib as well. However, it also can sort and compress numerical citations, something that is required by some journals.

What this means is that when multiple citations are given with a single \cite command, the normal order of the numbers is in the sequence given. This is usually a wild list of numbers, such as [4,2,8,3]. With the cite package, this list becomes [2–4,8].

It is impossible to make the cite and natbib packages compatible, since both reimplement \cite from scratch. Instead, I have taken over some of the coding from cite.sty, modifying it for natbib. This coding is activated by including one of the options sort or sort&compress in the \usepackage command.

For author–year citations, the option sort orders the citations in a single \citep or \citet command into the sequence in which they appear in the list of references. This is normally alphabetical first, year second. This should avoid citations of the type: "James et al. (1994b,a)". For author–year mode, the sort&compress option is identical to sort.

2.17 Merged Numerical References

> **Note:** the `merge` coding was contributed by Arthur Ogawa for the American Physical Society.

Thorsten Ohl's `mcite` package cannot be used together with `natbib`. Instead, one must invoke the package option `merge` with the `\usepackage` statement.

With this option in effect, citation keys within a multiple `\citep` command may contain a leading * that causes them to be merged in the bibliography together with the previous citation as a single entry with a single reference number. For example, `\citep{feynmann,*salam,*epr}` produces a single number, and all three references are listed in the bibliography under one entry with that number.

Certain restrictions of Thorsten Ohl's `mcite` package are lifted: a * prefix can be used with any citation key, and Ohl's restrictions on syntax do not apply.

An additional feature allows text to be inserted inside the bibliography entry: within the argument of `\citep`, a cite key may be preceded by two optional arguements, e.g., `\citep{[`*pre*`][`*post*`]`*key*`}`, where *pre* represents text to be prepended to the reference (`\bibitem` content), with *post* appended thereto.

Thus it is possible for the user to mark up the document:

```
text \citep{*[{See, e.g., }][ for a simpler explanation]ablebaker}
```

The above example illustrates the use of the star-form and both optional arguments.

Caution: Because the comma (,) character is part of the syntax of `\citep`, and because the bracket delimiters ([]) are mere text characters and not true delimiters (like the braces), you must enclose the optional argument in braces ({}) if a comma is present in the argument (that goes for brackets, too, of course).

The `elide` option also activates the merging features, but also sees to it that common parts of the merged references (e.g., authors) are not repeated but are written only once in the single bibliography entry.

The `mcite` option turns off the merging and eliding features, but allows the special syntax (the * and optional inserted texts) to be ignored.

These functions are available only to numerical-mode citations, and only when used parenthetically, similar to the restrictions on `sort` and `compress`.

They also require special `.bst` files, as provided for example by the American Physical Society for their REVTEX class.

2.18 Long Author List on First Citation

A feature that has often been requested by otherwise happy users of `natbib` is one that is found in the `harvard` package as standard: with the first citation of any reference, the full author list is printed, and afterwards only the abbreviated list. One can control this with `\citet*` for the first citation, and `\citet` or `\citep` thereafter. However, the automatic feature is very desired.

This can be activated with the option `longnamesfirst`.

`\shortcites` Some references have so many authors that you want to suppress the automatic long list only for them. In this case, issue

`\shortcites{`*⟨key-list⟩*`}`

before the first citations, and those included in *key-list* will have a short list on their first citation.

Full author lists can still be forced at any time with the starred variants.

3 Numerical Citations with Author–Year Styles

It is possible to produce numerical citations with any author-year `.bst` file, with minimal change to the text. The commands `\citet` and `\citep` will produce sensible results in both modes, without any special editing. Obviously, the opposite is not possible; a `.bst` file intended for numerical citation can never produce author–year citations, simply because the information is not transferred to the auxiliary file.

3.1 Selecting Numerical Mode

By default, `natbib` is in author–year mode. This can be changed by

1. selecting a numerical bibliography style with predefined citation style, defined either in the package or in the local configuration file;
2. giving options `numbers` or `super` to the `\usepackage` command;
3. issuing `\setcitestyle{numbers}`;
4. issuing `\citestyle` with the name of a predefined numerical bibliography style (like `plain` and use it with `plainnat`).

The `natbib` package will automatically switch to numerical mode if any one of the `\bibitem` entries fails to conform to the possible author–year formats. There is no way to override this, since such an entry would cause trouble in the author–year mode.

There are certain special ‘numerical’ styles, like that of the standard `alpha.bst`, which include a non-numerical label in place of the number, in the form

```
\bibitem[ABC95]{able95}
```

As far as `natbib` is concerned, this label does not conform to the author{ year possibilities and is therefore considered to be numerical. The citation mode switches to numerical, and `\cite{able95}` prints [ABC95].

See however, the end of Section 2.7 for another possibility. The above result can be achieved with

```
\bibitem[ABC95()]{able95}
```

4 Local Con guration

It is possible to add a local con guration le `natbib.cfg`, which is read in, if it exists, at the end of the package. It may thus contain coding to supecede that in the package, although its main purpose is to allow the user to add his or her own `\bibstyle@`*bst* de nitions to couple citation punctuation with local bibliography styles or for use with `\citestyle`.

5 Package Options

When a package is loaded with `\usepackage`, one can add options to select di erent features, as

```
\usepackage[options]{natbib}
```

The options available provide another means of specifying the punctuation for citations:

`round` (default) for round parentheses;

`square` for square brackets;

`curly` for curly braces;

`angle` for angle brackets;

`semicolon` (default) to separate multiple citations with semi-colons;

`colon` the same as `semicolon`, an earlier mistake in terminology;

`comma` to use commas as separators;

`authoryear` (default) for author{year citations;

`numbers` for numerical citations;

`super` for superscripted numerical citations, as in Nature;

`sort` orders multiple citations into the sequence in which they appear in the list of references;

`sort&compress` as `sort` but in addition multiple numerical citations are compressed if possible (as 3{6, 15);

`compress` to compress without sorting, so compression only occurs when the given citations would produce an ascending sequence of numbers;

`longnamesfirst` makes the first citation of any reference the equivalent of the starred variant (full author list) and subsequent citations normal (abbreviated list);

`sectionbib` redefines `\thebibliography` to issue `\section*` instead of `\chapter*`; valid only for classes with a `\chapter` command; to be used with the `chapterbib` package;

`nonamebreak` keeps all the authors' names in a citation on one line; causes overfull hboxes but helps with some `hyperref` problems;

`merge` to allow the * prefix to the citation key, and to merge such a citation's reference with that of the previous citation;

`elide` to elide common elements of merged references, like the authors or year;

`mcite` to recognize (and ignore) the merging syntax.

The options `curly` and `angle` are not really serious; I only added them because that completes the normal list of bracket types. The only other citation possibilities I know have really encountered are solidus, e.g. /21/, or something like (Ref. 21). These must be set with `\setcitestyle{open={/},close={/}}`.

The package options are overwritten by any explicit `\setcitestyle`, `\bibpunct`, or `\citestyle` commands. And both these commands and the package options turn off the automatic setting with `\bibliographystyle`, if effective.

6 Reference Sheet

A summary of the main points on using `natbib` can be obtained by LaTeXing the file `natnotes.tex`, which is extracted from the main source file `natbib.dtx` with the `docstrip` option `notes`. This is intended to act as a handy reference sheet.

This file should be extracted automatically by the supplied installation file, `natbib.ins`.

7 Options with docstrip

The source .dtx file is meant to be processed with docstrip, for which a number of options are available:

all includes all of the other interfaces;

apalike allows interpretation of minimal apalike form of \bibitem;

newapa allows \citeauthoryear to be in the optional argument of \bibitem along with the punctuation commands of newapa.sty;

chicago is the same as newapa;

harvard includes interpretation of \harvarditem;

astron allows \astroncite to appear in the optional argument of \bibitem;

authordate adds the syntax of the \citename command.

The remaining options are:

package to produce a .sty package file with most comments removed;

notes extracts a summary of usage to be used as a reference sheet; the resulting file is to be LaTeXed;

driver to produce a driver .ltx file that will print out the documentation when LaTeX'd. This file can be modified to produce various alternatives (page size, fonts, manual only, or with annotated code). The natbib.dtx file is itself such a driver but it should never, ever be edited by a user.

The source file natbib.dtx is itself a driver file and can be processed directly by LaTeX.

8 Other Author–Year Solutions

This section is of historical interest only.

Before natbib was published in 1993, there were several other attempts to provide author–year citations, some of which inspired natbib. A few of these are still maintained and used, and for that reason, natbib has attempted to include their \bibitem syntaxes, to be compatible with those .bst files.

Most of these 'packages' are really LaTeX 2.09 style files, so do not have features available with the modern LaTeX 2ε.

8.1 The natsci.bst Style

What gave me my first inspiration was Stephen Gildea's `natsci.bst` for use with his `agujgr.sty` file. This showed me that the problem was solvable. However, Gildea's formats `\bibitem` with just the abbreviated authors and year. Thus only parenthetical citations can be accommodated.

The name `natsci` stands for *natural sciences*, and it was this that led to the name `natbib`. (This is admittedly an ugly name, but it is now established and cannot be changed so easily.)

8.2 The apalike.bst Style

Oren Patashnik, the originator of BibTEX and the standard `.bst` files, has also worked on an author{year style, called `apalike.bst` with a corresponding `apalike.sty` to support it. Again, only the parenthetical citation is provided. Its functionality is identical to that of the `natsci` files.

The form of the `thebibliography` entries in this system is

```
\bibitem[Jones et al., 1990]{jon90}...
```

This is the most minimal form that can be given. I name it the `apalike` variant, after Patashnik's `apalike.bst` and `apalike.sty`. However, there could be many independent `.bst` files that follow this line, such as the `natsci` styles.

The bibliography style files belonging to this group include:

`apalike`, `apalike2`, `cea`, `cell`, `jmb`, `phapalik`, `phppcf`, `phrmp`

8.3 The newapa Style

A major improvement was achieved with `newapa.bst` and the accompanying `newapa.sty` files by Stephen N. Spencer and Young U. Ryu. Under their system, three separate items of information are included in the `\bibitem` label, to be used as required. These are: the full author list, the abbreviated list, and the year. This is accomplished by means of a `\citeauthoryear` command included in the label, as

```
\bibitem[\protect\citeauthoryear{Jones, Barker,
  and Williams}{Jones et al.}{1990}]{jon90}...
```

Actually, this only illustrates the basic structure of `\citeauthoryear`; the `newapa` files go even further to replace some words and punctuation with commands. For example, the word 'and' above is really `\betweenauthors`, something that must be defined in the `.sty` file. Of course, `\citeauthoryear` is also defined in that file. A number of different `\cite` commands are available to print out the citation with complete

author list, with the short list, with or without the date, the textual or parenthetical form.

Thus the `\citeauthoryear` entry in `\bibitem` is very flexible, permitting the style file to generate every citation form that one might want. It is used by a number of other styles, with corresponding `.sty` files. They all appear to have been inspired by `newapa.bst`, although they lack the extra punctuation commands.

Bibliographic style files belonging to the `newapa` group include

`newapa`, `chicago`, `chicagoa`, `jas99`, `named`

Note: the last of these, `named.bst`, uses `\citeauthoryear` in a slightly different manner, with only two arguments: the short list and year.

8.4 The Harvard Family

The same effect is achieved by a different approach in the Harvard family of bibliographic styles. Here a substitute for `\bibitem` is used, as

```
\harvarditem[Jones et al.]{Jones, Baker, and
   Williams}{1990}{jon90}...
```

The accompanying interface package file is called `harvard.sty` and is written by Peter Williams and Thorsten Schnier. It defines `\harvarditem` as well as the citation commands `\cite`, for parenthentical, and `\citeasnoun`, for textual citations. The first citation uses the long author list, following ones the shorter list, if it has been given in the optional argument to `\harvarditem`.

Bibliography styles belonging to the Harvard family are

`agsm`, `dcu`, `kluwer`

This package has been updated for LaTeX 2″, with many additions to add flexibility. The result is a powerful interface that should meet most citation needs. (It does not suppress repeated authors, though, as `natbib` does.)

8.5 The Astronomy Style

Apparently realizing the limitations of his `apalike` system, Oren Patashnik went on to develop a 'true' `apa` bibliographic style, making use of the method already employed by an astronomy journal. This is actually very similar to the `newapa` label but with only the short list of authors:

```
\bibitem[\protect\astroncite{Jones et al.}{1990}]{jon90}
   ...
```

It requires the package file `astron.sty` or any other style that defines `\astroncite` appropriately.

Bibliographic styles belonging to the astronomy group are

`apa`, `astron`, `bbs`, `cbe`, `humanbio`, `humannat`, `jtb`

This is as good as the `\citeauthoryear` command, although not as flexible since the full list of authors is missing.

8.6 The authordate Style

Finally, I also found some packages making use of a label command called `\citename` in the form

```
\bibitem[\protect\citename{Jones et al., }1990]{jon90}
    ...
```

This is not a good system since the author list and date are not cleanly separated as individual arguments, and since the punctuation is included in the label text. It is better to keep the punctuation fully removed, as part of the definitions in the `.sty` file, for complete flexibility.

Bibliographic styles belonging to this group are

`authordate1`, `authordate2`, `authordate3`, `authordate4`, `aaai-named`

with accompanying style file `authordate1-4.sty`.