

Pergamon

BibLaTeX-inspired bibliography management for Typst

<https://github.com/alexanderkoller/pergamon>

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(TODO: Document `fjoin`)

1 Introduction

Pergamon is a package for typesetting bibliographies in Typst. It is inspired by [BibLaTeX](#), in that the way in which it typesets bibliographies can be easily customized through Typst code. Like Typst's regular bibliography management model, Pergamon can be configured to use different styles for typesetting references and citations; unlike it, these styles are all defined through Typst code, rather than CSL.

Pergamon has a number of advantages over the builtin Typst bibliographies:

- Pergamon styles are simply pieces of Typst code and can be easily configured or modified.

- The document can be easily split into different refsections, each of which can have its own bibliography (similar to [Alexandria](#)). Unlike in Alexandria, you do not have to manually add bibliography prefixes to your citations.
- Paper titles can be automatically made into hyperlinks – as in [blinky](#), but much more flexibly and correctly.
- Bibliographies can be filtered, and bibliography entries programmatically highlighted, which is useful e.g. for CVs.
- References retain nonstandard BibTeX fields ([unlike in Hayagriva](#)), making it e.g. possible to split bibliographies based on keywords.

At the same time, Pergamon is very new and has a number of important limitations compared to the builtin system.

- Pergamon currently supports only bibliographies in BibTeX format, not the Hayagriva YAML format.
- Only a handful of styles are supported at this point, in contrast to the large number of available CSL styles. Pergamon comes with implementations of the BibLaTeX styles numeric, alphabetic, and authoryear.
- Pergamon still requires a lot of testing and tweaking.

[Pergamon](#) was an ancient Greek city state in Asia Minor. Its library was second only to the Library of Alexandria around 200 BC.

2 Example

The following piece of code typesets a bibliography using Pergamon. (You can try out a more complex example yourself: download [example.typ from Github](#); see also [the generated PDF](#).)

```
1 #import "@preview/pergamon:0.1.0": *
2
3 #let style = format-citation-numeric()
4 #add-bib-resource(read("bibliography.bib"))
5
6 #refsection(format-citation: style.format-citation)[
7   ... some text here ...
8   #cite("bender20:_climb_nlu")
9
10  #print-bibliography(
11    format-reference:
12      format-reference(reference-label: style.reference-label),
13    label-generator: style.label-generator,
14    sorting: "nyt")
15 ]
```

This will generate the output shown in [Figure 1](#). Let's go through the different parts of this code one by one.

The first relevant function that is called here is `add-bib-resource`. It parses a BibTeX file and adds all the BibTeX entries to Pergamon's internal list of references. Notice that you have to

... some text here ... [1]

References

- [1] Emily M. Bender and Alexander Koller. “Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data.” In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020.

Figure 1: Example bibliography typeset with Pergamon.

read the BibTeX file yourself and pass its contents to `add-bib-resource` as a string. This is because Typst packages can’t access files in your working directory for security reasons.

We then create a `refsection`. A `refsection` is a section of Typst content that shares a bibliography. Pergamon tracks the citations within each `refsection` separately and prints only those references that were cited within the current `refsection` when you call `print-bibliography`.

The actual citation is generated by the call `cite("bender20:_climb_nlu")`. Pergamon currently does not use the regular Typst citation syntax `@bender20:_climb_nlu` for a number of reasons (see [issue #40](#)). Instead you call Pergamon’s `cite` function, with the key of the BibTeX entry as a string (not a Typst label). Note that this is not the same as Typst’s builtin `cite` function, which is overwritten by Pergamon.

Notice that `refsection` has a parameter `format-citation` to which we passed `style.format-citation` in the example. This tells the `refsection` how to typeset citations – in the example, that `#cite("bender20:_climb_nlu")` should be rendered as “[1]”.

The `format-citation` function is typically defined in a *Pergamon style*, along with a companion function `format-reference` that specifies how the individual references in the bibliography are rendered. In the example, the style is obtained through a call to `format-citation-numeric()` in line 4. Observe that it has an opening and closing bracket after the function name. This is because citation and reference formatters can be configured by passing arguments to this function. In the example, we just use the default configuration for the `numeric` style.

Finally, the example calls `print-bibliography` to typeset the bibliography itself. This is where you pass the `format-reference` function that renders the individual references. You can furthermore specify how the references should be ordered in the bibliography through the `sorting` parameter. In the example, the references are ordered by ascending author name; then ascending publication year; then ascending title. Note also that `style.label-generator` is passed as an argument to `print-bibliography`. This function generates internal style-specific information that is used to typeset both references and citations.

All of these functions can take additional parameters that you can use to customize the appearance of the bibliography. See [Section 6](#) for details.

... some text here ... [1]

References

- [1] Emily M. Bender and Alexander Koller (2020). Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data. In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*.

Figure 2: Bibliography with the configuration of [Section 3.1](#).

3 Pergamon styles

Pergamon is highly configurable with respect to the way that references and citations are rendered. Its defining feature is that the *styles* that control the rendering process are defined as ordinary Typst functions, rather than in CSL.

There are two different types of styles in Pergamon:

- *Reference styles* define how the individual references are typeset in the bibliography.
- *Citation styles* define how citations are typeset in the text.

Obviously, the reference and citation style that is used in a refsection should fit together to avoid confusing the reader.

Pergamon comes with one predefined reference style and three predefined citation styles. We will explain these below, and then we will sketch how to define your own custom styles.

3.1 Builtin reference style

The builtin reference style is defined by the `format-reference` function. This reference style aims to replicate the builtin reference style of BibLaTeX, but note that not all features of BibLaTeX are implemented at this point.

The builtin reference style can currently render the following BibLaTeX entry types:

- `@article`
- `@book`
- `@incollection`
- `@inproceedings`
- `@misc`
- `@thesis`

These are explained in more detail in Section 2.1.1 of the [BibLaTeX documentation](#). BibTeX entries of a different type are typeset as a references in a dummy format which displays the entry type and BibTeX key. The aim is to eventually support all BibLaTeX styles; see [issue #1](#) to track the progress, and feel free to submit pull requests implementing them.

The builtin `format-reference` function can be customized by passing arguments to it. These arguments are explained in detail in [Section 6.3](#). As one example, the following arguments will change the output of the example above to look like in [Figure 2](#):

```

1 #print-bibliography(
2   format-reference: format-reference(
3     reference-label: style.reference-label,
4     print-date-after-authors: true,
5     format-quotes: it => it
6   ),
7   label-generator: style.label-generator,
8   sorting: "nyt")

```

We passed `true` for the argument `print-date-after-authors`. This moved the year from the end of the reference to just after the authors and put it in brackets.

We also passed the function `it => it` as the `format-quotes` argument. The builtin reference style surrounds all papers that are contained in bigger collections (in this case, a volume of conference proceedings) in quotes by applying the `format-quotes` function. By replacing the default `format-quotes` function with the identity function, we can make the quotes disappear in the output.

Pergamon exploits Typst's ability to pass functions as arguments quite heavily. This makes it cleaner in some ways than BibLaTeX, which is built on top of LaTeX, whose macros are much less flexible.

3.2 Builtin citation styles

Pergamon comes with three builtin citation styles: *alphabetic*, *numeric*, and *authoryear*. These replicate the BibLaTeX styles of the same names (see e.g. the [examples on Overleaf](#)).

Unlike in Typst's regular bibliography mechanism, you write `#cite("key")` to insert a citation into your document when you use Pergamon. The exact string that is inserted depends on the citation style you use.

The difference between the three builtin citation styles is illustrated in [Figure 1](#) (*numeric*), [Figure 3](#) (*alphabetic*), and [Figure 4](#) (*authoryear*). *Numeric* and *alphabetic* both create a label for each bibliography entry; in the case of *numeric*, the label is the position in the bibliography, and in the case of *alphabetic*, it is a unique string consisting of the first characters of the author names and the year. In both cases, these labels are displayed next to the references and also used as the string to which `@key` expands. By contrast, *authoryear* does not display any labels next to the references; it expands `@key` to a string consisting of the last names of the authors and the year.

Some of the citation styles have options that will let you control the appearance of the citations in detail. These are documented in [Section 6.3](#). For instance, to enclose the year in the *authoryear* style in square brackets rather than round ones, you can replace line 4 in the above example with

```

1 #let style = format-citation-authoryear(format-parens: nn(it => [(#it)]))

```

... some text here ... [BK20]

References

[BK20] Emily M. Bender and Alexander Koller. “Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data”. In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2020.

Figure 3: Bibliography with the alphabetic citation style.

... some text here ... (Bender and Koller 2020)

References

Emily M. Bender and Alexander Koller. “Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data”. In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2020.

Figure 4: Bibliography with the authoryear citation style.

	authoryear	alphabetic	numeric
auto	(Bender and Koller 2020)	[BK20]	[1]
p	(Bender and Koller 2020)	–	–
t	Bender and Koller (2020)	–	–
g	Bender and Koller’s (2020)	–	–
n	Bender and Koller 2020	BK20	1

Table 1: Citation forms.

Citation forms

Each citation style offers you different *citation forms* for presenting your citation. These are documented in [Table 1](#). Citation forms are selected using the optional form argument to the cite function:

```
1 #cite("bender20:_climb_nlu", form: "t")
```

If you do not specify a citation form, the auto citation forms will be used. For your convenience, BibLaTeX defines the functions `citet`, `citep`, `citen`, and `citeg`, which all just call `cite` with the respective citation form.

3.3 Implementing custom styles

Instead of using the builtin styles, you can also define your own Pergamon style – either a reference style or a citation style or both.

Implementing a reference style amounts to defining a Typst function that can be passed as the `format-reference` argument to `print-bibliography`. Such a function receives arguments (`index`, `reference`, `eval-mode`) containing the zero-based position of the reference in the bibliography; a reference dictionary; and the mode in which `eval` should evaluate the paper titles. A call to your function should return some content, which will be displayed in the bibliography.

Reference dictionaries are a central data structure of Pergamon. They represent the information contained in a single bibliography entry and are explained in detail in [Section 6.1](#).

Implementing a citation style is a little more involved, because a citation style consists of three different functions:

- The *label generator* is passed as an argument to `print-bibliography`. It is a function that receives a reference dictionary and the bibliography position as arguments and is expected to return an array of length two. Its first element is the bib entry's *label*; it is stored under the `label` field of the reference dictionary and can contain any information that your style finds useful. The second element is a string summarizing the contents of the label. It is used to recognize when two bib entries have the same label and therefore need an “extradate” to make it unique, e.g. the letter “a” in a citation string like “Smith et al. (2025a)”. It is up to your style to ensure that entries with the same label also have the same string summary.
- The *reference labeler* is passed as an argument to `format-reference`. It receives a reference dictionary and the bibliography position as arguments and returns content. If this content is not none, it will be typeset as the first column in the bibliography, next to the reference itself. Of the builtin citation styles, the reference labeler of `authoryear` always returns none (indicating a one-column bibliography layout), and the other two return their respective labels in square brackets. Pergamon assumes that the reference labeler of a citation style either always returns none or never returns none, making for a consistent number of columns.
- The *citation formatter* is passed as an argument to `refsection`. It receives a reference dictionary and a citation form (see above) as arguments and returns content. This function generates the actual citation that is typeset into the document.

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Note that the label information that the label generator produces will be stored in the `label` field of the reference dictionary. When the reference labeler and the citation formatter are called, the `label` information will still be available, allowing you to precompute any information you find useful.

4 Advanced usage

4.1 Multiple refsections

A Pergamon document consists of one or more `refsections`. Each `refsection` is a segment of the document that shares a bibliography: Pergamon collects all citations within each `refsection` and prints them in the `refsection`'s bibliography. This allows you to have multiple bibliographies per document, as in the well-known [Alexandria](#) package.

Every refsection in a document has a unique identifier that distinguishes it from the other refsections. These identifiers are prepended to the keys of the bibliography entries in every citation. You still write `#cite("key")` in your document, with the same key that you also use in your BibTeX file; in a refsection with identifier `id`, Pergamon automatically converts this into a reference to `id-key`. The only situation where you will notice that the keys were modified is when a citation is undefined; in this case, Typst will warn you that the reference `id-key` couldn't be resolved, rather than `key`.

You can specify the refsection identifier yourself by passing it as the `id` argument to the `refsection` function. But typical usage will be to not specify an explicit `id` argument and let Pergamon assign a unique identifier automatically. In this case, the first refsection in the document will have the identifier `none`, and the subsequent ones will be names `"ref1"`, `"ref2"`, and so on. When the identifier is `none`, Pergamon simply uses the key itself as the label, rather than prepending it with an identifier string. For the frequent use case where the document has only one refsection, this will make error messages easier to read.

You may use `print-bibliography` only in the context of a refsection. If your document has only a single refsection, you can configure it through a document show rule, like this:

```
1 #let style = format-citation-numeric()
2 #show: doc => refsection(format-citation: style.format-citation, doc)
3
4 #add-bib-resource(read("bibs/bibliography.bib"))
5 #cite("bender20:_climb_nlu")
```

4.2 Styling the bibliography

A Pergamon bibliography is displayed as a [grid](#), with one row per bibliography entry. The grid has one or two columns, depending on whether a first column is needed to display a label or not.

You can style this grid by passing a dictionary in the `grid-style` argument of `print-bibliography`. The values in this dictionary will be used to overwrite the default values.

4.3 Sorting the bibliography

You can furthermore control the order in which references are presented in the bibliography. To this end, you can pass a sorting string in the `sorting` argument of `print-bibliography`. See the documentation of this argument in [Section 6](#) for details.

4.4 Styling the citations

Citations in Pergamon are [link](#) elements, and can be styled using show rules. However, it is not entirely trivial to distinguish a link element that represents a Pergamon citation from any other link element (referring e.g. to a website). Pergamon therefore provides a function `if-citation` which will make this distinction for you. The following piece of code typesets all Pergamon citations in blue:


```

1  #show link: it => if-citation(it, value => {
2    set text(fill: blue)
3    it
4  })

```

The value argument contains metadata about the citation; value.reference is the reference dictionary (see [Section 6.1](#)). You can use this information to style citations conditionally. For instance, in order to typeset all citations to my own papers in green and all other citations in blue, I could write:

```

1  #show link: it => if-citation(it, value => {
2    if "Koller" in family-names(value.reference.fields.parsed-author) {
3      set text(fill: green)
4      it
5    } else {
6      set text(fill: blue)
7      it
8    })

```

4.5 Showing the entire bibliography

It is sometimes convenient to display the entire bibliography, and not just those references that were actually cited in the current refsection. You can instruct print-bibliography to do this using the show-all argument:

```

1  #print-bibliography(
2    format-reference: format-reference(),
3    show-all: true
4  )

```

To obtain finer control over the bibliography entries that are shown, you can use the filter argument. This function receives a [reference dictionary](#) as its argument and returns true if this reference should be included in the bibliography and false otherwise. For instance, the following call shows all journal articles and nothing else:

```

1  #print-bibliography(
2    format-reference: format-reference(),
3    show-all: true,
4    filter: reference => reference.entry_type == "article"
5  )

```

4.6 Highlighting references

The builtin format-reference function accepts a parameter highlight, which you can use to highlight individual references in the bibliography. The highlight function takes a rendered-reference as argument; this is a piece of content representing the entire rendered

★ Emily M. Bender and Alexander Koller. “Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data”. In: *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2020.

Figure 5: Highlighting a reference.

bibliography entry, just before it is printed. It also receives the corresponding reference dictionary and the position in the bibliography.

Let’s say that you use the keywords field in your BibTeX entries to contain the keyword highlight if you want to highlight the paper. You can then selectively highlight references like this:

```
1 #let f-r = format-reference(  
2   highlight: (rendered, reference, index) => {  
3     if "highlight" in reference.fields.at("keywords", default: ()) {  
4       [#text(size: 8pt)[#emoji.star.box] #rendered]  
5     } else {  
6       rendered  
7     }  
8 })
```

This will place a marker before each reference with the “highlight” keyword, and will leave all other references unchanged.

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5 Data model

Let’s talk about the assumptions Pergamon makes about the structure and contents of the BibTeX file. This corresponds roughly to Chapter 2 (“Database Guide”) of the BibLaTeX documentation.

5.1 Dates

Dates can be specified in one of two ways:

- In the date field using the ISO 8601-2 format: “YYYY-MM-DD” or “YYYY-MM” or “YYYY”. Years, months, and days must be positive integers. Date ranges, approximate dates, and years BCE are currently not supported.
- In the year and month fields. The month field should contain a positive integer, full English month names like january, or three-letter abbreviations of English month names like feb. These will all be resolved to the proper months and potentially localized. As a fallback option, you can also specify some other string, which will be printed in the reference verbatim.

The “year/month” option is only available for the publication date of the paper.

All other fields whose name ends in date (e.g. urldate) will also be parsed as in option 1.

6 Detailed documentation

Let's now go through the detailed documentation of all the functions and data structures that Pergamon exposes to you.

6.1 Reference dictionaries

The central data structure that Pergamon manages is the *reference dictionary*. This is a dictionary as shown in [Figure 6](#); its purpose is to represent all information about a single bib entry. It is obtained by parsing a BibTeX file using [citegeist](#) and then enriching it with some extra information from within Pergamon.

From the perspective of a style developer, the most important part of the reference dictionary is the `fields` part, which contains the fields of the BibTeX entry. In the example, the BibTeX entry defined a number of standard BibTeX fields, such as `author` and `title`; it also defines some lesser-known fields that are standard in BibTeX, such as `keywords`; and it also has extra fields, such as `award`. The reference dictionary makes all of these BibTeX fields available to you.

The keys `entry_type` and `entry_key` at the top of [Figure 6](#) also come from the BibTeX file; they represent the key and entry type of the BibTeX entry. In addition, Pergamon preprocesses the reference dictionary and adds some fields of its own.

- The `label` and `label-repr` fields store the output of the `label-generator` call.
- The `parsed-X` fields contain parsed name information. For instance, `parsed-author` represents the outcome of parsing the names in the `author` field. It consists of an array of *name-part dictionaries*, which map the keys given and `family` (aka “first” and “last” names) to the parts of that author’s name. Name parsing is currently a bit naive; see [issue #9](#) to track progress on this.
- The `sortstr-author` field concatenates the author names, family-name first. It is used when sorting references in a bibliography using the `n` identifier.

The preprocessing happens relatively early, so the code in a reference or citation style can rely on the presence of these fields in the reference dictionary.

6.2 Main functions

These are functions implementing the base functionality of Pergamon, such as `cite` and `print-bibliography`.

>> [add-bib-resource](#)

Parses BibTeX references and makes them available to Pergamon. Due to architectural limitations in Typst, Pergamon cannot read BibTeX from a file. You will therefore typically call `read` yourself, like this:

```
1 #add-bib-resource(read("bibliography.bib"))
```

```

1 (
2   entry_type: "inproceedings",
3   entry_key: "bender20:_climb_nlu",
4   fields: (
5     author: "Emily M. Bender and Alexander Koller",
6     award: "Best theme paper",
7     booktitle: "Proceedings of the 58th Annual Meeting of the Association
8                 for Computational Linguistics (ACL)",
9     doi: "10.18653/v1/2020.acl-main.463",
10    keywords: "highlight",
11    title: "Climbing towards NLU: On Meaning, Form, and Understanding
12           in the Age of Data",
13    year: "2020",
14    parsed-author: (
15      (given: "Emily M.", family: "Bender"),
16      (given: "Alexander", family: "Koller"),
17    ),
18    sortstr-author: "Bender,Emily M. Koller,Alexander",
19    parsed-editor: none,
20    parsed-translator: none,
21  ),
22  label: ("Bender and Koller", "2020"),
23  label-repr: "Bender and Koller 2020",
24 )

```

Figure 6: Example of a reference dictionary.

You can call `add-bib-resource` multiple times, and this will add the contents of multiple bib files. However, all bibliography entries must have different keys, even if they are in different source files.

Parameters

```

add-bib-resource(
  bibtex-string: str,
  source-id: str or none
) -> none

```

bibtex-string `str`

A BibTeX string to be parsed.

source-id `str` or `none`

If `source-id` is not `none`, it is added to all references loaded from this BibTeX source under the `source-id` field. This can e.g. be used to filter bibliographies by source id.

For instance, this value of `filter` for `print-bibliography()` will only show the references that were assigned the source id `other.bib`:

```
filter: reference => reference.fields.at("source-id", default: none) ==
"other.bib"
```

Default: `none`

>> **cite**

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Create a citation to the bibliography entry with the given key. The `cite` function keeps track of what refsection we are in and uses that refsection's `format-citation` argument to typeset the citation.

(Also fix documentation of `citet` etc.)

You can pass a form for finer control over the citation string, depending on what your citation style supports (see [Section 3.2](#)). If you do not specify the `form`, its default value of `auto` will generate a default form that depends on the citation style.

Parameters

```
cite(
  ..keys: str,
  form: str auto,
  separator
) -> content
```

..keys `str`

The key of the BibTeX entry you want to cite.

form `str` or `auto`

The citation form.

Default: `auto`

>> **citeg**

Creates a citation with the form "g", e.g. "Smith et al.'s (2020)". See `cite()` for details.

Parameters

```
citeg(..key: str)
```

..key `str`

The key of the BibTeX entry you want to cite.

>> **citen**

Creates a citation with the form "n", e.g. "Smith et al. 2020". See [cite\(\)](#) for details.

Parameters

```
citen(..key: str)
```

..key `str`

The key of the BibTeX entry you want to cite.

>> **citep**

Creates a citation with the form "p", e.g. "(Smith et al. 2020)". See [cite\(\)](#) for details.

Parameters

```
citep(..key: str)
```

..key `str`

The key of the BibTeX entry you want to cite.

>> **citet**

Creates a citation with the form "t", e.g. "Smith et al. (2020)". See [cite\(\)](#) for details.

Parameters

```
citet(..key: str)
```

..key `str`

The key of the BibTeX entry you want to cite.

>> if-citation

Helper function for rendering the links to a bibliography entry. The first argument is assumed to be a Typst [link](#) element, obtained e.g. as the argument of a show rule. If this link is a citation pointing to a bibliography entry managed by Pergamon, e.g. generated by Pergamon's cite function, the function passes the metadata of this bib entry to the citation-content function and returns the content this function generated. Otherwise, the link is passed to other-content for further processing.

The primary purpose of if-citation is to facilitate the definition of show rules. A typical example is the following show rule, which colors references to my own publications green and all others blue.

```
1 #show link: it => if-citation(it, value => {
2   if "Koller" in family-names(value.reference.fields.parsed-author) {
3     set text(fill: green)
4     it
5   } else {
6     set text(fill: blue)
7     it
8   }}
```

Parameters

```
if-citation(
  it: link,
  citation-content: function,
  other-content: function
) -> content
```

it link

A Typst link element.

citation-content function

A function that maps the metadata associated with a Pergamon reference to a piece of content. The metadata is a dictionary with keys reference, index, and key. reference is a reference dictionary (see [Section 6.1](#)), key is the key of the bib entry, and index is the position in the bibliography.

other-content function

A function that maps the link to a piece of content. The default argument simply leaves the link untouched, permitting other show rules to trigger and render it appropriately.

Default: $x \Rightarrow x$

>> **print-bibliography**

Prints the bibliography for the `refsection()` in which it is contained. This function cannot be used outside of a refsection.

Parameters

```
print-bibliography(  
    format-reference: function,  
    label-generator: function,  
    sorting: function str none,  
    show-all: bool,  
    filter: function,  
    grid-style: dict,  
    eval-mode: str none,  
    title: str none,  
    name-fields: array  
) -> none
```

format-reference function

A function that renders the reference into Typst content, which will then be included in the printed bibliography. This function will typically be defined in a Pergamon style, to be compatible with the `format-citation` function that is passed to `refsection()`.

`format-reference` is passed the position of the reference in the bibliography as a zero-based int in the first argument. It is passed the [reference dictionary](#) for the reference in the second argument.

The third argument is a mode string that Pergamon expects your `format-reference` function to pass to the Typst `eval` function. See the explanation for `print-bibliography`'s own `eval-mode` argument below.

It returns an array of contents. The elements of this array will be laid out as the columns of a grid, in the same row, permitting e.g. bibliography layouts with one column for the reference label and one with the reference itself. If only one column is needed (e.g. in the authoryear citation style), `format-reference` should return an array of length one. All calls to `format-reference` should return arrays of the same length.

Default: `(index, reference, eval-mode) => ([REFERENCE],)`

label-generator function

Generates label information for the given reference. The function takes the reference dictionary and the reference's index in the sorted bibliography as input and returns an array `(label, label-repr)`, where `label` can be anything the style finds useful for generating the citations and `label-repr` is a string representation of the label. These string representations are used to detect label collisions, which cause the generation of extradataes.

The default implementation simply returns a number that is guaranteed to be unique to each reference. Styles that want to work with `extradate` will almost certainly want to pass a different function here.

The function passed as `label-generator` does not control whether labels are printed in the bibliography in their own separate column; it only computes information for internal use. A style can decide whether it wants to print labels through its `format-reference` function.

Note that `label-repr` *must* be a `str`.

Default: `(index, reference) => (index + 1, str(index + 1))`

sorting `function` or `str` or `none`

A function that defines the order in which references are shown in the bibliography. This function takes a [reference dictionary](#) as input and returns a value that can be [sorted](#), e.g. a number, a string, or an array of sortable values.

Alternatively, you can specify a BibLaTeX-style sorting string. The following strings are supported:

- `n`: author name (lastname firstname)
- `t`: paper title
- `y` or `d`: the year in which the paper was published; write `yd` or `dd` for descending order
- `v`: volume, if defined
- `a`: the contents of the `label` field (if defined); for the alphabetic style, this amounts to the alphabetic paper key

For instance, `"nydt"` sorts the references first by author name, then by descending year, then by title. Note that Pergamon currently makes no distinction between the year and the full date (cf. [issue #24](#)).

If `none` or the string `"none"` is passed as the `sorting` argument, the references are sorted in an arbitrary order. There is currently no reliable support for sorting the references in the order in which they were cited in the document.

Default: `none`

show-all `bool`

Determines whether the printed bibliography should contain all references from the loaded bibliographies (`true`) or only those that were cited in the current refsection (`false`).

Default: `false`

filter `function`

Filters which references should be included in the printed bibliography. This makes sense only if `show-all` is `true`, otherwise not all your citations will be resolved to bibliography entries. The parameter should be a function that takes a [reference dictionary](#) as argument and returns a boolean value. The printed bibliography will contain exactly those references for which the function returned `true`.

Default: `reference => true`

grid-style `dict`

A dictionary for styling the [grid](#) in which the bibliography is laid out. By default, the grid is laid out with `row-gutter: 1.2em` and `column-gutter: 0.5em`. You can overwrite these values and specify new ones with this argument; the revised style specification will be passed to the `grid` function.

Default: `(:)`

eval-mode `str` or `none`

The output of `format-reference` can be passed through the Typst [eval](#) function for final rendering. This is useful e.g. to typeset math in a paper title correctly. Pass the `eval` mode in this argument, or pass `none` if you don't want to call `eval`.

Default: `"markup"`

title `str` or `none`

The title that will be typeset above the bibliography in the document. The string given here will be rendered as a first-level heading without numbering. Pass `none` to suppress the bibliography title.

Default: `"References"`

name-fields `array`

BibTeX fields that contain names and should be parsed as such. For each `X` in this array, Pergamon will enrich the reference dictionary with a field `parsed-X` that contains an array of name-part dictionaries, such as `("family": "Smith", "given": "John")`. See [Section 6.1](#) for an example.

Default: `("author", "editor", "translator")`

>> refsection

Defines a section of the document with its own bibliography. You need to load a bibliography with the `add-bib-resource()` function in a place that is earlier than the refsection in rendering order.

Parameters

```
refsection(  
    format-citation: function or none,  
    id: str or none,  
    doc: content  
) -> none
```

format-citation function or none

A function that generates the citation string for a given reference. The function receives a [reference dictionary](#) as its first argument and a form string as its second argument. It returns the content that is displayed in place of a `cite()` call.

The function you pass here will typically be defined in a Pergamon citation style, to be compatible with the `format-reference` function that is passed to `print-bibliography()`. Note that `format-citation` can return any content it wants, but it does not need to generate a hyperlink to the bibliography; the citation string is automatically wrapped in a link by Pergamon.

You can pass `none` in this argument to indicate that you want to use the same citation formatter as in the previous refsection. If you pass `none` to the first refsection in the document, Pergamon will use the dummy citation formatter (`reference, form`) => [CITATION].

Default: `none`

id str or none

A unique identifier for this refsection. Each refsection needs its own unique id, which distinguishes it from all the other refsections. You can either specify an explicit identifier here, or you can pass `none` to indicate that Pergamon should assign an identifier automatically. In this case, the first refsection in the document receives the identifier `none`, and the subsequent refsections will be named `ref1`, `ref2`, and so on.

All references and citations within a refsection with identifier `X` will be prefixed by `X-`; so for instance, the citation `cite("knuth1990")` in the refsection `ref1` will silently introduce and reference a label `ref1-knuth1990`. If the refsection identifier is `none`, the original label `knuth1990` will be used instead.

Default: `none`

doc content

The section of the document that is to be wrapped in this refsection.

6.3 The builtin styles

Here we explain the builtin reference and citation styles.

>> **format-citation-alphabetic**

The *alphabetic* citation style renders citations in a form like “[BK20]”. The citation string consists of a sequence of the first letters of the authors’ family names. See [Figure 3](#) for an example.

If there are too many authors, the symbol “+” is appended to the citation string to indicate “et al.”, e.g. “[YDZ+25]”. What constitutes “too many” is controlled by the `maxalphanames` parameter.

If there is only one author, the first few characters of the author name are displayed instead, as in “[Knu90]”. The number of characters is controlled by the `labelalpha` parameter.

If more than one reference would receive the same citation string under this policy, the style appends an “extradate” character. For example, if two papers would receive the label “[BDF+20]”, then the first one (in the sorting order of the bibliography) will be replaced by “[BDF+20a]” and the second one by “[BDF+20b]”.

The function `format-citation-alphabetic` returns a dictionary with keys `format-citation`, `label-generator`, and `reference-label`. You can use the values under these keys as arguments to `refsection`, `print-bibliography`, and `format-reference`, respectively.

Parameters

```
format-citation-alphabetic(  
    maxalphanames: int,  
    labelalpha: int,  
    labelalphaothers: str,  
    citation-separator: str,  
    format-brackets: function  
)
```

maxalphanames `int`

The maximum number of authors that will be printed in a citation string. If the actual number of authors exceeds this value, the symbol specified under `labelalphaothers` below will be appended to indicate “et al”.

Default: 3

labelalpha `int`

The maximum number of characters that will be printed for single-authored papers.

Default: 3

labelalphaothers str

The “et al” character that is appended if the number of authors exceeds the value of the `maxalphanames` parameter.

Default: "+"

citation-separator str

The string that separates the author and year in the p citation form.

Default: ", "

format-brackets function

Wraps text in square brackets. The argument needs to be a function that takes one argument (str or content) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the `nn` function wrapper, see [Section 6.4](#).

Default: `nn(it => [[#it]])`

>> **format-citation-authoryear**

The *authoryear* citation style renders citations in a form like “(Bender and Koller 2020)”. The citation string consists of a sequence of the authors’ family names. See [Figure 4](#) for an example.

If a paper has more than two authors, only the first author will be printed, together with the symbol “et al.”.

If more than one reference would receive the same citation string under this policy, the style appends an “extradate” character. For example, if two papers would receive the label “(Yao et al. 2025)”, then the first one (in the sorting order of the bibliography) will be replaced by “(Yao et al. 2025a)” and the second one by “(Yao et al. 2025b)”.

The *authoryear* citation style supports a particularly rich selection of citation forms (see [Table 1](#)).

The function `format-citation-authoryear` returns a dictionary with keys `format-citation`, `label-generator`, and `reference-label`. You can use the values under these keys as arguments to `refsection`, `print-bibliography`, and `format-reference`, respectively.

Parameters

```
format-citation-authoryear(  
  format-parens: function,  
  format-brackets: function,  
  author-year-separator: str,  
  citation-separator: str  
)
```

format-parens function

Wraps text in round brackets. The argument needs to be a function that takes one argument (str or content) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the nn function wrapper, see [Section 6.4](#).

Default: `nn(it => [(#it)])`

format-brackets function

Wraps text in square brackets. The argument needs to be a function that takes one argument (str or content) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the nn function wrapper, see [Section 6.4](#).

Default: `nn(it => [[#it]])`

author-year-separator str

The string that separates the author and year in the p citation form.

Default: " "

citation-separator str

Separator symbol to connect the citations for the different keys.

Default: "; "

>> [format-citation-numeric](#)

The *numeric* citation style renders citations in a form like “[1]”. The citation string is the position of the reference in the bibliography. See [Figure 1](#) for an example.

The function `format-citation-numeric` returns a dictionary with keys `format-citation`, `label-generator`, and `reference-label`. You can use the values under these keys as arguments to `refsection`, `print-bibliography`, and `format-reference`, respectively.

Parameters

```
format-citation-numeric(  
    citation-separator: str,  
    format-brackets: function  
)
```

citation-separator `str`

The string that separates the author and year in the p citation form.

Default: `" , "`

format-brackets `function`

Wraps text in square brackets. The argument needs to be a function that takes one argument (`str` or `content`) and returns `content`.

It is essential that if the argument is `none`, the function must also return `none`. This can be achieved conveniently with the `nn` function wrapper, see [Section 6.4](#).

Default: `nn(it => [[#it]])`

>> **format-reference**

The standard reference style. It is modeled after the standard bibliography style of BibLaTeX.

A call to `format-reference` takes a number of options as argument and returns a function that will take arguments `index`, `reference`, and `eval-mode` and return a rendered reference. This function is suitable as an argument to the `format-reference` parameter of `print-bibliography`, and will control how the references in this bibliography are rendered. See the documentation of `print-bibliography` for a more detailed specification of the `format-reference` function in general.

Most of the options of `format-reference` have sensible default values. The one exception is the mandatory named argument `reference-label`, which you obtain from your citation style.

Parameters

```
format-reference(  
    reference-label: function,  
    highlight: function,  
    link-titles: bool,  
    print-url: bool,  
    print-doi: bool,
```

```

print-eprint: bool,
use-author: bool,
use-translator: bool,
use-editor: bool,
print-date-after-authors: bool,
eval-mode: str,
list-middle-delim: str,
list-end-delim-two: str,
list-end-delim-many: str,
author-type-delim: str,
subtitlepunct: str,
format-journaltitle: function,
format-issuetitle: function,
format-parens: function,
format-brackets: function,
format-quotes: function,
name-format: str,
volume-number-separator: str,
bibeidpunct: str,
bibpagespunct: str,
print-isbn: bool,
bibstring: dict,
additional-fields: array none,
suppress-fields: array dictionary none,
periods: function,
commas: function
)

```

reference-label function

The reference labeler that should be used for this bibliography; see [Section 3.3](#) for a detailed explanation.

The reference labeler typically comes from a citation style (e.g. *authoryear*, *numeric*, *alphabetic*).

Unlike the other parameters of `format-reference`, you *must* pass a meaningful argument for this parameter. If you leave it at the default value of `none`, Typst will not even show you a proper error message; it will just say “warning: layout did not converge within 5 attempts”.

Default: `none`

highlight function

Selectively highlights certain bibliography entries. The parameter is a function that is applied at the final stage of the rendering process, where the whole rest of the entry has already been rendered. This is an opportunity to e.g. mark certain entries in the bibliog-

raphy by boldfacing them or prepending them with a marker symbol. See [Section 4.6](#) for an example.

The highlighting function accepts arguments `rendered-reference` (str or content representing the reference as it is printed), `index` (position of the reference in the bibliography), and `reference` (the reference dictionary). It returns content. The default implementation simply returns the `rendered-reference` unmodified.

Default: `(rendered-reference, index, reference) => rendered-reference`

link-titles `bool`

If `true`, titles are rendered as hyperlinks pointing to the reference's DOI or URL. When both are defined, the DOI takes precedence.

Default: `true`

print-url `bool`

If `true`, prints the reference's URL at the end of the bibliography entry.

Default: `false`

print-doi `bool`

If `true`, prints the reference's DOI at the end of the bibliography entry.

Default: `false`

print-eprint `bool`

If `true`, prints the reference's eprint information at the end of the bibliography entry. This could be a reference to arXiv or JSTOR.

Default: `true`

use-author `bool`

If `true`, prints the reference's author if it is defined.

Default: `true`

use-translator `bool`

If `true`, prints the reference's translator if it is defined. Note that support for "authors" that are not the author is currently weak. See [issue 28](#) to track progress on this.

Default: `true`

use-editor `bool`

If `true`, prints the reference's editor if it is defined. Note that support for "authors" that are not the author is currently weak. See [issue 28](#) to track progress on this.

Default: `true`

print-date-after-authors `bool`

If `true`, Pergamon will print the date right after the authors, e.g. 'Smith (2020). "A cool paper"'. If `false`, Pergamon will follow the normal behavior of BibLaTeX and place the date towards the end of the reference.

Default: `false`

eval-mode `str`

When Pergamon renders a reference, the title is processed by Typst's `eval` function. The `eval-mode` argument you specify here is passed as the `mode` argument to `eval`.

The default value of `"markup"` renders the title as if it were ordinary Typst content, typesetting e.g. mathematical expressions correctly.

Default: `"markup"`

list-middle-delim `str`

When typesetting lists (e.g. author names), Pergamon will use this delimiter to combine list items before the last one.

Default: `", "`

list-end-delim-two `str`

When typesetting lists (e.g. author names), Pergamon will use this delimiter to combine the items of lists of length two.

Default: `" and "`

list-end-delim-many `str`

When typesetting lists (e.g. author names), Pergamon will use this delimiter in lists of length three or more to combine the final item in the list with the rest.

Default: `", and "`

author-type-delim `str`

String that is used to combine the name of an author with the author type, e.g. “Smith, editor”.

Default: `" , "`

subtitlepunct `str`

String that is used to combine a title with a subtitle.

Default: `" . "`

format-journaltitle `function`

Renders the title of a journal as content. The default argument typesets it in italics.

Default: `it => emph(it)`

format-issuetitle `function`

Renders the title of a special issue as content. The default argument typesets it in italics.

Default: `it => emph(it)`

format-parens `function`

Wraps text in round brackets. The argument needs to be a function that takes one argument (`str` or `content`) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the `nn` function wrapper, see [Section 6.4](#).

Default: `nn(it => [(#it)])`

format-brackets `function`

Wraps text in square brackets. The argument needs to be a function that takes one argument (`str` or `content`) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the `nn` function wrapper, see [Section 6.4](#).

Default: `nn(it => [[#it]])`

format-quotes `function`

Wraps text in double quotes. The argument needs to be a function that takes one argument (str or content) and returns content.

It is essential that if the argument is none, the function must also return none. This can be achieved conveniently with the nn function wrapper, see [Section 6.4](#).

Default: `nn(it => ["#it"])`

name-format `str`

The format in which names (of authors, editors, etc.) are printed. This is an arbitrary string which may contain the placeholders {given} and {family}; these will be replaced by the person's actual name parts. You can use {g} and {f} for the first letters of the given and family name, respectively.

Default: `"{given} {family}"`

volume-number-separator `str`

Separator symbol for “volume” and “number” fields, e.g. in @articles.

Default: `","`

bibeidpunct `str`

Separator symbol that connects the EID (Scopus Electronic Identifier) from other journal information.

Default: `","`

bibpagespunct `str`

Separator symbol that connects the “pages” field with related information.

Default: `","`

print-isbn `bool`

If true, prints the ISBN or ISSN of the reference if it is defined.

Default: `false`

bibstring `dict`

The bibstring table. This is a dictionary that maps language-independent IDs of bibliographic constants (such as “In: “ or “edited by”) to their language-dependent surface forms.

Replace some or all of the values with your own surface forms to control the way the bibliography is rendered.

Default: `default-bibstring`

additional-fields `array` or `none`

An array of additional fields which will be printed at the end of each bibliography entry. Fields can be specified either as a string, in which case the field with that name is printed using the reference style's normal rules. Alternatively, they can be specified as a function `(reference, options) -> content`, in which case the returned content will be printed directly. Instead of an array, you can also pass `none` to indicate that no additional fields need to be printed.

For example, both of these will work:

```
additional-fields: ("award",)
```

```
additional-fields: ((reference, options) =>
  ifdef(reference, "award", (:), award => [*#award*]),)
```

Default: `none`

suppress-fields `array` or `dictionary` or `none`

A specification of field names that should not be printed. References are treated as if they do not contain values for these fields, even if the BibTeX file defines them.

You can pass an array of strings here. These field names will be suppressed in all references.

Alternatively, you can pass a dictionary that maps entry types to arrays of strings. `("inproceedings": ("editor", "location"))` means that the editor and location fields will not be printed in inproceedings references, but may be printed in other entry types. You can use the special key `"*"` to suppress fields in *all* entry types.

Finally, you can also pass `none` to indicate that no fields should be suppressed.

Default: `none`

periods `function`

Function that joins an arbitrary number of strings or contents with a period symbol. This corresponds roughly (but not precisely) to blocks in BibLaTeX.

The function should return `none` if the argument is `none`, and it should skip all elements of `. . x` that are `none` when joining the elements.

It may be convenient to use `fjoin` to implement this function. The default connects elements with an actual period. It skips the period if the preceding element ends with punctuation.

Default: `(..x) => fjoin(".", ..x, skip-if: ".,?!;:;")`

commas **function**

Function that joins an arbitrary number of strings or contents with a comma symbol. This corresponds roughly (but not precisely) to units in BibLaTeX.

The function should return `none` if the argument is `none`, and it should skip all elements of `..x` that are `none` when joining the elements.

It may be convenient to use `fjoin` to implement this function. The default connects elements with an actual comma. It skips the comma if the preceding element already ends with a comma.

Default: `(..x) => fjoin(",", ..x, skip-if: ",")`

6.4 Utility functions

The following functions may be helpful in the advanced usage and customization of Pergamon.

>> **nn**

Wraps a function in none-handling code. `nn(func)` is a function that behaves like `func` on arguments that are not `none`, but if the argument is `none`, it simply returns `none`. Only works for functions `func` that have a single argument.

Parameters

`nn(func) -> function`

>> **family-names**

Extracts the list of family names from the list of name-part dictionaries. For instance, the `parsed-author` entry of the example in [Figure 6](#) will be mapped to the array `("Bender", "Koller")`.

If `parsed-names` is `none`, the function returns `none`.

Parameters

`family-names(parsed-names) -> array none`

>> **default-bibstring**

The default bibstring table. A bibstring table maps a number of language-independent identifiers to the strings that will be printed in the bibliography (see the `bibstring` parameter of `format-reference`). Modifying the bibstring table can be useful if you want to localize your bibliography to a language other than English, or if your bibliographic conventions differ from those of the standard BibLaTeX style. For instance, to keep the reference style from printing

“In:” with a trailing colon, you could use a bibstring table in which the “in” key maps to “In” rather than “In:”.

This default bibstring table is a verbatim copy of the standard English bibstring table in BibLaTeX. It contains only the “long” versions of these entries; so references will be typeset to print e.g. “Jones, editor”, rather than “Jones, ed.”. You can find this table in the file [bibstrings.typ](#) and modify it to your needs.