Package innerscript v. 1.2 User Guide

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For easy, off-the-shelf use, type the following in your document preamble and compile using LuaLaTeX:

```
\usepackage{innerscript}
```

Overview

The innerscript package optionally modifies four aspects of TeX's automatic math formatting to improve typesetting: (1) it adds extra space around relation and operation symbols in superscripts and subscripts; (2) it removes extra space around `\left`-`\right` delimiter pairs; (3) it adds extra space after right delimiters in certain situations; and (4) it forces `\left` and `\right` delimiters to completely cover their contents. Using LuaLaTeX is required.

For several years before the first release of innerscript, I wondered whether it was possible to adjust two features of TeX's automatic mathematics spacing, namely adding more space in superscripts and subscripts and removing the extra space around `\left`-`\right` delimiter pairs. LuaTeX's extra math-mode primitives make these changes possible, and innerscript grew out of my desire to implement them in my documents. For example, compare the next two lines:

$$\sum_{i=1}^{n} x_i^{1+a} \qquad f(x) = g\left(\frac{1}{x}\right) \qquad x(t)y(t) \qquad \left(\frac{x}{2}\right) \tag{1}$$

$$\sum_{i=1}^{n} x_i^{1+a} \qquad f(x) = g\left(\frac{1}{x}\right) \qquad x(t)y(t) \qquad \left(\frac{x}{2}\right) \tag{2}$$

Equation (1) uses traditional TeX formatting, and equation (2) incorporates the small tweaks characteristic of innerscript. If you like equation (2) more than equation (1), then innerscript is the package for you! This file explains how to load innerscript and enable whichever adjustments you want to use. For version history and documentation of the code, see `innerscript_code.pdf`, which is included with the package installation and is available on CTAN.

Table 1 explains which parts of equation (2) show different aspects of innerscript's be-

Table 1: Package Behavior Shown in Each Part of Equation (2)

Part of equation (2)	Summation	Functions	Product	Fraction
Option shown	`script`	`inner`	`close`	`cover`

Table 2: Package Options for innerscript

Package Option	Meaning
`script`	Change `\scriptstyle` (and cramped style) spacing
`scriptscript`	Change `\scriptscriptstyle` (and cramped style) spacing
`inner`	Use `\mathord` spacing for `\mathinner` subformulas
`close`	Extra space between `\mathclose\mathord` pairs
`cover`	Resizable delimiters (i.e. `\left` and `\right`) fully cover contents
`legacy-script`	Option `script` with legacy spacing (not recommended)
`legacy-scriptscript`	Option `scriptscript` with legacy spacing (not recommended)
`no-script`	No changes to `\scriptstyle` spacing
`no-scriptscript`	No changes to `\scriptscriptstyle` spacing
`no-inner`	No changes to treatment of `\mathinner` subformulas
`no-close`	No changes to `\mathclose` atoms
`no-cover`	No changes to resizable delimiters

havior. At far left, the subscript under the summation symbol and the superscript of x_i have small amounts of extra space around the = and + signs respectively, and at center-left, the g is directly next to the parenthesis. At center-right, the closing parenthesis is offset from the following y, and on the right, the parentheses cover the entire fraction instead of covering only most of it. Using the package will automate some or all of these changes for you depending on which options you specify.

Users can load innerscript with the standard

`\usepackage[`⟨*options*⟩`]{innerscript}`

syntax, and when doing so, you must typeset with LuaTEX. If it detects a different engine, innerscript will raise an error and stop loading, which will prevent it from changing the math in your document. The package provides no user-level commands—rather, you can control its functionality through the twelve options in Table 2. Options `script`, `legacy-script`, and `no-script` determine how innerscript treats superscripts and subscripts. Options `scriptscript`, `legacy-scriptscript`, and `no-scriptscript` are the same except that they deal with second-order superscripts and subscripts. The `inner` option tells TEX to avoid placing extra space around `\mathinner` subformulas, which in practice mostly means that TEX will position `\left`-`\right` delimiter pairs the same way as ordinary variables such as f or g in equation (2). The `close` option adds a small amount of space after a closing grouping symbol, such as a right parenthesis, when it comes before a regular variable or number, and `cover` tells TEX to make sure that resizable delimiters fully cover their contents. The `no-` variants disable formatting adjustments, and by default, innerscript selects the first five options from Table 2.

The `inner`, `close`, and `cover` options are straightforward, but the options `script` and `scriptscript` warrant more explanation. With its usual math formatting, TEX adds small amounts of space between different math-mode characters depending on what types of symbols they represent, and TEX's fine-tuned math spacing is part of what makes it a great

Table 3: Space Inserted by innerscript

Consecutive Atom Types	Option `script`	Option `scriptscript`
`\mathord\mathop`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathord\mathbin`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathord\mathrel`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathord\mathinner`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathop\mathord`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathop\mathop`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathop\mathrel`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathop\mathinner`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathbin\mathord`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathbin\mathop`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathbin\mathopen`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathbin\mathinner`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathrel\mathord`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathrel\mathop`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathrel\mathopen`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathrel\mathinner`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathclose\mathop`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathclose\mathbin`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathclose\mathrel`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathclose\mathinner`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathord`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathop`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathrel`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathopen`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathclose`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathpunct`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathpunct\mathinner`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathinner\mathord`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathinner\mathop`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathinner\mathbin`	0.6`\medmuskip`	0.4`\medmuskip`
`\mathinner\mathrel`	0.6`\thickmuskip`	0.4`\thickmuskip`
`\mathinner\mathopen`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathinner\mathpunct`	0.6`\thinmuskip`	0.4`\thinmuskip`
`\mathinner\mathinner`	0.6`\thinmuskip`	0.4`\thinmuskip`

program for typesetting equations.[1] However, some spacing additions from inline and dis-

[1] TEX classifies math symbols into eight categories: `\mathord` (ordinary), `\mathop` (big operator), `\mathbin` (binary operation), `\mathrel` (relation), `\mathopen` (opening delimiter), `\mathclose` (closing delimiter), `\mathpunct` (punctuation), and `\mathinner` ("inner" subformula). As part of its definition, every math-

Table 4: Factors of \thinmuskip in Legacy Spacing

Skip Used in Current Version	For Option `script`	For Option `scriptscript`
`\thinmuskip`	0.6	0.4
`\medmuskip`	0.7	0.5
`\thickmuskip`	1	0.7

play math don't appear inside superscripts and subscripts. The `script` and `scriptscript` options address this situation by changing the space in superscripts and subscripts to scaled-down versions of the standard spacing rules.[2] Table 3 lists the spacing that innerscript adds under both options.

Finally, in version 1.2, I redesigned the extra space amounts in the `script` and `scriptscript` options, and for backwards compatibility, the `legacy-` options implement the old spacing. In legacy spacing, all space additions are multiples of `\thinmuskip`, and Table 4 lists the factors of `\thinmuskip` from version 1.1. The factors correspond to whether a given row of Table 3 uses `\thinmuskip`, `\medmuskip`, or `\thickmuskip`. For example, the current version of innerscript adds a multiple of `\thinmuskip` between an ordinary math symbol and a large operator, so under legacy spacing, innerscript inserts 0.6`\thinmuskip` in superscripts and subscripts and 0.4`\thinmuskip` in second-order superscripts and subscripts. I changed the package this way so that superscripts and subscripts will parallel inline and display spacing. Now if you set the value of `\thinmuskip`, `\medmuskip`, or `\thickmuskip` before loading innerscript, the adjustment will have the same effect in all parts of your equation.

mode character is assigned a math class. See Donald Knuth, *The TEXbook* (Addison Wesley, 1986), 170; David Salomon, *The Advanced TEXbook* (Springer, 1995), 256–258.

[2]Technically, innerscript scales down the standard spacing twice. The exact length of a `\muskip` register varries proportionally with the surrounding font size, so, for example, a `\thinmuskip` inside a superscript or subscript will be about two-thirds the size of a `\thinmuskip` in regular inline math. If innerscript always inserted the same amounts of muglue between math characters as with inline math, the spacing in superscripts and subscripts would be proportional to inline and display spacing. However, doing so produces math where the symbols appear too far apart, so innerscript scales the muglue by a factor of 0.6 in superscripts and subscripts and by a factor of 0.4 in second-order superscripts and subscripts.