

# SciType

by Canada Type

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# Overview

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Set in Aragon ST  
from Canada Type  
with Nisus Writer Pro  
*Version 1.0 — September 2013*

# Introduction

It's a dream come true for scientists, math teachers, students, journalists and everyone else who has to type a sum, a formula, an algebraic equation or a Greek letter every now and then: [SciType](#), developed by science journalist and type designer Hans van Maanen.

With [SciType](#), you can type phrases like CO<sub>2</sub> per m<sup>3</sup>, numbers like 21//2 and  $6.2 \times 10^{-23}$ , reactions like  $2\text{H}^+ + \text{O}^{2-} \rightarrow \text{H}_2\text{O}$  and even  $c^2 = a^2 + b^2 - 2ab \cos \gamma$ , and they will appear, properly formatted and all, on your screen and in your paper.

With [SciType](#), you can type phrases like CO<sub>2</sub> per m<sup>3</sup>, numbers like 2½ and  $6.2 \times 10^{-23}$ , reactions like  $2\text{H}^+ + \text{O}^{2-} \rightarrow \text{H}_2\text{O}$  and even  $c^2 = a^2 + b^2 - 2ab \cos \gamma$ , and they will appear, properly formatted and all, on your screen and in your paper.

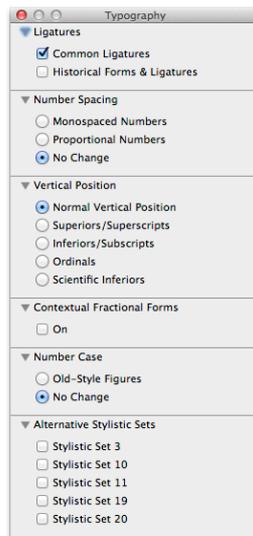
[SciType](#) was developed with OpenType, a technology that almost all modern text applications, both for Windows, Mac and Linux can handle. The first font using [SciType](#) was published by Canada Type in June 2013.

At the moment, OpenType already lets you turn 123 into 'oldstyle' figures 123, superscripts <sup>123</sup> and even lower case text into SMALL CAPS, but [SciType](#) takes the features of OpenType to the next level. If you know how to use OpenType, you know how to use [SciType](#).

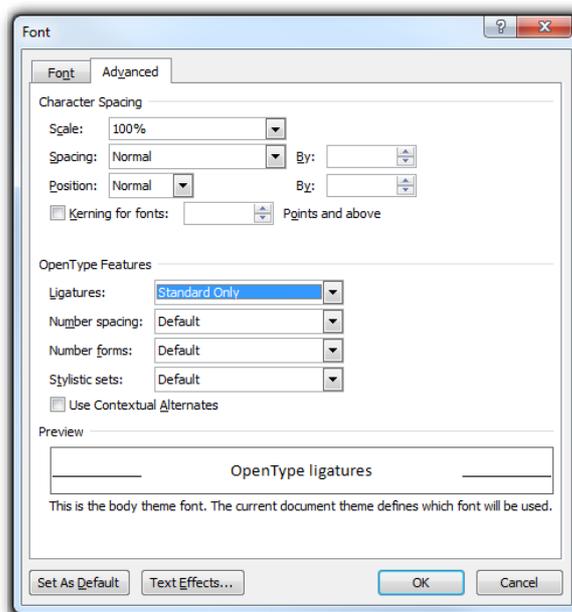
*Note:* Although OpenType is now more than fifteen years old and typography's standard, still not all applications can handle all features, so we'll assume we're moving about in the best of all possible worlds, where everything works as expected. Your mileage may vary, as they say.

# Installing SciType

To install SciType from an ST font, all you have to do is activate **Stylistic Set 20** in your OpenType palette, which should look something like this on a Mac (usually available via *cmd-T*):



and like this in Word for Windows:



# Stylistic Set 20

## Sums

First of all, simple arithmetics. With **Stylistic Set 20** enabled, you'll never have to search for multiplication and minus signs anymore. An x becomes ×, and a hyphen becomes −. Type

$$4 x 3 - 2 = 10$$

and with **Stylistic Set 20** activated, you'll see

$$4 \times 3 - 2 = 10.$$

Some people like to type an asterisk \* as multiplication sign, that works too.

The x and the hyphen are also substituted right before and right after a digit, so typing

$$-1 \text{ and } 2x \text{ a } 3-$$

will be formatted, with **Stylistic Set 20** 'on', as

$$-1 \text{ and } 2 \times \text{ a } 3-.$$

If the font has oldstyle figures, this shows up as

$$-1 \text{ and } 2 \times \text{ a } 3-.$$

Should **Stylistic Set 20** fail to recognize an x or a hyphen as a math symbol, or if you want one in an unexpected place, you can always type \\* (backslash asterisk) or xx for multiplication, and \- (backslash hyphen) or -- for minus.

## Subscripts and superscripts

Scientists have developed the convention to write their exponents and other superscripts with ^ (caret) or \*\* (two asterisks), and subscripts with the \_ (underline). SciType puts this practice to good use to automatically format superscripts and subscripts. With this notation,

$$23 \times 10^3 - 21 = 22,979$$

becomes

$$23 \times 10^3 - 21 = 22,979.$$

Again, it all works with oldstyle figures as well, if the font provides them:

$$23 \times 10^3 - 21 = 22,979.$$

In general, superscripts and subscripts in SciType fonts do not have oldstyle variants: that would defeat their purpose and besides, they look ugly.

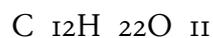
Superscripts and subscripts stay 'on' until SciType encounters a non-number like a space or a comma. Plus and minus count as numbers, so you can simply type

$$662 * 10**-36$$

to get

$$662 \times 10^{-36}.$$

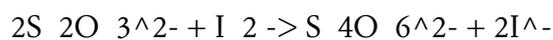
Similarly, with subscripts,



will be formatted as



You can, of course, use them all together. Type



to get the redox reaction



Also, note the arrow conversion: -> (hyphen greater-than) will be turned into an arrow, while equilibrium  $\rightleftharpoons$  can be reached by <->.

Scientists like their subscripts rather big, so H\_2 will show up as H<sub>2</sub>, but many SciType fonts will also provide the usual somewhat smaller OpenType ‘inferiors’, so it’s possible to have n<sub>2</sub> as well (it’s subtle...). You cannot use letters A..Z, a..z and other non-numbers in superscript and subscript, but some future SciType fonts may carry these.

All these number features are also available in Italic SciType-equipped fonts:

*3.28084 × 10<sup>3</sup> feet*

is in Bold:

**3.937 × 10<sup>5</sup> inch.**

## Fractions

OpenType in itself has limited support for fractions: onehalf, onequarter and threequarters, and that's about it: ½, ¼ and ¾ — and even those are a bit of a hassle. With **SciType**, small simple fractions, with just one digit in the numerator and one in denominator, can be produced with a double slash:

1//3 2//5% 46//7 -8//9

will be printed, with **Stylistic Set 20** active, as

$\frac{1}{3}$   $\frac{2}{5}\%$   $4\frac{6}{7}$   $-\frac{8}{9}$ .

Notice how **SciType** leaves the whole parts alone, and takes care of the minus, too.

To make any simple fraction, use the **Fractional Forms** (or whatever it is called in the OpenType menu). For instance, to type  $\frac{355}{113}$  as a fraction, type 355/113, select it, **355/113**, and tick the **Fractional Forms** in the OpenType palette or menu. Or, check **Fractional Forms**, type the fraction, and uncheck. No need to type double slashes.

**Fractional Forms** work with **StylisticSet 20** either on or off.

## Thousands separator

Built into **StylisticSet 20** is the ability to space millions and billions *à la européenne* by replacing the spaces by thin spaces:

the speed of light is 299 789 458 ms<sup>-1</sup>

will then show up as

the speed of light is 299 789 458 ms<sup>-1</sup>.

To produce an explicit thin space, type two brackets `{}` or `\,` (backslash comma), so

the speed of sound is 340 m{s}^s<sup>-1</sup>

will become

the speed of sound is 340 m s<sup>-1</sup>.

## Letters

In algebra and physics, it is customary to write quantities and unknowns *italic* (sloped). This can be quite cumbersome with ordinary typefaces, but **SciType** tries to make it as simple as possible. Put a \$ (dollar) before a character, and it will be printed italic. So

$$\$A = -\$b + 4\$c$$

turns into

$$A = -b + 4c$$

without a second thought. Combining this with the numbers features, it is easy to see how

$$\$c^2 = \$a^2 + \$b^2 \text{ and } \$n = 1//2\ln(\$P_1/\$P_2)$$

become

$$c^2 = a^2 + b^2 \text{ and } n = 1/2\ln(P_1/P_2).$$

Similar to the exponents and subscripts, italics are ‘sticky’: they stay activated until **SciType** encounters a non-letter, so you can just type

$$\$E = \$mc^2$$

to arrive at the obvious result

$$E = mc^2.$$

**Note:** using this feature, you can also print a word (with the regular capitals A..Z and lowercase a..z) in italics on the fly, real \$quick and \$easy, real *quick* and *easy*. However, it is not sensible to type complete italic sentences this way, since spell checking and hyphenation do not always handle these math italics properly.

## Greek

Finally, in most [SciType](#) text fonts it is possible to use Greek letters without selecting and switching and being distracted. Just precede the a with a \ (backslash) to get

`\a`

and with **Stylistic Set 20** turned on, this produces

$\alpha$ .

It's as simple as that. Some more elaborate examples:

`cos \g = 1//2\sqrt{3}, $R_2 > 5 \mu\O, \h^2 = 3.85 ($p < 0.05)`

will turn into

$\cos \gamma = \frac{1}{2}\sqrt{3}, R_2 > 5 \mu\Omega, \chi^2 = 3.85 (p < 0.05)$ .

Here's a list of the Greek letters and how to produce them:

$\alpha$	$\beta$	$\gamma$	$\delta$	$\epsilon$	$\zeta$	$\eta$	$\theta$	$\iota$	$\kappa$	$\lambda$	$\mu$	$\nu$	$\xi$		
<code>\a</code>	<code>\b</code>	<code>\c</code>	<code>\g</code>	<code>\d</code>	<code>\e</code>	<code>\z</code>	<code>\e</code>	<code>\y</code>	<code>\i</code>	<code>\k</code>	<code>\l</code>	<code>\m</code>	<code>\n</code>	<code>\x</code>	
$\omicron$	$\pi$	$\rho$	$\sigma$	$\tau$	$\upsilon$	$\phi$	$\chi$	$\psi$	$\omega$						
<code>\o</code>	<code>\p</code>	<code>\r</code>	<code>\s</code>	<code>\t</code>	<code>\u</code>	<code>\f</code>	<code>\h</code>	<code>\q</code>	<code>\w</code>	<code>\o</code>					
$\Gamma$	$\Delta$	$\Theta$	$\Lambda$	$\Xi$	$\Pi$	$\Sigma$	$\Upsilon$	$\Phi$	$\Psi$	$\Omega$					
<code>\G</code>	<code>\D</code>	<code>\Y</code>	<code>\L</code>	<code>\X</code>	<code>\P</code>	<code>\S</code>	<code>\U</code>	<code>\F</code>	<code>\Q</code>	<code>\W</code>	<code>\O</code>				

**Note:** Following mathematical tradition, Greek uppercase forms are upright and lowercase forms are italic. On the other hand, according to the 'official' rules, mathematical constants and prefixes should be set upright. Hence, we'll also want  $2\pi r$  and  $\mu\text{m}$ . These can be reached in the usual way with the option/alt-keys.

## Extras

SciType fonts carry several other enhancements to make life easier for science types. Here's a small lookup table.

$\times$	$-$	$\pm$	$\approx$	$\neq$	$\div$	$\rightarrow$
<code>\*</code> or <code>xx</code>	<code>\-</code> or <code>--</code>	<code>+-</code>	<code>=~</code>	<code>=/</code>	<code>-:</code>	<code>-&gt;</code>
$'$	$"$	thin space	$\infty$	$\dots$	$\dots$	$\Leftrightarrow$
<code>\'</code>	<code>\''</code>	<code>\}</code> or <code>\,</code>	<code>\0</code>	$\dots$	$\dots$	<code>&lt;-&gt;</code>

The ellipses ( $\dots$  and  $\dots$ ,  $\dots$  and  $\dots$ ) work independently of **Stylistic Set 20**: they are considered to be common ligatures, used not only by science types.

$$\tan 63^{\circ}26'5.82'' = 2$$

$$1\frac{3}{8}''$$

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots = 2$$

$$\varphi = \frac{1}{2}(1 + \sqrt{5}) = 1 + \sin(\pi/10) \approx 1.618\,034\dots$$

**Known bug:** In Mac OS X, the upright pi (option-p) and  $\Omega$  (option-z) do not play well with SciType. We can't seem to get an italic R in  $2\pi R$  or even an italic l in  $2\pi l$ . Typing the italic character first and then backspacing usually works...



Obviously, CAPITALS (and, if available, SMALL CAPITALS), can similarly be constructed with **Stylistic Set 19** ‘on’: ‘Z for **Z**, ‘W for **W**.

For good measure, we’ve thrown in for Spanish phrases the **¿** and the **¡**, for music lovers the **b** and the **#**, and for Europeans the official euro sign, **€**.

**Note.** Beware, again, that inserting characters like this, throws spell checking and hyphenation off the scent.

## Extras

For people who prefer the official euro sign above the designer's: with **Stylistic Set 3**, all €-signs will become official €'s. Even in bold and italic, because there is just one official euro-sign.

In French, it seems to be considered good taste to leave a bit of room between the guillemets and other punctuation marks. **SciType**-equipped fonts take care of this automatically, with or without **Stylistic Set 19**: a space will be converted to a thin space. So

Il demande : « C'est vrai ? » « Mais oui ! »

will be rendered as

Il demande : « C'est vrai ? » « Mais oui ! »

The *ela geminada* in Catalan, ll, can be typed as ll.

Finally, many Dutch cling to the tradition that their ij is a separate character — they say that *ijzer* (iron) is just a four-letter word. The uppercase ij is IJ, as in *IJzer* (Yser). Many vintage Dutch font designs have a separate, calligraphic ij in the italic. **SciType** fonts honor the tradition and have a special italic ij, *ij*, as in *ijzer*. With **Stylistic Set 11**, the Dutch can turn all their *ij*s into *ij*s.

On a typophile note, if the ij is a separate letter, the fi-ligature would look a bit off in a word like *fijn* (fine), let alone *fijn*. **SciType** solves this problem by disassembling the ligature fi if it is followed by a j.

## SciType and Unicode

SciType is, in a way, a ‘hack’ — a makeshift solution for the long-standing problem of writing science quickly and effortlessly. As such, it is an input method, not a re-encoding tool. This means that if you copy text from a SciType font to a non-SciType font, the text will revert back to what it originally was. Furthermore, applications that do not understand Stylistic Sets (or any OpenType at all), will be at a loss and also reproduce the original glyph stream.

This may be just fine for your own mails and papers and talks, but if you have to produce a proper, modern Unicode document for posterity, this will not do. In that case, for example,  $a^2$ ,  $\$a^2$ , should not be the Unicode stream U+0024 U+0061 U+005E U+0032 (i.e., DOLLAR SIGN, LATIN SMALL LETTER A, CIRCUMFLEX ACCENT, DIGIT TWO), but U+1D44E U+00B2 (MATHEMATICAL ITALIC SMALL A, SUPERSCRIPT TWO). So in this case, you want to directly re-encode the  $a$  to U+1D44E and the  $^2$  to U+00B2.

To do this, you could use a utility like TextExpander ([www.smilesoftware.com/textexpander](http://www.smilesoftware.com/textexpander)) or Keyboard Maestro ([www.keyboardmaestro.com](http://www.keyboardmaestro.com)) or a similar macro utility for Windows. With these, it is possible to type, e.g.,  $\backslash a$  and have the application insert Unicode character U+1D6FC (MATHEMATICAL ITALIC SMALL ALPHA) from the SciType font into the glyph stream. Hence, the result is pure Unicode. With, of course, the main disadvantage being that any font not recognizing these Unicode characters will now probably show a difficult-to-interpret ‘not-found’ symbol.

It all depends on the purpose of the text which method is preferable; more details and ready-made macros for TextExpander can be found at [www.vanmaanen.org/fonts/scitype](http://www.vanmaanen.org/fonts/scitype).

## Conclusion

SciType fonts, either with OpenType or a text expanding utility, are meant to make popular scientific writing easier by supplying typing shortcuts to the most-used typographical conventions in mathematics, chemistry and other sciences. It is, again, not intended as a full-fledged mathematical typesetting system like LaTeX or an Equation Editor, nor as a re-encoding engine for Unicode streams. It's supposed to be lean and mean, yet powerful enough to handle the numbers scientifically-trained writers use in their everyday correspondence, notes, presentations and e-mails.

And it's only version 1.0, so we'd be interested to hear feature requests, bug reports, and other praise!

**Note:** SciType is OpenSource. Designers wishing to implement, modify or expand the features in their fonts, may contact Canada Type for further information: [patrick@canadatype.com](mailto:patrick@canadatype.com).

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