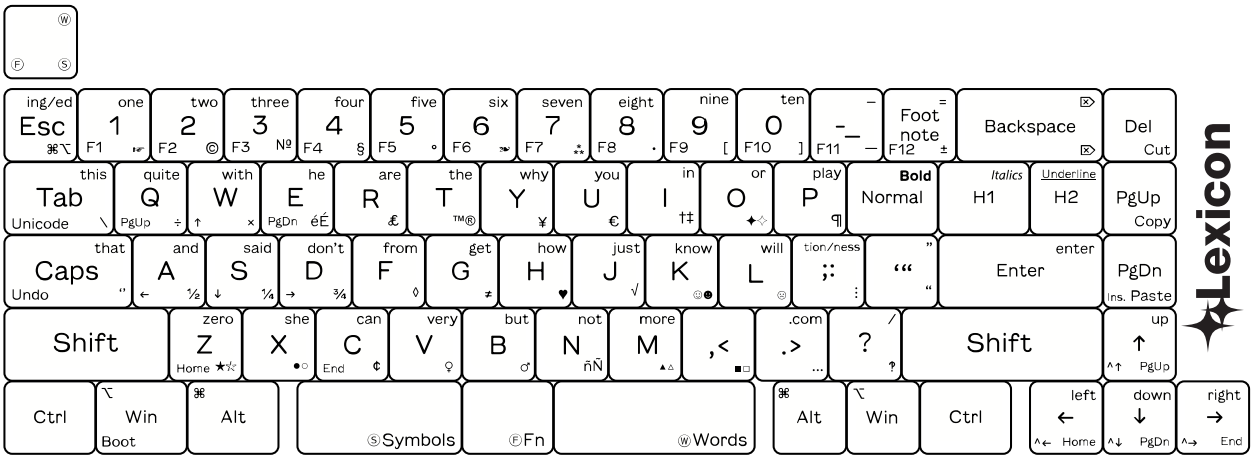
Lexicon User’s Guide

Version 1.0

☞ The Lexicon is a mechanical keyboard made for writing. It can’t make you a better writer, but it does put essential punctuation and shortcuts in easy reach. It even has shortcuts that type out whole words for you!



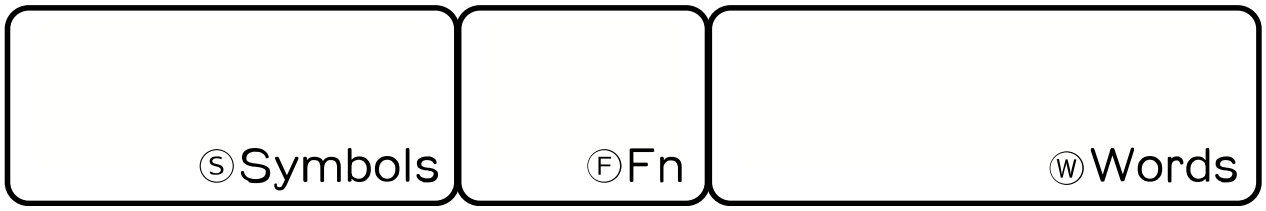
The Lexicon uses the QMK open-source firmware package (**qmk.fm**). You don’t have to learn how to customize the QMK keymap to use the keyboard, but that’s a powerful way to change the keyboard’s functionality to your liking. It also uses the power of the Raspberry Pi RP2040 controller chip, allowing for complex firmware with many features. Even with everything the Lexicon already uses, there’s plenty of room for anything you might want to add.

Compatibility

The Lexicon will work with most devices that take input from standard USB HID keyboards, including Windows, macOS, and Linux computers, as well as Chromebooks and Android and iOS devices. The Symbols layer (see below) relies on Unicode input and may not work on all platforms.

The Space Bars

The heart of the Lexicon's unique functionality is accessible via its three space bars. Each one produces a space when pressed briefly and activates a different set of key functions when held down.



- The leftmost is the **Symbols** key. This makes the keys produce various Unicode symbols. In this manual the Ⓢ symbol represents the Symbols key.
- The small middle space is for the **Function** layer, which gives you access to function keys and other special commands. In this manual the Ⓕ symbol represents the Function space.
- The largest, rightmost space is the **Words** key. The Words layer has shortcuts that produce whole words. In this manual the Ⓦ symbol represents the Words key.

In this manual the ⇧ symbol represents the Shift key; both the Symbols and Words layers have capabilities that use Shift. Also, although the Words and Symbols layers are mostly for the things in their names, there are a few exceptions to make certain functions easier to access.

Meet Lexi

If you look at the Lexicon's bottom plate, you'll see artwork of Lexi, the keyboard's mascot character, by retrotv5000 (**retrotvart.com**). Lexi is a vivacious young typist from an idealized version of the 1960s, sporting a flip hairstyle and mod dress. Check your packaging for a free Lexi sticker!

Shortcut Keys

The Lexicon has several keys assigned to various hotkeys for common functions in various word processors. In the default firmware they're based on the hotkeys for Microsoft Word on Windows; there are alternate keymaps and compiled firmware profiles for several other combinations of OS and word processor.

Keystrokes marked with an asterisk are those that the user has to configure in the word processor themselves, explained in greater detail below.

Command	Windows	macOS
Undo	Ctrl-Z	⌘Z
Bold	Ctrl-B	⌘B
Italics	Ctrl-I	⌘I
Cut	Ctrl-X	⌘X
Copy	Ctrl-C	⌘C
Paste	Ctrl-V	⌘V

Microsoft Word

Command	Word (Windows)	Word (macOS)
"Normal" Style	Ctrl-Shift-N	⌘⇧N
"Heading 1" Style	Ctrl-Alt-1	⌘⌥1
"Heading 2" Style	Ctrl-Alt-2	⌘⌥2
Footnote	Ctrl-Alt-F	⌘⌥F

The Android and iOS versions of Word use the same keyboard shortcuts as the Windows and macOS versions respectively.

Google Docs

Command	Google Docs	gDocs (macOS)
"Normal" Style	Ctrl-Alt-0 (zero)	⌘⌥0 (zero)
"Heading 1" Style	Ctrl-Alt-1	⌘⌥1
"Heading 2" Style	Ctrl-Alt-2	⌘⌥2
Footnote	Ctrl-Alt-F	⌘⌥F

The Android and ChromeOS versions of Google Docs use the same shortcuts as on Windows, while the iOS version uses the same shortcuts as on macOS.

LibreOffice

Command	LibreOffice Writer	LibreOffice (macOS)
“Normal” Style	Ctrl-0	⌘0
“Heading 1” Style	Ctrl-1	⌘1
“Heading 2” Style	Ctrl-2	⌘2
Footnote	*Ctrl-Shift-F	*⌘⌥F

LibreOffice does not have a shortcut for footnotes by default, but you can define one yourself. To create a new shortcut, open Tools > Customization, then click the Keyboard tab. Select the “Insert” Category and the “Footnote” function, then pick a key combination under Shortcut Keys, and finally click the Assign button. The pre-made Lexicon keymaps use the Word shortcuts (Ctrl-Shift-F or ⌘⌥F on macOS).

Pages

Command	Pages (macOS)
“Normal” Style	*F8
“Heading 1” Style	*F1
“Heading 2” Style	*F2
Footnote	*⌘⌥F

Pages does not have keyboard shortcuts for styles or footnotes by default.

To assign a shortcut to a style, open the list of styles, click the > to the right of the style’s name, and select a Function key under Shortcut.

To assign a shortcut to creating a footnote, open the Keyboard section of System Preferences, click “Keyboard Shortcuts…”, click “App Shortcuts,” click +, select Pages, enter “Footnote” as the Menu title, and finally enter your desired keystroke under “Keyboard shortcut.”

Symbols Layer

The Symbols layer provides quick access to numerous characters and typographical marks. Some are very common symbols used in writing, but most are a whimsical selection of typographical oddities.

Most of these use Unicode output, so the keyboard and your OS have to be configured correctly for them to work. If these key combinations don't work or produce a seemingly random series of numbers or characters, it isn't set up properly.

Changing Modes

To change the keyboard's Unicode output mode, press ⒻTab to cycle between WinCompose, macOS, and Linux modes. The keyboard will remember which mode is selected even when it's unplugged or the device it's connected to is shut down.

Windows

Using Unicode output in Windows require installing a free app called WinCompose, available at **wincompose.info**. Once it's installed and running, it should recognize Unicode input from the Lexicon.

macOS

In macOS you will need to enable Unicode Hex Input. Open System Settings > Keyboard, go to Text Input, click Edit..., click the +, scroll to the bottom and select Others and Unicode Hex Input. You can then switch to Unicode Hex Input. It's easier to do this if you click "Show Input menu in menu bar," which will then let you click to select which input mode you want.

Since this mode uses the Option key, you will not have access to the usual macOS character shortcuts that use it while Unicode Hex Input is active. Also, note that changing which key produces Option can cause Unicode input from the keyboard to stop working.

Linux

For Linux, the firmware is using the Ctrl-Shift-U shortcut. Most Linux distributions include this shortcut, but not all. Since **ChromeOS** is based on Linux, the Linux mode should work on Chromebooks.

Ⓢ1	manicule	☞
Ⓢ2	copyright	©
Ⓢ3	numero	№
Ⓢ4	section	§
Ⓢ5	degree	°
Ⓢ6	fleuron	❧
Ⓢ7	asterism	⁂
Ⓢ8	Bullet	•
Ⓢ9	left bracket	[
ⓈO	right bracket	]
Ⓦ-	en dash	–
Ⓦ"	close quote	”
Ⓢ"	open quote	“
Ⓢ,	box 1	■
⇧Ⓢ,	box 2	□
Ⓢ.	ellipsis	…
Ⓢ:	tricolon	⋮
Ⓢ?	interrobang	⁉
Ⓢ-	em dash	—
Ⓢ+	plus or minus	±
ⓈA	half	½
ⓈB	Male	♂
ⓈC	cent	¢
ⓈD	three quarters	¾
ⓈE	accent E	é
⇧ⓈE	capital accent E	É
ⓈF	lozenge	◊
ⓈG	not equal	≠

ⓈH	heart	♥
ⓈI	dagger	†
⇧ⓈI	double dagger	‡
ⓈJ	root	√
ⓈK	smile 1	☺
⇧ⓈK	smile 2	☻
ⓈL	frown	☹
ⓈM	triangle 1	▲
⇧ⓈM	triangle 2	△
ⓈN	enye	ñ
⇧ⓈN	capital enye	Ñ
ⓈO	4-pointed star 1	✦
⇧ⓈO	4-pointed star 2	✧
ⓈP	pilcrow	¶
ⓈQ	bolus	÷
ⓈR	pound	£
ⓈS	quarter	¼
ⓈT	trademark	™
⇧ⓈT	registered	®
ⓈU	euro	€
ⓈV	female	♀
ⓈW	multiplication	×
ⓈX	circle 1	●
⇧ⓈX	circle 2	○
ⓈY	yen	¥
ⓈZ	star 1	★
⇧ⓈZ	star 2	☆

ⓈTab	backslash	\
Ⓢ⇧Tab	pipe/vertical bar	|
Ⓢ⇧9	left curly bracket	{
Ⓢ⇧0	right curly bracket	}
ⓌFootnote	equals sign	=
Ⓦ⇧Footnote	plus sign	+
ⓈFootnote	plus or minus	±
ⓈEsc	Command	⌘
Ⓢ⇧Esc	Option	⌥
ⓈCaps	open single quote	‘
⇧ⓈCaps	close single quote	’

Ⓢ↑	PgUp
Ⓢ↓	PgDn
Ⓢ←	Home
Ⓢ→	End
ⓈBackspace	Delete
ⓈDel	Cut
ⓈPgUp	Copy
ⓈPgDn	Paste

Win-Esc	`
Shift-Esc	~

Grave Escape

If you’re looking for the key with the tilde ~ and grave accent `, the Lexicon uses a QMK feature called the “grave escape.” When used normally, Escape is an ordinary Escape key, but Shift-Escape gives you a tilde and Windows-Escape (or ⌘Esc in macOS) gives you a grave accent.

Words Layer

Holding down the Words space bar activates the Words Layer. On that layer, each letter key produces a specific word, as do certain other keys. Word shortcuts are typed without spaces before or after, so you'll need to add spaces yourself.

Capitalization

Holding Shift while using a word shortcut will give you that word with the first letter capitalized. For example, holding Shift and pressing ⓌP would give you "Play" instead of "play." There are also a handful of instances where using Shift will produce something entirely different.

This will only happen for the first word shortcut you use in a given instance of holding down the Shift key, so you will have to release Shift and press it again to use the capitalization feature on multiple consecutive words.

ⓌA	and
ⓌB	but
ⓌC	can
ⓌD	don't
ⓌE	he
ⓌF	from
ⓌG	get
ⓌH	how
ⓌI	in
ⓌJ	just
ⓌK	know
ⓌL	will
ⓌM	more
ⓌN	not
ⓌO	or

ⓌP	play
ⓌQ	quite
ⓌR	are
ⓌS	said
ⓌT	the
ⓌU	you
ⓌV	very
ⓌW	with
ⓌX	she
ⓌY	why
ⓌZ	zero
ⓌTab	this
ⓌCaps	that
ⓌEsc	ing
⇧ⓌEsc	ed

Ⓦ1	one
Ⓦ2	two
Ⓦ3	three
Ⓦ4	four
Ⓦ5	five
Ⓦ6	six
Ⓦ7	seven
Ⓦ8	eight
Ⓦ9	nine
Ⓦ0	ten
Ⓦ⏎	enter
Ⓦ↑	up
Ⓦ↓	down
Ⓦ←	left
Ⓦ→	right

ⓌCaps	tion
⇧ⓌCaps	ness
Ⓦ.	.com
⇧Ⓦ.	.net
Ⓦ?	/
Ⓦ⌫	Delete

Word Combos

A “combo” is a keyboard feature where pressing multiple keys simultaneously produces different output. The Lexicon has a set of two-key combos to add more shortcuts to type common words.

Capitalization

You can also capitalize words from word combos, but this works differently from the Words layer. To capitalize a word combo, tap the Shift key and the two letter keys at the same time. Holding Shift and pressing SG will produce “SOMETHING,” but pressing S, G, and Shift at the same time produces “Something.”

Timing

The firmware has a value called `COMBO_TERM` (in the keymap’s config.h file), which determines the length of the time window for entering a combo. Depending on your typing habits, you may find it easier to change this value, to ensure that you aren’t accidentally entering combos when you don’t mean to or not getting them when you want to. If they don’t work for you, you can disable them entirely.

Creating New Combos

The firmware stores the definitions for combos in a “combos.def” file; you can modify or add to these by following the same format. For example:

```
SHIFT_SUBS(SG_SOMETHING,    "something",    "Something",    KC_S, KC_G)
```

“SG_SOMETHING” is an ID for the combo, which needs to be unique among the labels used in the keyboard firmware. The word to be typed appears in quotes, and has both lower case and capitalized versions, the latter being what shows up when you hold Shift when using the combo. Lastly there are the keycodes for the keys the user will press simultaneously to activate the combo. You can find a list of keycodes available in QMK here:

`https://github.com/qmk/qmk_firmware/blob/master/docs/keycodes.md`

Note that although the firmware will compile, combos that use keys assigned to layer-tap or mod-tap functions will not work. On the Lexicon that means you can’t use Space in any combos unless you change one of the space bars to only be used for `KC_SPC`.

able	BL
about	AB
after	AF
already	LR
also	AL
another	NR
any	NY
anything	AG
aren't	AR
back	BK
because	BC
been	BN
before	BF
being	BG
come	CM
company	CP
could	CO
didn't	DI
doesn't	DT
easy	EZ
enough	NF
especially	SP
even	EN
first	FI
for	FR
give	GI
good	GD
guy	GY
had	HD
hahaha	HA
has	HZ

have	HV
idea	YD
important	PR
into	NO
keep	KP
know	KN
like	LE
little	LI
look	LK
make	MK
more	ME
need	ND
new	NU
nothing	NG
okay	OK
only	OY
other	OR
out	OT
over	OV
people	PL
please	PZ
really	RY
remember	RM
should	SO
shouldn't	SN
some	SM
somebody	SB
something	SG
still	ST
stuff	SF
take	TE

than	TA
their	TR
them	TM
then	TN
there	TH
these	TZ
they	TY
they're	T'
thing	TG
think	TK
though	ZO
time	TI
until	NL
use	UZ
very	VY
want	WT
was	WA
wasn't	WN
way	WY
well	WL
were	WR
what	WH
when	WE
which	WI
work	WK
would	WO
yes	YS
your	YO
you're	UR
you've	UF

Function Layer

The Function Layer, accessed with the small middle space, includes additional keystrokes not covered elsewhere in the Lexicon's layout. This includes the function keys, as well as alternate navigation keys so you can access those with just your left hand.

Ⓕ1-0	F1-F10	ⒻW	↑	**macOS Navigation Keys**	
Ⓕ- (dash)	F11	ⒻA	←	Ⓕ↑	⌘↑
ⒻFootnote	F12	ⒻS	↓	Ⓕ↓	⌘↓
Ⓕ↑	Ctrl-↑	ⒻD	→	Ⓕ←	⌥←
Ⓕ↓	Ctrl-↓	ⒻQ	Page Up	Ⓕ→	⌥→
Ⓕ←	Ctrl-←	ⒻE	Page Down		
Ⓕ→	Ctrl-→	ⒻZ	Home		
ⒻBackspace	Delete	ⒻC	End		
ⒻCaps	Undo	ⒻPgDn	Insert		

Bootloader

Pressing Ⓕ and the left Windows key (or the left Option key on macOS layouts) will put the keyboard into bootloader mode for flashing new firmware. If you do this unintentionally, the keyboard will stop responding to keystrokes, but you can just unplug it and plug it back in again.

Unicode

As noted in the section on the Symbols layer, pressing ⒻTab cycles through WinCompose, macOS, and Linux Unicode input modes.

Flashing the Firmware

Because the Lexicon runs an RP2040 chip, the compiled firmware takes the form of .uf2 files. If you have the .uf2 file available, it's fairly easy to re-flash your keyboard with that profile.

There are two methods for putting the keyboard into bootloader mode:

- The PCB has a reset button on the bottom, below the USB connector. The bottom plate has a hole that lets you press the button with a screwdriver or similar. Hold the button down while plugging it in.
- Hold the Function spacebar and press the left Windows key (or the left Option key on macOS).

Either one should make the keyboard's controller appear as a disk drive called RPI-RP2. Drag the .uf2 file into this drive, and the keyboard will reset and begin running the new firmware.

There are several pre-compiled .uf2 files available, to cover different word processors, operating systems, and uses:

default	Word for Windows
macword	Word for macOS
libreoffice	LibreOffice Writer on Windows or Linux
libremac	LibreOffice Writer on macOS
gdocs	Google Docs on Windows, Linux, or ChromeOS
gdocsmac	Google Docs on macOS
pages	Pages on macOS
basic	A keymap that removes the Lexicon features, making it act like a standard 65% keyboard.
via	A version of the Basic keymap with support for the VIA customization app, available at caniusevia.com. See below for instructions on how to use it with the Lexicon.

Note that the macOS versions transpose the Alt and Windows keys to match how the Option and Command keys are laid out on Mac keyboards.

You Can Use VIA

To use VIA on that version of the firmware, you'll need to go to **usevia.app** in a web browser with WebHID support. Most current browsers have that, though Firefox is a notable exception.

1. Click the gear icon to access settings.
2. Toggle "Show Design tab" to ON.
3. Click the paintbrush icon for the Design tab.
4. Click the "Load" button and then select the lexicon69.json file.

You should now be able to edit the keymap in VIA's Configure tab.

Modifying the Firmware

To modify and compile firmware on your own, you'll need to set up a command line environment for QMK. In Windows that means installing QMK MSYS, while for macOS or Linux you'll instead add QMK to your system's terminal. Visit **qmk.fm** to learn more.

This manual notes some places where you may want to modify the firmware, but of course you can change it as much as you want. QMK's directory has a keyboards folder, in which you can find the profiles for various keyboards. These are in simple C code, and you can make changes with a text editor. You'll need to move the lexicon69 folder into your keyboards folder; you'll then be able to compile Lexicon firmware from the command line.

The aliases.c file defines a series of keycodes for the formatting shortcuts, which the keymaps reference. You can quickly switch to shortcuts for different platforms and software by changing which sets of keycodes have comment markers `/* */` in the file, without having to alter them in the keymap.

Once you have your modifications ready, open MSYS or your terminal, go to the QMK directory (typically "`cd qmk_firmware`"), and then "`make:lexicon:default`" (or replace "default" with the name of your keymap). That should compile the firmware, though of course there may be errors to contend with. Once it's compiled you can flash it as explained above, though from there it's best to test it to ensure that the compiled firmware functions how you want.

Tips

- The word shortcuts are there if you want to use them, but it's totally fine if you don't, whether you miss the opportunity once in a while or decide to ignore them entirely. Using them can make you think more about the specific words you're using; whether that's helpful is for you to decide.
- If the app you're using has automatic suggestions, they can further help you along. When grayed-out words appear ahead of the cursor, you can typically press Tab or right arrow to accept them, or just ignore them and keep typing.
- Caps Lock affects word shortcuts just like with normal typing.
- Capitalizing word combos is generally easier if you press Shift with a hand not busy with hitting the letter keys.
- You can use the word shortcuts to produce part of a word and add more. If you want to type "note," you can press ⓌN for "not" and then type the E. You can even combine shortcuts; for example, pressing SM followed by Ⓦ1 will give you "someone."
- If you're using multiple consecutive Words layer shortcuts, you can hold the Words spacebar down and use the Symbols and Function spacebars to add spaces between the words.
- While the functionality of word shortcuts is useful, it does create exciting new kinds of typos, which you'll want to be aware of when proofreading text written with a Lexicon. Watch for missing and extraneous words and chunks of words, as well as incorrect words.
- The Shift key works on standard symbols even when you're using them via a layer. For example, if you need curly brackets, that would be ⇧Ⓢ9 and ⇧ Ⓢ0. Virtually any keystroke available on a standard keyboard is on the Lexicon in some form.
- Since the space bars double as the means to access alternate layers, you can't enter a bunch of spaces by holding them down, but since there are three of them, you can mash on all of them instead.
- You can use the Lexicon for things other than writing, though it may not be as good for some purposes. With a few exceptions like text adventure games ("ⓌG lamp"), keymaps with Lexicon's special functions won't be good for gaming. If you do want to use it for a typical computer game, we recommend flashing it with the Basic or VIA firmware.

Trivia

- If you really enjoy getting words out with simple shortcuts, check out steno via the Open Steno Project at **openstenoproject.org**. The Lexicon's word shortcuts give you kind of a light form of steno, and many of its combos are based on steno chords.
- If you know the Lexicon word shortcuts well enough, you can use them as a simple shorthand when writing. Try writing the letter(s) for a shortcut and underlining them. For example, "Why did he get something from there?" could be "Y did e g sg f th?" Save time and baffle your friends!
- The four solder points in a row on the PCB are an SWD (single wire debug) interface, a common feature used for debugging. If you end up using it for something let us know, because that sounds neat.
- The Lexicon is also known as the Lexicon 69 (because it has 69 keys), or the Cluney №3 (because it's Ewen Cluney's third keyboard design).
- The Lexicon takes some aesthetic inspiration from the Olivetti Valentine portable typewriter. For the full effect, use black or dark gray keycaps.
- The inspiration for word shortcuts came from the Sinclair ZX Spectrum's BASIC programming shortcuts.

Credits

Keyboard design and manual by Ewen Cluney

PCB design by Supul/circuitwork32

Additional design and firmware assistance by DeskDaily

Word shift programming by Phoebe Zeitler

Lexi art by retrotv5000 (**retrotvart.com**)

Testing by C. Ellis, Steven Savage, Phoebe Zeitler

Special thanks to Marcin Wichary, Mirabai Knight, SethSempai, Vladimir Glushkov, Danny Nguyen, Clay Gardner


Ⓦ
Ⓕ Ⓢ
ing/ed Esc ⌘⌥
one 1 F1
two 2 F2 ©
three 3 F3 №
four 4 F4 §
five 5 F5 °
six 6 F6
seven 7 F7
eight 8 F8 ·
nine 9 F9 [
ten 0 F10]
– -_ F11 —
= Foot note F12 ±
Backspace
Del Cut
this Tab Unicode \
quite Q PgUp ÷
with W ↑ ×
he E PgDn éÉ
are R €
the T ™®
why Y ¥
you U €
in I ††
or O ✦✧
play P ¶
Bold Normal
Italics H1
Underline H2
PgUp Copy
that Caps Undo ‘’
and A ← ½
said S ↓ ¼
don't D → ¾
from F ◊
get G ≠
how H ♥
just J √
know K ☺☻
will L ☹
tion/ness ;: ⋮
” “ “
enter Enter
PgDn Ins. Paste
Shift
zero Z Home ★☆
she X ●○
can C End ¢
very V ♀
but B ♂
not N ñÑ
more M ▲△
,< ■□
.com .> …
/ ? ⁉
Shift
up ↑ ^↑ PgUp
Ctrl
⌥ Win Boot
⌘ Alt
Ⓢ Symbols
Ⓕ Fn
Ⓦ Words
⌘ Alt
⌥ Win
Ctrl
left ← ^← Home
down ↓ ^↓ PgDn
right → ^→ End
Lexicon