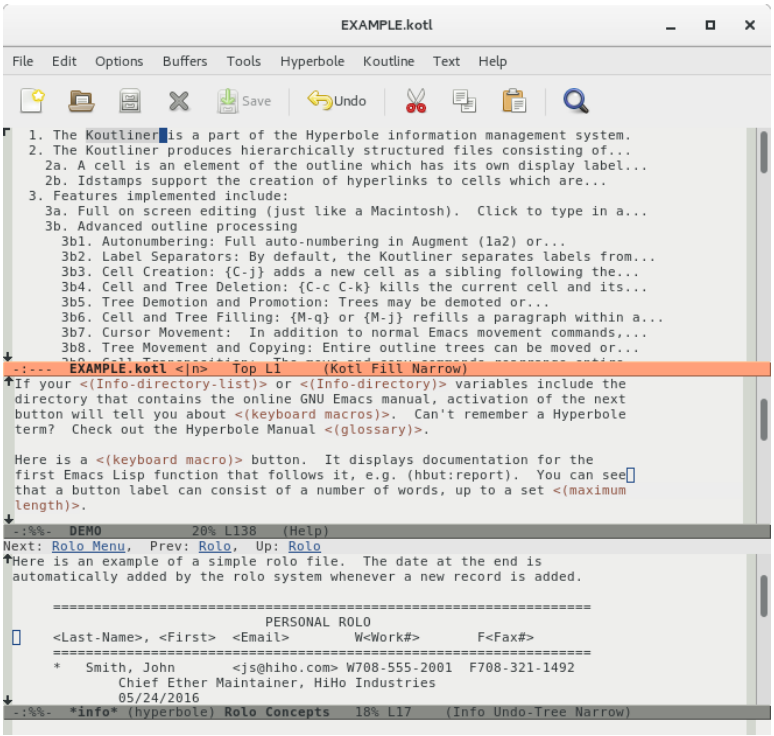
GNU Hyperbole Manual

The Everyday Hypertextual Information Manager



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The body of the manual was written in Emacs and laid out using the GNU Texinfo markup language.

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GNU Hyperbole

GNU Hyperbole was designed and written by Bob Weiner. See Appendix B [Setup], page 101, for information on how to obtain and to install Hyperbole.

This manual explains user operation and summarizes basic developer facilities of GNU Hyperbole. Hyperbole provides convenient access to information, control over its display and easy linking of items across documents and across the web. The Hyperbole Koutliner offers flexible views and structure manipulation within bodies of information.

We hope you enjoy using Hyperbole and that it improves your productivity. If it does, consider sending us a quote or short note discussing how it helps you. We may use your submission to help promote further use of Hyperbole; all submissions will be considered freely reusable and will fall under the same license as Hyperbole. E-mail your quote to <hyperbole-users@gnu.org>. We volunteer our time on Hyperbole and love to hear user stories in addition to any problem reports.

Before we delve into Hyperbole, a number of acknowledgments are in order. Many thanks to Mats Lidell, a long-time Hyperbole user and developer, who maintains Hyperbole with me and with whom I enjoy interacting. Peter Wegner and Morris Moore encouraged the growth of this work. Douglas Engelbart showed us the bigger picture and will forever be an inspiration. His life-long quest at augmenting individual and team capabilities represents a model from which we continue to draw. Chris Nuzum has used Hyperbole since its inception, often demonstrating its power in creative ways. The Koutliner is dedicated to my lovely wife, Kathy.

1 Introduction

This edition of the GNU Hyperbole Manual is for use with any version 9.0.0 or greater of GNU Hyperbole. Hyperbole runs atop GNU Emacs 27.1 or higher. It will trigger an error if your Emacs is older.

This chapter summarizes the structure of the rest of the manual, describes Hyperbole, lists some of its potential applications, and explains how to subscribe to its mail lists.

Throughout this manual, sequences of keystrokes are delimited by curly braces `{ }`; function and variable names use this `typeface`.

In brief, Hyperbole lets you:

- Quickly create typed hyperlink buttons either from the keyboard or by dragging between a source and destination window with a mouse button depressed. Activate Hyperbole buttons by pressing/clicking on them or by name;
- Activate many kinds of *implicit buttons* recognized by context within text buffers, e.g. URLs, pathnames with section anchors, grep output lines, and git commits. A single key, `{M-RET}`, or mouse button automatically does the right thing in dozens of contexts; just press and go;
- Build outlines with multi-level, numbered outline nodes, e.g. 1.4.8.6, that all renumber automatically when any cell (node) or tree is moved in the outline. Each cell also has a permanent hyperlink anchor that you can reference from any other cell;
- Manage all your contacts or record-based, unstructured texts quickly with hierarchical categories; each entry can have embedded hyperbuttons of any type. Or create an archive of documents with hierarchical entries and use the same search mechanism to quickly find any matching entry;
- Use single keys to easily manage your Emacs windows or frames and quickly retrieve saved window and frame configurations;
- Search for things in your current buffers, in a directory tree or across major web search engines with the touch of a few keys.

1.1 Manual Overview

Hyperbole is an efficient, programmable hypertextual information management system. It is intended for everyday work on any GNU Emacs platform. Hyperbole allows hypertext buttons to be embedded within unstructured and structured files, mail messages and news articles. It offers intuitive keyboard and mouse-based control of information display within multiple windows. It also provides point-and-click access to Info manuals, ftp archives, and the World-Wide Web.

This is a reference manual with extensive details about Hyperbole use. If you prefer a simpler, more interactive introduction to Hyperbole, the `FAST-DEMO` file included in the Hyperbole distribution demonstrates many of Hyperbole's standard facilities without the need to read through this reference manual. The `FAST-DEMO` is a good way to rapidly understand some of what Hyperbole can do for you. Once Hyperbole is installed, (see Appendix B [Setup], page 101), you can access the `FAST-DEMO` with the key sequence `{C-h h d d}`.

See Appendix A [Glossary], page 92, for definitions of Hyperbole terms. In some cases, terms are not precisely defined within the body of this manual since they are defined within the glossary. Be sure to reference the glossary if a term is unclear to you. Although you need not have a keen understanding of all of these terms, a quick scan of the glossary helps throughout Hyperbole use.

See Appendix B [Setup], page 101, for explanations of how to obtain, install, configure and load Hyperbole for use. This appendix includes information on user-level settings that you may want to modify after you understand Hyperbole's basic operation.

See Appendix F [Suggestion or Bug Reporting], page 154, for instructions on how to ask a question, suggest a feature or report a bug in Hyperbole. A few commonly asked questions are answered in this manual, see Appendix G [Questions and Answers], page 155. If you are interested in classic articles on hypertext, see Appendix I [References], page 159.

See Chapter 3 [Smart Keys], page 12, for an explanation of the innovative, context-sensitive mouse and keyboard Action and Assist Keys offered by Hyperbole. See Appendix E [Smart Key Reference], page 125, for a complete reference on what the Action and Assist Keys do in each particular context they recognize. See Section 3.3 [Smart Key Argument Selection], page 15, for how Hyperbole speeds selection of values when prompting for arguments.

Keep in mind as you read about using Hyperbole that in many cases, it provides a number of overlapping interaction methods that support differing work styles. In such instances, you need learn only one technique that suits you.

See Chapter 4 [Buttons], page 24, for an overview of Hyperbole buttons and how to use them.

See Chapter 5 [Menus], page 48, for summaries of Hyperbole menu commands and how to use the minibuffer-based menus that work on any display that Emacs supports.

See Chapter 6 [HyControl], page 53, for how to quickly and interactively control what your Emacs windows and frames display and where they appear.

See Chapter 7 [Koutliner], page 59, for concept and usage information on the autonumbered, hypertextual outliner. See Appendix D [Koutliner Keys], page 117, for a full summary of the outliner commands that are bound to keys.

See Chapter 8 [HyRolo], page 73, for concept and usage information on the rapid lookup, hierarchical, full-text record management system included with Hyperbole.

See Chapter 9 [Window Configurations], page 81, for instructions on how to save and restore the set of buffers and windows that appear within a frame. This feature lets you switch among working contexts easily, even on a dumb terminal. Such configurations last throughout a single session of editor usage only.

See Chapter 10 [Developing with Hyperbole], page 83, if you are a developer who is comfortable with Lisp.

See Appendix H [Future Work], page 157, for future directions in Hyperbole's evolution.

1.2 Motivation

Database vendors apply tremendous resources to help solve corporate information management problems. But the information that people deal with in their everyday worklife is

seldom stored away in neatly defined database schemas. Instead it is scattered among local and remote files, e-mail messages, faxes, voice mail and web pages.

The rise of the web has demonstrated how hypertext technologies can be used to build massive organized repositories of scattered information. But assembling information for the web still remains a great challenge and the data formats of the web are too structured to deal with the wide variety of information that people process. Modern web development requires the use of many languages: HTML, JavaScript, and CSS. This in itself prevents its use as the prime means of organizing and interlinking the constant flows of daily information.

GNU Hyperbole takes a distinctly different approach. It has its own hypertext technology that can interface perfectly with web links but which are much easier to create (simply drag from the source to the destination of a link to create a new hyperlink). Hyperbole hyperbuttons can link not only to static information but can perform arbitrary actions (through the use of button types written in a single, highly interactive language, Emacs Lisp). Hyperbole adds all of this power to your written documents, e-mail, news articles, contact management, outlines, directory listings, and much more. Hyperbole works well with the very latest versions of GNU Emacs across every editing and viewing mode in Emacs. It's core hypertext capabilities operate as a global minor mode available across most file types, unlike Org mode which is its own structured file format.

Unlock the power of GNU Hyperbole to make your information work for you. One system. One language. One manual. One solution. Learn Hyperbole and start moving further, faster.

1.3 Hyperbole Overview

GNU Hyperbole (pronounced Ga-new Hi-per-bo-lee), or just Hyperbole, is like Markdown for hypertext. Hyperbole automatically recognizes dozens of common, pre-existing patterns in any buffer regardless of mode and can instantly activate them as hyperbuttons with a single key: email addresses, URLs, grep -n outputs, programming backtraces, sequences of Emacs keys, programming identifiers, Texinfo and Info cross-references, Org links, Markdown links and on and on. All you do is load Hyperbole and then your text comes to life with no extra effort or complex formatting.

Hyperbole includes easy-to-use, powerful hypertextual button types without the need to learn a markup language. Hyperbole's button types are written in Lisp and can be wholly independent of the web, i.e. web links are one type of Hyperbole link, not fundamental to its link architecture. However, Hyperbole is a great assistant when editing HTML or Javascript or when browsing web pages and links.

Hyperbole comes pre-built with most of the implicit button types you will need but with a little extra effort and a few lines of code (or even just a few words), you can define your own implicit button types to recognize your specific buttons and then activate them anywhere in Emacs. You press a single key, `{M-RET}` by default, on any kind of Hyperbole button to activate it, so you can rely on your muscle memory and let the computer do the hard work of figuring out what to do. `{C-u M-RET}` shows you what any button will do in any context before you activate it, so you can always be sure of what you are doing when needed or if someone emails you a button (Hyperbole allows embedding buttons in email messages too).

Hyperbole is something to be experienced and interacted with, not understood from reading alone. It installs normally as a single Emacs package with no dependencies outside of built-in Emacs libraries, see Section B.1 [Installation], page 101. Most of Hyperbole is a single global minor mode that you can activate and deactivate at will. And it can be uninstalled quickly as well if need be, so there is no risk in giving it a spin.

Once you have it installed, try the interactive demo with `{C-h h d d}`. In fact, if you have Hyperbole loaded and you use the Emacs Info reader to read this manual, you can press `{M-RET}` inside any of the brace delimited series of keys you see in this document and Hyperbole will execute them on-the-fly (easy keyboard-macro style buttons in any text).

Hyperbole can dramatically increase your productivity and greatly reduce the number of keyboard/mouse keys you'll need to work efficiently.

Hyperbole consists of five parts.

Buttons and Smart Keys
: There are three categories of buttons:

  explicit buttons
  : may be added to documents with a simple drag between windows, no markup language needed. With two windows on screen, an explicit link button can be created at point in the current buffer linking to the position in the other window's buffer by pressing `{C-h h e l}`.

  Implicit buttons
  : are patterns automatically recognized within existing text that perform actions, e.g. bug#24568 displays the bug status information for that Emacs bug number, without the need for any additional markup. Implicit link buttons can be added to documents with a simple drag between windows too.

    Or from the keyboard, With two windows on screen, an implicit link button can be created at point in the current buffer linking to the position in the other window's buffer by pressing `{C-h h i l}`. Use `{M-1 C-h h i l}` instead to be prompted for a name for the implicit button.

  Global buttons
  : are buttons that are activated by name from anywhere within Emacs. They may be either explicit or named implicit buttons. They are the named buttons stored in the a user's personal button file, directly editable from the minibuffer menu with `{C-h h b p}`.

    With two windows on screen, a global explicit link button can be created at point in the current buffer linking to the position in the other window's buffer by pressing `{C-h h g l}`. Use `{C-u C-h h g l}` instead to create a named global implicit button.

  Buttons are activated by pressing `{M-RET}` on them, clicking them with a dedicated mouse button, or by referencing them by name (global buttons that can be activated regardless of what is on screen). Users create and activate Hyperbole buttons; see Chapter 4 [Buttons], page 24. Emacs Lisp programmers can develop new button types and actions. See Section 10.2 [Creating Types], page 84.

  Hyperbole includes two special *Smart Keys*, the Action Key and the Assist Key, that perform an extensive array of context-sensitive operations across emacs usage, including activating and showing help for Hyperbole buttons. In many popular Emacs modes, they allow you to perform common, sometimes complex operations without having to use a different key for each operation. Just press a Smart Key and the right thing happens. The mouse versions of these keys additionally allow for drag actions. We call these the Action Mouse and Action Assist keys or buttons. See Chapter 3 [Smart Keys], page 12.

HyRolo a powerful, hierarchical contact manager which anyone can use, is also included. It is easy to learn since it introduces only a few new mechanisms and has a menu interface, which may be operated from the keyboard or the mouse. It may also be used to look up any record-based information in any number of Org or Markdown files. Hyperbole buttons may be embedded in any records. See Chapter 8 [HyRolo], page 73.

HyControl the fastest, easiest-to-use window and frame control available for GNU Emacs. With just a few keystrokes, you can shift from increasing a window's height by 5 lines to moving a frame by 220 pixels or immediately moving it to a screen corner. Text in each window or frame may be enlarged or shrunk (zoomed) for easy viewing, plus many other features; this allows Hyperbole to quickly control the way information is presented on-screen. See Chapter 6 [HyControl], page 53.

Koutliner an advanced outliner with multi-level autonumbering and permanent identifiers attached to each outline node for use as hypertext link anchors, per node properties and flexible view specifications that can be included in links or used interactively. See Chapter 7 [Koutliner], page 59.

Hyperbole API
a set of programming libraries for system developers who want to integrate Hyperbole with another user interface or as a back-end to a distinct system. (All of Hyperbole is written in Emacs Lisp for ease of modification. It has been engineered for real-world usage and is well structured). See Chapter 10 [Developing with Hyperbole], page 83.

Hyperbole may be used simply for browsing through documents pre-configured with Hyperbole buttons, in which case, you can safely ignore most of the information in this manual. Jump right into the Hyperbole fast demonstration by typing `{C-h h d d}`, assuming Hyperbole has been installed at your site. If you need to install Hyperbole, see Appendix B [Setup], page 101, for Hyperbole installation and configuration information. The demo offers a much less technical introduction to Hyperbole by supplying good examples of use.

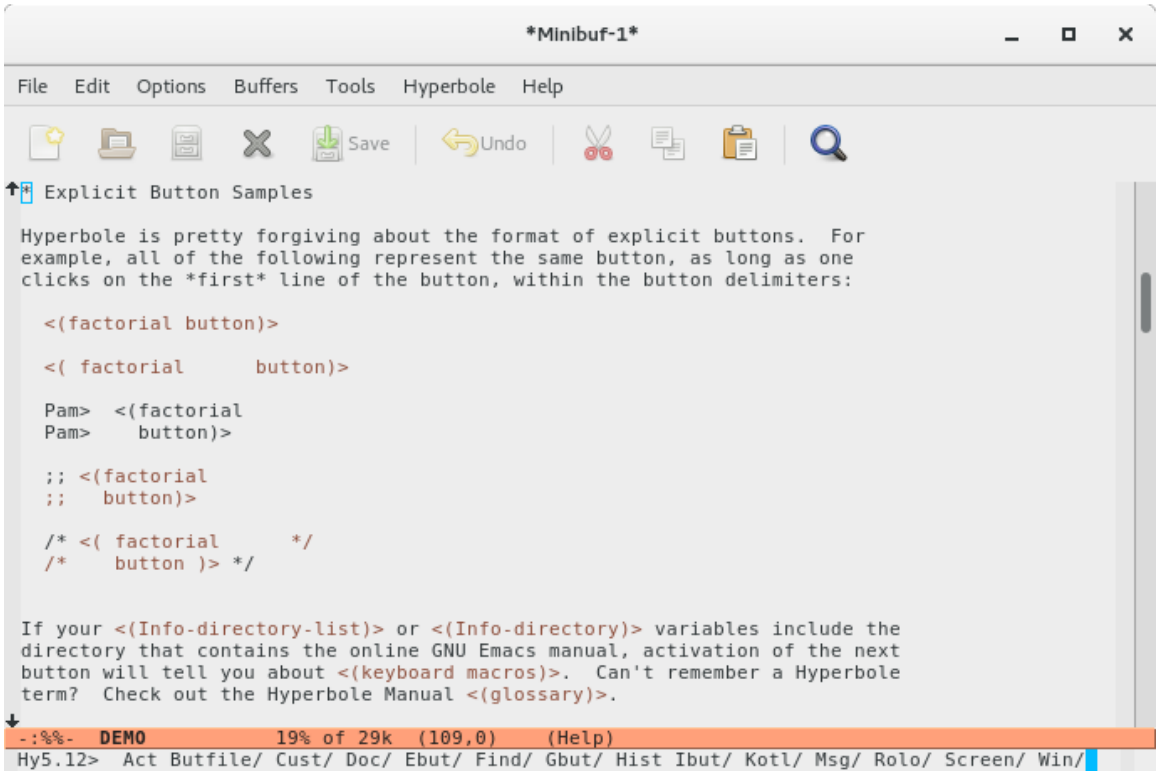

Image 1.1: Hyperbole Minibuffer Menu and Demonstration Screenshot

You likely will want to do more than browse with Hyperbole, e.g. create your own buttons. The standard Hyperbole button editing user interface is Emacs-based, so a basic familiarity with the Emacs editing model is useful. The material covered in the Emacs tutorial, normally bound to `{C-h t}`, is more than sufficient as background. See Section "Glossary" in *the GNU Emacs Manual*, if some emacs-related terms are unfamiliar to you.

A Hyperbole user works with chunks of information that need to be organized, interlinked, and processed. Such chunks can be hyperbuttons, address book contacts, items in an outline, or even database query results. Hyperbole does not enforce any particular hypertext or information management model, but instead allows you to organize your information in large or small chunks as you see fit. The Hyperbole outliner organizes information into hierarchies which may also contain links to external information sources. See Chapter 7 [Koutliner], page 59.

Some of Hyperbole's most significant features are:

- Buttons may link to information or may execute functions, such as starting or communicating with external programs;
- A simple mouse drag from a button source location to its link destination is often all that is needed to create a new link. The keyboard can also be used to emulate such drags;
- Buttons may be embedded within electronic mail messages;

- Outlines allow rapid browsing, editing and movement of chunks of information organized into trees (hierarchies);
- Other hypertext and information retrieval systems may be encapsulated under a Hyperbole user interface (a number of samples are provided).

Typical Hyperbole applications include:

personal information management
: Hyperlinks provide a variety of views into an information space. A search facility locates hyperbuttons in context and permits quick selection.

documentation and code browsing
: Cross-references may be embedded within documentation and code. Existing documentation may be augmented with point-and-click interfaces to link code with associated design documents, or to permit direct access to the definition of identifiers by selecting their names within code or other documents.

brainstorming
: The Hyperbole outliner (see Chapter 7 [Koutliner], page 59) is an effective tool for capturing ideas and then quickly reorganizing them in a meaningful way. Links to related ideas are easy to create so the need to copy and paste information is greatly reduced.

help/training systems
: Tutorials with buttons can show students how things work while explaining the concepts, e.g. an introduction to the commands available on a computer system. This technique can be much more effective than written documentation alone.

archive managers
: Programs that manage archives from incoming information streams may be supplemented by having them add topic-based buttons that link to the archive holdings. Users can then search and create their own links to archive entries.

1.4 Mail Lists

If you use Hyperbole, you may join the mailing list <hyperbole-users@gnu.org> to discuss Hyperbole with users and maintainers. There is a separate mail list to report problems or bugs with Hyperbole, <bug-hyperbole@gnu.org>. For more details, see Appendix F [Suggestion or Bug Reporting], page 154.

2 Usage

Once Hyperbole has been installed for use at your site, loaded into your Emacs session and activated with `(hyperbole-mode 1)`, it is ready for use. You will see a Hyperbole menu on your menubar and `Hypb` in your modeline.

2.1 Invocation

You can invoke Hyperbole's commands in one of three ways:

- use the Hyperbole entry on your menubar;
- type `{C-h h}` or `{M-x hyperbole RET}` to display the Hyperbole minibuffer menu;
- use a specific Hyperbole command, for example, a press of `{M-RET}` on a pathname to display the associated file or directory.

`{C-h h}` enables Hyperbole if it has been disabled and displays a Hyperbole menu in the minibuffer for quick keyboard or mouse-based selection. Select an item from this menu by typing the item's first capital letter. Use `{Q}` (note this is capitalized) to quit from the minibuffer menu while leaving Hyperbole enabled. Use `{X}` (note this is capitalized) to quit from the minibuffer menu and disable Hyperbole's minor mode.

Use `{C-h h d d}` for an interactive demonstration of standard Hyperbole button capabilities.

Type `{C-h h k e}` for an interactive demonstration of the Koutliner, Hyperbole's multi-level autonumbered hypertextual outliner.

To try out HyControl, Hyperbole's interactive frame and window control system, use `{C-h h s w}` for window control or `{C-h h s f}` for frame control. Pressing `{t}` switches between window and frame control once in HyControl. Hyperbole also binds `{C-c \}` for quick access to HyControl's window control menu if it was not already bound prior to Hyperbole's initialization.

Videos demonstrating Hyperbole's features are listed at `https://gnu.org/s/hyperbole`.

The above are the best interactive ways to learn about Hyperbole.

2.2 Documentation

The Hyperbole Manual is a reference manual, not a simple introduction. It is included in the `man/` subdirectory of the Hyperbole package directory in four forms:

```
man/hyperbole.info   - online Info browser version
man/hyperbole.html   - web HTML version
man/hyperbole.pdf    - printable version
man/hyperbole.texi   - source form
```

The Hyperbole package installation places the Info version of this manual where needed and adds an entry for Hyperbole into the Info directory under the Emacs category. `{C-h h d i}` will let you browse the manual. Then use `{s}` to search for anything throughout the manual. For web browsing, point your browser to `${hyperb:dir}/man/hyperbole.html`, wherever the Hyperbole package directory is on your system; often this is: `~/.emacs.d/elpa/hyperbole-${hyperb:version}/`.

2.3 Hyperbole Hooks

When Hyperbole's code is first loaded and initialized, `hyperbole-init-hook` is run. When `hyperbole-mode` is enabled, `hyperbole-mode-hook` and `hyperbole-mode-on-hook` are run. When `hyperbole-mode` is disabled, `hyperbole-mode-hook` and hyperbole-mode-off-hook are run.

If you prefer a different key to activate Hyperbole, you can bind it as part of any setting of `hyperbole-init-hook` within your personal `~/.emacs` file. For example, `(add-hook 'hyperbole-init-hook (lambda () (global-set-key "\C-ch" 'hyperbole--enable-mode) (global-set-key "\C-hh" 'view-hello-file)));` then restart Emacs.

3 Smart Keys

When active, Hyperbole offers two special *Smart Keys*, the Action Key and the Assist Key, that perform an extensive array of context-sensitive operations across emacs usage. In many Emacs modes, they allow you to perform common, sometimes complex operations without having to use a different key for each operation. Just press a Smart Key and the right thing happens. This chapter explains typical uses of the Smart Keys. See Appendix E [Smart Key Reference], page 125, for complete descriptions of their behavior in all contexts.

3.1 Smart Key Bindings

With `hyperbole-mode` enabled, `{M-RET}` is the Action Key and `{C-u M-RET}` is the Assist Key. These keys allow context-sensitive operation from any keyboard.

Mouse configuration of the Smart Keys is automatic for GNU Emacs under Mac OS X, the X Window System and MS Windows, assuming your emacs program has been built with support for any of these window systems.

The *Action Mouse Key* is bound to your shift-middle mouse key (or shift-left on a 2-button mouse). The *Assist Mouse Key* is bound to your shift-right mouse key, assuming Hyperbole is run under an external window system. These keys support *Drag Actions*, see Section E.1 [Smart Mouse Keys], page 125, as well as the standard Smart Key presses.

If you set the variable, `hmouse-middle-flag`, to '`t`' before loading Hyperbole, then you may also use the middle mouse key as the Action Key. If you want both the middle mouse key as the Action Key and the right mouse key as the Assist Key for ease of use, then within your personal `~/.emacs` file, add: `(add-hook 'hyperbole-init-hook 'hmouse-add-unshifted-smart-keys)` and then restart Emacs.

If you prefer other Smart Key bindings, simply bind the commands `action-key` and `assist-key` to keyboard keys. Hyperbole binds `{M-RET}` to the command `hkey-either`; this provides a single key binding for both Smart Key commands; a prefix argument, such as `{C-u}`, then invokes `assist-key` actions.

You may also bind `action-mouse-key` and `assist-mouse-key` to other mouse keys, though you won't be able to execute mouse drag actions with such key bindings. See Section 3.7 [Smart Mouse Key Drags], page 19, and see Section 3.7.5.5 [Keyboard Drags], page 21.

To permanently change any of these key bindings, use: `(add-hook 'hyperbole-init-hook (lambda () (hkey-set-key <KEY> '<CMD>)`, for example, `(hkey-set-key "\M-'" 'hkey-either)`.

3.2 Smart Key Operations

The Action Key generally selects entities, creates links and activates buttons. The Assist Key generally provides help, such as reporting on a button's attributes, or serves a complementary function to whatever the Action Key does within a context.

The Hyperbole Doc/SmartKeys menu entry, `{C-h h d s}`, displays a summary of what the Smart Keys do in all of their different contexts. Alternatively, a click of the Assist Mouse Key in the right corner of a window modeline (within the rightmost 3 characters)

toggles between displaying this summary and hiding it. Reference this summary whenever you need it.

The following table is the same summary. Much of the browsing power of Hyperbole comes from the use of the Smart Keys, so spend some time practicing how to use them. Study what modeline clicks and window drag actions do as these will give you a lot of power without much effort. This table may appear daunting at first, but as you practice and notice that the Smart Keys do just a few context-sensitive things per editor mode, you will find it easy to just press or point and click and let Hyperbole do the right thing in each context.

Smart Keys		
Context	Action Key	Assist Key
Hyperbole		
On a minibuffer menu item	Activates item	Item help
On an explicit button	Activates button	Button help
Reading argument		
1st press at an arg value	Copies value to minibuffer	<- same
2nd press at an arg value	Uses value as argument	<- same
In minibuffer at eol	Accepts minibuffer arg	List completions
In minibuffer before eol	Deletes rest of arg	Deletes rest of arg
On an implicit button/path	Activates button	Button help
Within a koutline cell	Collapses and expands	Shows tree props
Left of a koutline cell	Creates a klink	Moves a tree
HyRolo Match Buffer	Edits entries and mails to	e-mail addresses
Mouse or Keyboard Display Control		
Line end, not end of buffer		
smart-scroll-proportional		
= t (default)	Makes curr line top line	Bottom line
= nil	Scrolls up a windowful	Scrolls down
End of Any Help buffer	Restores screen to the previous state	
Read-only View Mode	Scrolls up a windowful	Scrolls wind down
Mouse-only Control		
Drag from thing start or end A thing is a delimited expression, such as a string, list or markup language tag pair	Yanks thing at release	Kills thing and yanks at release
Drag from bottom Modeline in frame with non-nil drag-with-mode-line param	Repositions frame as drag happens	<- same
Drag from shared window side or from left of scroll bar	Resizes window width	<- same
Modeline vertical drag	Resizes window height	<- same
Other Modeline drag to another window	Replaces dest. buffer with source buffer	Swaps window buffers
Drag to a Modeline from:		
but/buffer/file menu item	Displays ref/buffer/file in new window by release	Swaps window buffers
buffer/file menu 1st line	Moves buffer/file menu to	Swaps window buffers

	new window by release	
anywhere else	Displays buffer in new window by release	Swaps window buffers
Drag between windows from:		
but/buffer/file menu item	Displays ref/buffer/file in window of button release	<- same
buffer/file menu 1st line	Moves buffer/file menu	<- same
anywhere else	Creates an ibut link	Creates an ebut link
Drag outside of Emacs from:		
but/buffer/file menu item	Displays ref/buffer/file in a new frame	Moves window to new frame
Modeline or other window	Clones window to new frame	Moves window to new frame
Modeline Click		
Left modeline edge	Buries current buffer	Unburies bottom buffer
Right modeline edge	Displays GNU Info manuals	Displays Smart Key summary
Buffer ID	Dired on buffer's dir or on parent when a dir	Displays next buffer
Other blank area	Action Key modeline hook Shows/Hides Buffer Menu	Assist Key modeline hook Popups Jump & Manage Menu
Drag in window, region active	Error, not allowed	Error, not allowed
Horizontal drag in a window	Splits window below	Deletes window
Vertical drag in a window	Splits window side-by-side	Deletes window
Diagonal drag in a window	Saves wconfig	Restores wconfig from ring
Active region exists, click outside of the region	Yanks region at release	Kills and yanks at release

Hyperbole Key Press/Click in Special Modes

Region Active	Yanks region at release	Kills and yanks at release
Company Mode Completion	Displays definition	Displays documentation
Helm Completion	Displays item	Displays item
Treemacs	Displays item	Displays item
Dired Sidebar	Displays item	Displays item
Emacs Push Button	Activates button	Button help
Emacs Regression Test Def	Evals and runs test	Edebugs and runs test
Thing Begin or End	Marks thing region	Marks & kills thing region
Page Directory Listing	Jumps to page	<- same
C,C++,Objective-C,Java Modes	Jumps to id/include def	Jumps to next def
Assembly Language Mode	Jumps to id/include def	Jumps to next def
Java Cross-reference Tag	Jumps to identifier def	Jumps to next def
JavaScript and Python Modes	Jumps to identifier def	Jumps to next def
Any Known Lisp or ChangeLog	Jumps to identifier def	Referent Doc
Fortran Mode	Jumps to identifier def	Jumps to next def
Imenu Programming Identifier	Jumps to in-buffer def	Prompts for id to jump to
Emacs Lisp Compiler Error	Jumps to def with error	<- same
Emacs Regression Test (ERT)	Jumps to def with error	<- same
Other Compiler Error	Jumps to src error line	<- same
Grep or Occur Match	Jumps to match source line	<- same
Multi-buffer Occur Match	Jumps to match source line	<- same
Etags `TAGS' file entry	Jumps to source line	Button help
Ctags file entry	Jumps to source line	Button help
Texinfo Cross-reference		
Before opening brace	Jumps to Texinfo referent	Button help
Within braces	Jumps to Info referent	Button help

```
    Menu Item or node hdr       Jumps to Texinfo referent  Button help
    Include file                Jumps to Texinfo referent  Button help
    code/var reference          Displays doc for referent  Button help
  Org Mode                      Follows links and cycles outline views
  Org/Roam ID                   Jumps to ID referent       Button help
  Magit Modes                   Collapses, expands and jumps to things
  Outline Major/Minor Modes     Collapses, expands, and moves outline entries
  Man Apropos                   Displays man page entry    <- same
  Man Pages                     Follows cross refs, file refs and C code refs
  I/Buffer Menu                 Saves, deletes and displays buffers
  Todotxt Mode                  Toggles item completion    Edit and archive items

Emacs Info Reader
  Menu Entry or Cross Ref       Jumps to referent          <- same
  Up, Next or Prev Header       Jumps to referent          Jumps to prior node
  File entry of Header          Jumps to top node          Jumps to (DIR) node
  End of current node           Jumps to next node         Jumps to previous node
  Anywhere else                 Scrolls up a windowful     Scrolls down a windowful

Subsystems
  Calendar                      Scrolls or shows appts     Scrolls/marks date
  GNU Debbugs Tracker           Displays issue discussion  Displays issue status
  Dired Mode                    Views and deletes files from dir listing
  GNUS News Reader              Toggles group subscriptions, gets new news,
                                  and browses articles
  Mail Reader and Summaries     Browses, deletes and expunges messages
  OO-Browser                    Browses object classes and elements
  Tar Mode                      Views and edits files from tar archive files

Any other context (defaults)    Invalid context error      Invalid context error
================================================================================
```

See Appendix E [Smart Key Reference], page 125, for extensive reference documentation on the Smart Keys.

Note how the last line in the table explains that the default behavior of the Smart Keys in an unknown context is to report an error. You can change these behaviors by setting two variables. See the documentation for the variables `action-key-default-function` and `assist-key-default-function` for information on how to customize the behavior of the Smart Keys within default contexts.

When you use a mouse and you want to find out what either of the Smart Keys does within a context, depress the one you want to check on and hold it down, then press the other and release as you please. A help buffer will pop up explaining the action that will be performed in that context and attributes of the button, if any. A press of either Smart Key at the end of that help buffer will restore your display to its configuration prior to invoking help.

On the keyboard, `{C-h A}` displays this same context-sensitive help for the Action Key while `{C-u C-h A}` displays the help for the Assist Key. Note that `{C-h a}` performs a function unrelated to Hyperbole, so you must press the shift key when you type the `A` character.

3.3 Smart Key Argument Selection

A prime design criterion of Hyperbole's user interface is that you should be able to see what an operation will do before using it. The Assist Key typically shows you what a button or

minibuffer menu item will do before you activate it. Hyperbole also displays the result of directly selecting an argument value with the Action Key, to provide feedback as to whether the correct item has been selected. A second press/click is necessary before an argument is accepted and processed.

Many Hyperbole commands prompt you for arguments. The standard Hyperbole user interface has an extensive core of argument types that it recognizes. Whenever Hyperbole is prompting you for an argument, it knows the type that it needs and provides some error checking to help you get it right. More importantly, it allows you to press the Action Key within an entity that you want to use as an argument. Hyperbole will copy the appropriate thing to the minibuffer as the argument. If you press (click with a mouse) the Action Key on the same thing again, e.g. within a list of possible completions, Hyperbole exits the minibuffer and uses the current argument. Thus, a double click registers a desired argument. Double-quoted strings, pathnames, mail messages, Info nodes, dired listings, buffers, numbers, completion items and so forth are all recognized at appropriate times. All of the argument types mentioned in the documentation for the Emacs Lisp `interactive` function are recognized. Experiment a little and you will quickly get used to this direct selection technique.

Wherever possible, standard Emacs completion is offered, as described in Section "Completion" in *the GNU Emacs Manual*. Remember to use `{?}` to see what your possibilities for an argument are if completions are not automatically shown to you. Once you have a list of possible completions on screen, press the Action Key twice on any item to enter it as the argument. If you are using the Vertico completion library with completions displayed in the minibuffer, selection of completions works the same as if they were displayed in a separate buffer as in standard Emacs.

Within the minibuffer itself, the Smart Keys are also context-sensitive. A press of the Action Key at the end of the argument line tries to accept the argument and when successful, exits the minibuffer. A press of the Assist Key at the end of the argument line displays matching completions for times when they are not automatically displayed or need updating. A press of the Action or Assist Key on part of the argument, deletes from point to the end of the line, expanding the set of available completions and redisplaying them.

3.4 Smart Key Debugging

Typically, `{C-h A}` and `{C-u C-h A}` which show Action and Assist Key help for the current context, are sufficient for seeing how the Smart Keys behave no matter where they are used.

However, if a Smart Key ever behaves differently than you think it should or if you want to test how the Smart Keys respond in a new context, then the Smart Key debugging flag may be of use. You toggle it on and off with `{C-h h c d}` (minibuffer menu Cust/Debug-Toggle). Once enabled, this displays a message in the minibuffer each time the Action or Assist Key is released, showing the context of the press and its associated action, so you can see exactly what is happening whenever you use a Smart Key. These messages are all prefaced with "(HyDebug)" and logged to the "*Messages*" buffer for later viewing.

If you do find a problem with the Smart Keys and want to report a bug, use `{C-h h m r}` to compose an email message to the bug-hyperbole list. Hyperbole will automatically include all of the "(HyDebug)" messages from your current emacs session into your email.

Similarly, when you compose an email to the hyperbole-users mailing list with `{C-h h m c}`, these messages are also included.

3.5 Smart Key Thing Selection

Hyperbole has some radically cool ways to select regions of structured text or source code and to copy or move them between buffers with a single mouse drag or two key presses. A great deal of smarts are built-in so that it does the right thing most of the time; many other attempts at similar behavior such as `thing.el` fail to deal with many file format complexities.

We use the term *things* to refer to structured entities that Hyperbole can select. These include: delimited pairs of (), {}, <>, [] and quote marks, source code functions, source code comments and matching tag pairs in HTML and SGML modes. *Delimited things* are those things that contain a selectable delimiter such as an opening parenthesis.

The best way to mark a delimited thing is to move your cursor to the starting delimiter of the thing and then press the Action Key. Typically, you will see the thing highlight. You can then operate upon it as you would any Emacs region. In many cases, you can do the same thing upon the closing delimiter, but this is not as reliable. An Action Key press on the start of an HTML, XML, or SGML tag pair marks the entire region span of the pair. If you use the Assist Key instead, it will mark and kill (delete) the thing.

Even better are Smart Mouse Key thing drags which let you copy or move delimited things in one operation without having to select a region. To copy, simply drag with the Action Key from a thing's opening delimiter and release somewhere outside of the thing, either within the same window or within another window. The thing will be copied to the point of release. If you want to move a thing, simply perform the same drag but with the Assist Mouse Key. Ensure that you do not move any explicit buttons from one buffer to another as that does not work.

Hyperbole also binds two convenience keys for working with things.

The first such key is `{C-c RET}` `hui-select-thing` which selects bigger and bigger syntactic regions with each successive use. Double or triple clicks of the Selection Key (left mouse key) do the same thing. The first press selects a region based upon the character at point. For example, with point over an opening or closing grouping character, such as { or }, the whole grouping is selected, e.g. a C function. When on an _ or - within a programming language identifier name, the whole name is selected. The type of selection is displayed in the minibuffer as feedback. When using a language in which indentation determines nesting level like Python, a double click on the first alpha character of a line, such as an if statement, selects the current clause (until the next line at the same or lesser indentation). Use `{C-g}` to unmark the region when done. Use, `hui-select-thing-with-mouse` if you want to bind this to a different mouse key to use single clicks instead of double clicks.

This key defers to any currently active `major-mode` which also binds it.

The second convenience key is bound in HTML/XML/SGML/web modes. `{C-c .}` `hui-select-goto-matching-tag` jumps between the opening and closing tag of a pair. It moves point to the start of the tag paired with the closest tag that point is within or which it precedes. A second press moves point to the matching tag of the pair, allowing you to quickly jump back and forth between opening and closing tags.

This key defers to any currently active `major-mode` which also binds it.

3.6 Smart Mouse Key Modeline Clicks

Smart Mouse Key clicks on a window's modeline offer many powerful browsing features, including directory editing (dired), user manual browsing, and window, buffer and frame selection. Generally, only Hyperbole-specific modeline actions are discussed herein.

- Leftmost Character

  Action Key clicks on the first (usually blank) character of the modeline bury the current buffer in the buffer list and display the next buffer in the list. Assist Key clicks do the reverse and unbury the bottom buffer.

  A similar effect can be achieved with the standard Emacs mouse 1 (left) and 3 (right) buttons on the Buffer ID element of modeline to cycle through previous and next buffers, respectively. This may be easier to use since you can click anywhere on the buffer identifier.

- Buffer ID Element

  On the left part of the modeline is the buffer identification, generally the name of the buffer in use. An Action Key click on that switches the window to edit the buffer's directory using dired. Then Action Key clicks on directory items in the dired buffer display the items selected in other windows. An Action Key drag from an item to another window displays the item in that window.

  An Action Key click on the first line in a dired buffer which contains the current directory path, specifically on any ancestor part of the path (the part to the left of the click point), starts another dired session on the ancestor directory. Click at the end of this line or on the last line to end the dired session (bury its buffer).

  If you use the Treemacs file viewer Emacs package, you can configure Hyperbole to use this instead of Dired when you click on a modeline buffer id.

  Since this is a customization option, it may be changed permanently like so. Use `{M-x customize-set-variable RET action-key-modeline-buffer-id-function RET}`. Change the value to `smart-treemacs-modeline`. Then press `RET`. To change it back to Hyperbole's default, use the value, `dired-jump`.

- Large Blank Area

  An Action Mouse Key click in a blank area of a window modeline (away from left and right edges) toggles between displaying and hiding a list of all buffers. Once displayed, an Action Key click on a buffer item will display it in another window. You can drag items to specific windows for display as well.

  Alternatively, you may (1) display the buffer menu, (2) use its `{m}` command to mark buffers, and (3) use the Hyperbole `{@}` command to display the marked buffers in a grid of popup windows whose number of rows and columns you specify at the prompt or via a prefix argument. This also works in `ibuffer-menu` and `dired` modes. See Chapter 6 [HyControl], page 53.

  An Assist Key click in the blank area of the modeline displays a quick access menu of display-oriented commands. You can jump to buffers categorized by major mode, jump to windows by buffer name, or to frames by name. Manage your windows and frames quickly with this menu as well. As always with Hyperbole, just try it and you'll begin to wonder how you lived without it before.

- Right Corner

A click of the Action Mouse Key in the right corner of a window modeline (within the rightmost 3 characters) displays or hides the GNU Info Manual Browser, giving you quick point and click access to an amazing wealth of documentation, since the Action Key also browses through these manuals and follows their hyperlinked cross-references. A click of the Assist Key in the same location displays or hides the Smart Key summary, as noted earlier.

- Customizable Variables

  Hyperbole modeline mouse click actions are controlled by the two functions, `action-key-modeline` and `assist-key-modeline`. If you know a little Emacs Lisp you can change these to do whatever you like. When a Smart Key press is on a blank part of a modeline but not at the left or right, the function given by one of these two variables is executed: `action-key-modeline-function` or `assist-key-modeline-function`. By default, the Action Key toggles between displaying and hiding the buffer menu. If you like the more advanced features of `Ibuffer Mode`, you can change the buffer menu to use that with the following in your Emacs initialization file: `(setq action-key-modeline-function #'hmouse-context-ibuffer-menu)`. To set it back to the default use: `(setq action-key-modeline-function #'hmouse-context-menu)`.

  The default `assist-key-modeline-function` is to pop up a menu of convenient screen commands that lets you select buffers grouped by major mode, use HyControl, or jump to specific windows, window configurations or frames.

  Since these are customization options, they may be change permanently like so. Use `{M-x customize-set-variable RET assist-key-modeline-function RET}`. Change the value to your desired command. Then press `RET`.

3.7 Smart Mouse Key Drags

As mentioned in the section on Thing Selection, Hyperbole Smart Mouse Key drag actions can be quite useful. This section summarizes other drag contexts and actions; for complete documentation, see Section E.1 [Smart Mouse Keys], page 125.

3.7.1 Creating and Deleting Windows

Horizontal and vertical drags of the Smart Mouse Keys are used to split and delete Emacs windows.

An Action Mouse Key horizontal drag of five or more characters in either direction within a single window creates a new window by splitting the current window into two windows, one atop the other. An Action Mouse Key vertical drag in either direction splits the current window into two side-by-side windows. A horizontal or vertical drag of the Assist Mouse Key within a single window, deletes that window.

If you split windows many times and then delete a number of the windows, you'll be left with windows of differing heights. Use `{C-x +}` to re-balance the sizes of the remaining windows, so they are fairly even.

3.7.2 Saving and Restoring Window Configurations

A window configuration consists of the set of windows within a single Emacs frame. This includes their locations, buffers, and the scrolled positions of their buffers.

Hyperbole allows you to save and restore window configurations with simple diagonal mouse drags within a single window. A diagonal drag in any direction of the Action Key saves the current window configuration to a ring of window configurations, just like the Emacs text kill ring. See Section "Kill Ring" in *the Emacs Manual*. Each diagonal drag in any direction of the Assist Key restores a prior saved window configuration from the ring. Window configurations are restored in reverse order of the way they were saved. Since a ring is circular, after the oldest element is restored, the newest element will again be restored and so on.

3.7.3 Resizing Windows

Emacs windows may be resized by dragging their window separators (modelines or vertical side lines) within a frame. Simply depress either Smart Mouse Key on a non-bottommost modeline or near a window side, hold it down while you drag to a new location and then release. The window separator will move to the location of release. Basically, just drag the window separator to where you want it. Drags from a blank area of a modeline show visible feedback as the window is resized.

3.7.4 Moving Frames

Drags of either Smart Key from a bottommost modeline can be configured to drag Emacs frames to new locations on screen. To configure all existing and future frames for such dragging, use:

`(modify-all-frames-parameters '((drag-with-mode-line . t)))`.

To configure just the selected frame for such dragging, use:

`(set-frame-parameter nil 'drag-with-mode-line t)`.

on each frame you would like to drag.

Then drag with either Smart Key from a bottommost modeline within a frame to move the frame on screen with live feedback, as if you were dragging from the titlebar. If you use a click-to-focus window manager, click on the desired frame first and then depress to drag.

3.7.5 Dragging Buffers, Windows and Items

Smart Mouse Key drags let you display buffers and windows however you want them. Dired, Treemacs and buffer-menu items as well as Hyperbole button referents may be displayed in specific locations with drags. Below we explore these drag actions.

3.7.5.1 Swapping Buffers

Swapping buffer locations is quick and easy with Hyperbole. Simply drag the Assist Mouse Key (not the Action Key) from the open area of one window's modeline to the text area of another. This works across frames as well.

If you have precisely two windows in an Emacs frame, you can swap their buffers from the keyboard. Use this Hyperbole minibuffer menu key sequence involving the tilde key to swap the buffers and quit from the Hyperbole minibuffer menu: `{C-h h s w ~ Q}`. Similarly, if you have two single window frames, you can swap buffers between them with `{C-h h s f ~ Q}`.

3.7.5.2 Displaying Buffers

What if you want to display the same buffer in another window and not swap buffers? Depress the Action Mouse Key in the open area of the modeline of the source window and drag to the text area of the destination window. Voila, the buffer appears in the new location as well as the old one.

If you want a new window where you release (so the original destination window's buffer stays onscreen), just drag to the release window's modeline; that window will be split before the buffer is displayed.

3.7.5.3 Cloning Windows

To clone a window with its buffer to a new frame, simply drag the Action Mouse Key from the window to outside of Emacs and release the key. A new frame will be created, selected and sized according to the original window. Do the same thing with the Assist Mouse Key and the original window will be deleted as well, unless it is the only window in that frame.

3.7.5.4 Displaying Items

You can also drag items to other windows with the Action or Assist Mouse Keys in Dired, Buffer Menu, Ibuffer and Treemacs listing buffers, rather than the buffers themselves. Dragging Hyperbole buttons to display their referents in another window works too.

Drag with the Action or Assist Mouse Key and the selected item's referent will be displayed in any Emacs window in which you release. Drag outside Emacs and it will be displayed in a new frame. To display the last item you want within the listing window itself, press and release the Action Key on that item after dragging your other items to their respective windows. Remember that you can emulate these drags from the keyboard when needed, see Section 3.7.5.5 [Keyboard Drags], page 21.

So now you can put a bunch of buffers and files on your screen wherever you like. Typically, a brief visual pulse is shown first at the source item and then in the destination window, to help you see that the transfer has been made. An Assist Key drag will move the the item list buffer to the destination (swapping buffers), just as it does with other buffers.

3.7.5.5 Keyboard Drags

If you run Emacs under a window system and there is no prior key binding on `{M-o}` when you load Hyperbole, then many Smart Key drags can be emulated from the keyboard. To do so, press `{M-o}`, the `hkey-operate` command, at the button source location, move to the link destination, e.g. with `{C-x o}`, and then press `{M-o}` again. This simulates a depress and release of the Action Key. `{C-u M-o}` emulates drags of the Assist Key. This will not work when Hyperbole is run from a dumb terminal Emacs session since drag actions are not supported without a window system.

For even faster keyboard-based display of items and drag emulations, use the Emacs package `ace-window` (see `https://elpa.gnu.org/packages/ace-window.html`).

The *ace-window* package assigns short letter IDs to each Emacs window and lets you jump to or operate upon a specific window by giving its ID. Hyperbole can add commands to ace-window that replace the two-step drag emulation key described above with a single key sequence that does not require moving to the drag target window since it is specified by ID as part of the command.

To enable this feature, in your Emacs initialization file after Hyperbole is initialized, if you do not have a key bound for `ace-window`, then call: `(hkey-ace-window-setup \"\M-o\")` to bind it to `{M-o}`, replacing Hyperbole's default `hkey-operate` command there (because ace-window can emulate the drags performed by `hkey-operate`). If you already have a key bound for `ace-window`, then just ensure it is initialized by calling `(hkey-ace-window-setup)` without a key argument.

After setup, the leftmost character or two of each window's modeline will show the ID to type to use that window as the drag destination. Then whenever point is on an item you want displayed in another window, use `{M-o i <id-of-window-to-display-item-in>}` and watch the magic happen. If you want to display multiple items in different windows, instead use the `{M-o t <id-of-window-to-display-item-in>}` key sequence to *throw* the item to the window. To *replace* the selected window's buffer with that of another window, use `{M-o r <id-of-window-displaying-desired-buffer>}`. To instead *swap* the selected window's buffer with that of another window, use `{M-o m <id-of-window-to-swap-with>}`.

And finally, to create a new, *unnamed* implicit link in the selected window that refers to the location in the other window, use `{M-o w <referent-window-id>}`. This executes `hui:ibut-link-directly` which determines the link type by using the referent context. To create a *named* implicit link button in the selected window, use `{M-1 M-o w <window>}`. It prompts for the name and then links to the referent window location. If you highlight a region before invoking this, Hyperbole will use that as the name for the implicit button.

To create an explicit button the same way, use `{C-u M-o w <window-id>}`. This executes `hui:ebut-link-directly`, prompts for any needed arguments, determines the link type by using the referent context and then creates the explicit button. If you highlight a region before invoking this, Hyperbole will use that as the name for the explicit button.

You can also throw the active (highlighted) region of text to another window. Simply activate a region and then use `{M-o t <window-id>}`. If you don't use region highlighting, i.e. `transient-mark-mode`, then use `{C-u M-o t <window-id>}` for the same effect. The buffer in the target window must differ from the one in the source window. With no region active, this command throws the source buffer to the target window.

In summary:

M-o i <window>
: insert listing item at point into <window>; if not on a listing item, trigger an error

M-o m <window>
: swap the buffers in the selected window and <window>

M-o r <window>
: replace the selected (current) window's buffer with that of <window>

M-o t <window>
: throw region, listing item at point, or current buffer to <window>

M-o w <window>
: window link, create a new *unnamed implicit button* in the selected (current) window, linking to point in the referent <window>.

M-1 M-o w <window>
: window link, create a new *named implicit button* in the selected (current) window, linking to point in the referent <window>. Use region, if any, as the button name.

C-u M-o w <window>
: window link, create a new *explicit button* in the selected (current) window, linking to point in the referent <window>. Use region, if any, as the button name.

4 Buttons

This chapter explains use of Hyperbole *buttons*. There are several kinds of Hyperbole buttons: buttons that are created one at a time and stored in files (*explicit buttons*); buttons that can be activated by name anytime (*global buttons*); and buttons defined by textual patterns where one definition can create an infinite number of buttons (*implicit buttons*).

Hyperbole buttons are embedded within textual documents; they may be created, modified, moved or deleted. Each button performs a specific action, such as linking to a file or executing a shell command.

There are three categories of Hyperbole buttons:

explicit buttons
: created by Hyperbole, accessible from within a single document;

global buttons
: created by Hyperbole, specific to each user, and accessible anywhere within a user's network of documents;

implicit buttons
: created and managed by other programs or embedded within the structure of a document, accessible from within a single document. Hyperbole recognizes implicit buttons by contextual patterns given in their type specifications (explained later).

Explicit Hyperbole buttons may be embedded within any type of text file. Implicit buttons may appear only within document contexts allowed by their types, which may limit the kinds of documents or the locations within those documents at which such buttons may be found. All global buttons for a user are stored in a single location and are activated by typing their names, rather than by direct selection, the means used to activate explicit and implicit buttons.

To summarize:

Button Category	Active Within	Activation Means	Managed By
Explicit	a single document	direct selection	Hyperbole
Global	any document	typing its name	Hyperbole
Implicit	a matching context	direct selection	other tools

A click on a Hyperbole button may activate it or describe its actions, depending on which mouse key is used. Buttons may also be activated from a keyboard. (In fact, many Hyperbole operations, including menu usage, may be performed from any standard character terminal interface, so you need not be anchored to a desktop all day). See Chapter 3 [Smart Keys], page 12. There is also a key that shows you how a button will behave before you activate it, see Section 3.2 [Smart Key Operations], page 12.

4.1 Explicit Buttons

Hyperbole creates and manages *explicit buttons* which perform specific actions when activated (typically through a button press). They look like this '`<(fake button)>`'. They are quickly recognizable, yet relatively non-distracting as you scan the text in which they are embedded. The text between the '`<(`' and '`)>`' delimiters is called the *button label* or *button name*. Spacing between words within a button label is irrelevant to Hyperbole. Button labels may wrap across several lines without causing a problem; just be sure to select the first line of the button to activate it.

Explicit buttons may be added to any editable buffer including temporary buffers without any attached files (such buttons will last only the length of a single Emacs session). For source code files, simply place Hyperbole explicit buttons within comments. Buttons that you use for quick navigation to websites or other things you do often should be added to your personal button file. See Section 4.4 [Button Files], page 35.

Explicit buttons may be freely moved about within the buffer in which they are created. (No present support exists for moving buttons between buffers). A single button may also appear multiple times within the same buffer; simply copy the button label with its delimiters to a new location if you need another copy of it.

For details on how to create, activate, delete or edit explicit buttons, see Section 4.7 [Utilizing Explicit Buttons], page 42.

Each explicit button is assigned an action type that determines the actions it performs. Hyperbole includes its own set of useful action types but any named, interactive Emacs Lisp command may be used. For example, *Link action types* connect buttons to particular types of *referents*, the targets of their links. Link action type names all begin with `link-`. Link action button referents are displayed when such buttons are activated with a press or a click. See Section 4.5 [Action Types], page 36, for a list of Hyperbole action types, including link types.

Hyperbole does not manage referent data; this is left to the applications that generate the data. This means that Hyperbole provides in-place linking and does not require reformatting data to integrate it with Hyperbole.

Hyperbole stores the *button data* that gives an explicit button its behavior, separately from the button label, in a file named `.hypb` (`_hypb` under MS Windows) within the same directory as the file in which the button is created. Thus, all files in the same directory share a common button data file. Button data is comprised of individual *button attribute* values. A user never sees this data in its raw form but may see a formatted version by asking for help on a button.

4.2 Global Buttons

Sometimes it is useful to activate buttons without regard to the information with which you are working. In such instances, you use *global buttons*, which are buttons that may be activated or otherwise operated upon by typing their names/labels when they are prompted for, rather than selecting the buttons within a buffer. In contrast, activation of explicit buttons depends upon the information on your screen since they are accessible only from within their particular buffers.

If you want a permanent link to a file section that you can follow at any time, you can use a global button. Or what about an Emacs keyboard macro that you use frequently? Create a global button with an action type of `exec-kbd-macro` button and an easy to type name. Then you can activate it whenever the need arises.

Global buttons are managed with the Hyperbole Gbut/ menu accessed with `{C-h h g}`. The Create item, `{C-h h g c}`, prompts for a global button name, an action type, and the action's associated arguments, such as a file to which to link. It then creates the button. To activate the button, use the Act menu item, `{C-h h g a}`. Type the button's name, press `{RET}`, and then Hyperbole prompts you for its action type and associated arguments. `{C-h h g e}` to edit an existing global button. To remove a button, use the Delete menu item, `{C-h h g d}`; see Section 4.7.3 [Deletion], page 45.

To create a global button that links to point in one of your Emacs windows, use the Link menu item, `{C-h h g l}`.

By default this will create a global explicit link button. Give it a prefix argument to create a global implicit link button.

With a single window visible on-screen or a single window within your current frame, this will prompt you for a button name or label (temporarily showing you your global/personal button file) and then will insert a button that links to the current point within that window.

If you have exactly two Emacs windows in your current frame or exactly two windows visible across two Emacs frames, then the link referent will be to the point in the other, non-selected window.

With more than two windows on screen, Hyperbole will prompt you to choose the referent window and its associated point to which to link. If the Ace Window package is installed and active, this will be used to choose the window via keyboard; otherwise, you will be prompted to select it by mouse.

Global buttons are actually explicit buttons stored at the end of your personal button file, see Section 4.4 [Button Files], page 35. You can always go into that file and activate, edit or annotate these buttons with comments.

Emacs has a built-in feature similar to Global Buttons called Bookmarks. Bookmarks store places in files or link to URLs, so they are more limited than Hyperbole's global buttons and cannot utilize all of Hyperbole's capabilities for performing actions. Hyperbole has an action type, `link-to-bookmark`, for using an Emacs bookmark as a Hyperbole button referent. See Section "Bookmarks" in *the Emacs Manual*, for details on bookmarks.

4.3 Implicit Buttons

Hyperbole can recognize and activate *implicit buttons* within documents that require no special markup, e.g. pathnames or URLs, and many other types. For example, an Action Key press on a web URL will display its link in a browser, regardless of the format of the document. Similarly, an Action Key press on an email address starts composing mail to that address.

Implicit buttons are identified by implicit button type contextual pattern matchers that identify appropriate textual patterns at point. An *implicit button type* utilizes Emacs Lisp to identify a pattern or state that when matched triggers an *action* associated with the implicit button type. The action is specified by either a Hyperbole action type (see

Section 4.5 [Action Types], page 36) or an Emacs Lisp command. Implicit button types may use the same action types that explicit buttons use. As an example, the pathname implicit button type matches to any existing local filename or directory name and its action type, `link-to-file`, displays the associated file or directory, typically in another window. An explicit button could do the same thing but has to be created manually, rather than recognized as part of the buffer text.

Implicit buttons are managed with the Hyperbole Ibut/ menu accessed with `{C-h h i}`. The Create item, `{C-h h i c}`, prompts for an implicit button name (default is any selected region), an action type, and the action's associated arguments. It then creates the button at point. Use this to create a button with any implicit button type, not just links.

Alternatively, to create an implicit link button to something displayed within an Emacs window (the referent), simply drag with the Assist (not the Action) Mouse Key depressed from an editable source window to another window with the desired link referent and then release. The drag must start outside of a draggable item, see Section 3.7.5.4 [Displaying Items], page 21. Hyperbole will either automatically select the button type based on the referent context or will prompt you to select from one of a few possible link types.

If you have exactly two Emacs windows in your current frame or exactly two windows visible across two Emacs frames, this is even easier. Simply use the Link menu item, `{C-h h i l}`, to create a new unnamed implicit link button or to edit the one at point. `{C-u C-h h i l}` will additionally prompt to add a name or rename the button at point. With more than two windows, Hyperbole will prompt you to choose the referent window and its associated point to which to link. If the Ace Window package is installed and active, this will be used to choose the window via keyboard; otherwise, you will be prompted to select it by mouse.

To activate an implicit button with point on its name or button text, use the Act menu item, `{C-h h i a}` or press the Action Key. You can use `{C-h h i e}` to edit an implicit button (or simply edit it manually). If you want to add a name to an existing implicit button without one, use `{C-h h i n}` to name it. Rename an existing named implicit button with `{C-h h i r}`.

Unlike explicit buttons, implicit buttons have no individual button data other than their text and optional labels. You use implicit button types which include boolean expressions (predicates) that match to both the label and the context required of any button of the type. Each time a Smart Key is pressed at a location, Hyperbole evaluates the predicates from the list of implicit button types and the first one that evaluates true is selected and its associated action is triggered.

All of this happens transparently and is easy to use once you try it. The Hyperbole Smart Keys offer additional extensive context-sensitive point-and-click type behavior beyond implicit button types. See Section 3.2 [Smart Key Operations], page 12.

Individual implicit buttons may be labeled/named, allowing activation by name or use as a link target by other buttons. Such names are highlighted similarly to explicit button names. Here is a pathname button with a label of 'My Emacs Files':

```
<[My Emacs Files]>: "~/.emacs.d"
```

The name is delimited by '`<[`' and '`]>`' and can be followed by any number of :, - or = separator characters, including none.

4.3.1 Implicit Button Types

Below is a list of standard implicit button types in the order in which Hyperbole tries to match to the types when looking for an implicit button (decreasing priority order). `{C-h h i t RET}` provides similar information. See the Hyperbole file, `hibtypes.el`, for examples of how to define implicit button types (in the file, they are listed in reverse order, increasing in priority).

`smart-org`

`smart-org` is not an actual implicit button type, just an Elisp function, but it behaves similarly, so it is documented here.

Hyperbole recognizes Org mode constructs in any of these modes: `org-mode`, `org-agenda-mode`, `outshine-mode` or `poporg-mode`. (See the function `hsys-org-mode-p`).

Hyperbole does quite a few things for Org mode users. When the Action Key is pressed:

1. If on an Org todo keyword, cycle through the keywords in that set or if final done keyword, remove it.
2. If on an Org agenda view item, jump to the item for editing.
3. Within a radio or internal target or a link to it, jump between the target and the first link to it, allowing two-way navigation.
4. Follow other internal links and ID references in Org mode files.
5. Follow Org mode external links.
6. When on a Hyperbole button, activate the button.
7. With point on the :dir path of a code block definition, display the directory given by the path.
8. With point on any #+BEGIN_SRC, #+END_SRC, #+RESULTS, #+begin_example or #+end_example header, execute the code block via the Org mode standard binding of `{C-c C-c}`, `org-ctrl-c-ctrl-c`.
9. When point is on an Org mode heading, cycle the view of the subtree at point.
10. In any other context besides the end of a line, invoke the Org mode standard binding of `{M-RET}`, `org-meta-return`.

When the Assist Key is pressed, it behaves just like the Action Key except in these contexts:

1. If on an Org todo keyword, move to the first todo keyword in the next set, if any.
2. If on an Org mode link or agenda view item, display Hyperbole context-sensitive help.
3. On a Hyperbole button, performs the Assist Key function, generally showing help for the button.
4. With point on the :dir value of a code block definition, display a help summary of this implicit directory button.
5. With point on any #+BEGIN_SRC, #+END_SRC, #+RESULTS, #+begin_example or #+end_example header, remove any associated results.

6. Not on a Hyperbole button but on an Org mode heading, cycle through views of the whole buffer outline.

To disable Hyperbole support within Org major and minor modes, set the custom option `hsys-org-enable-smart-keys` to `nil`. Then in Org modes, the Action Key will simply invoke `org-meta-return`. `{C-h h c o}` (minibuffer menu Cust/Org-M-RET) will interactively customize this setting.

The following table summarizes the effect of this option setting.

This Setting	Smart Key Context	Hyperbole Button	Org Link	Fallback Command
buttons	Ignore	Activate	Activate	org-meta-return
nil	Ignore	Ignore	Ignore	org-meta-return
t	Activate	Activate	Activate	None

`doc-id` Display a document from a local document library given its id. Ids must be delimited by `doc-id-start` and `doc-id-end` and must match the function given by `doc-id-p`. (Note that this implicit button type is not installed by default. You must manually configure it and load it from the file, `${hyperb:dir}/hib-doc-id.el`). See the commentary at the top of that file for more information.

`completion`
Insert the completion at point (from a completions buffer) into the minibuffer or the other window.

`action` The Action Button type. At point, activate any of: an Elisp variable, a Hyperbole action-type, or an Elisp function call surrounded by `<>` rather than (). If an Elisp variable, display a message showing its value.

`hyp-source`
Turn source location entries following an '@loc>' line in Hyperbole reports into buttons that jump to the associated location. For example, `{C-u C-h h d d C-h h e h o}` summarizes the properties of the explicit buttons in the `${hyperb:dir}/DEMO` file and each button in that report buffer behaves the same as the corresponding button in the original `${hyperb:dir}/DEMO` file.

`hyp-address`
Within a mail or Usenet news composer window, make a Hyperbole support/discussion e-mail address insert Hyperbole environment and version information. This is useful when sending mail to a Hyperbole discussion mail list. See also the documentation for `actypes::hyp-config`. For example, a click of an Action Mouse Key on <hyperbole-users@gnu.org> in a mail composer window would activate this implicit button type.

`Info-node`
Make a "(filename)nodename" button display the associated Info node. Also make a "(filename)itemname" button display the associated Info index item. Examples are "(hyperbole)Implicit Buttons" and "(hyperbole)C-c /".

`gnus-push-button`
Activate GNUS-specific article push-buttons, e.g. for hiding signatures. GNUS is a news and mail reader.

`texinfo-ref`
: Display Texinfo, Info node or help associated with Texinfo node, menu item, @xref, @pxref, @ref, @code, @findex, @var or @vindex at point. If point is within the braces of a cross-reference, the associated Info node is shown. If point is to the left of the braces but after the @ symbol and the reference is to a node within the current Texinfo file, then the Texinfo node is shown.

  For @code, @findex, @var and @vindex references, the associated documentation string is displayed.

`patch-msg`
: Jump to the source code associated with output from the '`patch`' program. Patch applies diffs to source code.

`elisp-compiler-msg`
: Jump to source code for definition associated with an Emacs Lisp byte-compiler error message or ERT test output line. Works when activated anywhere within such a line.

`debugger-source`
: Jump to the source line associated with a debugger stack frame or breakpoint line. This works with gdb, dbx, and xdb. Such lines are recognized in any buffer.

`hib-python-traceback`
: Test for and jump to line referenced in Python pdb, traceback, or pytype error.

`grep-msg` Jump to the line associated with a grep or compilation error message. Messages are recognized in any buffer.

`hyrolo-stuck-msg`
: Jump to the position where a HyRolo search has become stuck from the error. Such errors are recognized in any buffer.

`ripgrep-msg`
: Jump to a line associated with a ripgrep (rg) line numbered msg. Ripgrep outputs each pathname once, followed by all matching lines in that pathname. Messages are recognized in any buffer (other than a helm completion buffer).

`ipython-stack-frame`
: Jump to the line associated with an ipython stack frame line numbered msg. ipython outputs each pathname once followed by all matching lines in that pathname. Messages are recognized in any buffer (other than a helm completion buffer).

`pathname-line-and-column`
: Make a valid `pathname:line-num[:column-num]` pattern display the path at *line-num* and optional *column-num*. Also works for remote pathnames. May also contain hash-style link references with the following format: `<path>[#<link-anchor>]:<line-num>[:<column-num>]`.

`link-to-ibut <ilink>`
: At point, activate a link to an implicit button within the current buffer. This executes the linked to implicit button's action in the context of the current buffer.

  Recognizes the format '<ilink:' button_label [':' button_file_path] '>', where button_file_path is given only when the link is to another file, e.g. <ilink: my series of keys: ${hyperb:dir}/HYPB>.

`link-to-gbut <glink>`
: At point, activate a link to a global button. This executes the linked to global button's action in the context of the current buffer.

  Recognizes the format '<glink:' button_label '>', e.g. <glink: open todos>.

`link-to-ebut <elink>`
: At point, activate a link to an explicit button within the current buffer. This executes the linked to explicit button's action in the context of the current buffer.

  Recognizes the format '<elink:' button_label [':' button_file_path] '>', where : button_file_path is given only when the link is to another file, e.g. <elink: project-list: ~/projs>."

`klink`
: Follow a link delimited by <> to a koutline cell. See the documentation for `actypes::link-to-kotl` for valid link specifiers.

`man-apropos`
: Make man apropos entries (from '`man -k`') display associated man pages when selected.

`rfc`
: Retrieve and display an Internet Request for Comments (RFC) standards document referenced at point. The following formats are recognized: RFC822, rfc-822, and RFC 822. The `hpath:rfc` variable specifies the location from which to retrieve RFCs via HTTP.

`kbd-key`
: Execute a key series (series of key sequences) around point, delimited by curly braces, {}. Key series should be in human readable form, e.g. `{C-x C-b}`. Formats such as `{^x^b}` will not be recognized. The string within `(kbd "string")` also acts as a key series button.

  Any key sequence must be a string of one of the following:

  - a Hyperbole minibuffer menu item key sequence,
  - a HyControl key sequence,
  - a M-x extended command,
  - or a valid key sequence together with its interactive arguments.

`debbugs-gnu-mode`
: Debbugs is a client-server issue tracker used by GNU free software projects, including Hyperbole, to manage issues and maintain threads of discussion around them. You issue queries to a Debbugs server and it returns a listing entry for each matching issue. When on a GNU Debbugs listing entry in `debbugs-gnu-mode`, an Action Key press displays the discussion of the selected issue; an Assist

Key press pretty prints the status of the issue to a window below the listing window.

`debbugs-gnu-query`
: Display the results of a Debbugs query based on a bug reference string around point. This works in most types of buffers. If the query includes a single id number, it displays the original message submission for that id and allows browsing of the followup discussion. The following buffer text formats are accepted (with point prior to any attribute):

```
bug#id-number, bug# id-number, bug #id-number or bug id-number
bug?attr1=val1&attr2=val2&attr3=val3
bug#id-number?attr1=val1&attr2=val2&attr3=val3
```

Note that *issue* or *debbugs* may also be used in place of *bug*. See the documentation at the top of the `hib-debbugs.el` file for detailed query format information.

`dir-summary`
: Detect filename buttons in files named "MANIFEST" or "DIR". Display selected files. Each filename must be at the beginning of the line and must be followed by one or more spaces and then another non-space, non-parenthesis, non-brace character.

`text-toc` Jump to the text file section referenced by a table of contents (toc) entry at point. This works in any text derived major mode buffer with a 'Table of Contents' or 'Contents' label on a line by itself (it may begin with an asterisk), preceding the table of contents. Each TOC entry must begin with some white-space followed by one or more asterisk characters. Each section header linked to by the toc must start with one or more asterisk characters at the very beginning of the line. TOCs in Internet RFCs work as well. For example, display this RFC, <link-to-rfc 822>, and Action Key press on any TOC line to jump to the associated section. Or try it in the Hyperbole `DEMO` file.

`cscope` Jump to a C/C++ source line associated with a Cscope C analyzer output line. The cscope.el Lisp library available from the Emacs package manager must be loaded and the open source cscope program available from http://cscope.sf.net must be installed for this button type to do anything.

`etags` Jump to the source line associated with an etags file entry in a TAGS buffer. If on a tag entry line, jump to the source line for the tag. If on a pathname line or line preceding it, jump to the associated file.

`ctags` Jump to the source line associated with a ctags file entry in any buffer. Ctags files are used by old editors like vi to lookup identifiers. Emacs uses the newer, more flexible Etags format.

`id-cflow` Expand or collapse C call trees and jump to code definitions. Requires cross-reference tables built by the external `cxref` program.

`rfc-toc` Summarize contents of an Internet rfc from anywhere within an rfc buffer. Each line of the summary may be selected to jump to the associated section.

`markdown-internal-link`
: Display any in-file Markdown link referent. Pathnames and urls are handled elsewhere.

`git-commit-reference`
: Display the changeset for a git commit reference, e.g. commit a55e21, typically produced by git log. Hyperbole also includes two commands, `hypb:fgrep-git-log` and `hypb:grep-git-log` to list git commit references whose changesets contain either the string (fgrep) or regular expression (grep) given. Then an Action Key press displays the associated changeset.

`social-reference`
: Display the web page associated with a social media hashtag or username reference at point.

  Reference format is:

  ```
  [facebook|instagram|twitter]?[#@]<hashtag-or-username> or
  [fb|in|tw]?[#@]<hashtag-or-username>
  ```

  For example, '`fb@someuser`' displays the home page for facebook user '`someuser`' and '`in#hashtag`' displays photos with the hashtag '`hashtag`'. The first part of the label for a button of this type is the social media service name. The service name defaults to the value of `hibtypes-social-default-service` (default value of "twitter") when not given, so #hashtag would be the same as twitter#hashtag.

`annot-bib`
: Display annotated bibliography entries defined within the same buffer as the reference. References must be delimited by square brackets, must begin with a word constituent character, and must not be in buffers whose names begin with a ' ' or '*' character.

`mail-address`
: If on an e-mail address in a specific buffer type, compose mail to that address in another window. Applies to any major mode descended from those in `hypb:mail-address-mode-list`, the HyRolo match buffer, any buffer attached to a file included in `hyrolo-file-list`, or any buffer with `mail` or `rolo` (case-insensitive) within its name. If `hypb:mail-address-mode-list` is set to '`nil`', this button type is active in all buffers.

`www-url`
: When not in an Emacs web browser buffer, follow any non-ftp URL (link) at point. The variable, `browse-url-browser-function`, may be used to customize which URL browser is called. Terse URLs which lack a protocol prefix, like www.gnu.org, are also recognized.

`pathname`
: Make a valid pathname display the path entry. Also works for delimited and non-delimited remote pathnames, Texinfo @file{} entries, and hash-style link references to HTML, XML, SGML, Markdown or Emacs outline headings, shell script comments, and MSWindows paths (see `${hyperb:dir}/DEMO#POSIX and MSWindows Paths` for details). Emacs Lisp library files (filenames without any directory component that end in .el and .elc) are located using the `load-path` directory list.

The pathname may contain references to Emacs Lisp variables or shell environment variables using the syntax, `\"${variable-name}\"`. See Section B.2.4 [Link Variable Substitution], page 109, for how this handled. The constant, `hpath:variable-regexp`, matches to this pattern within pathnames.

See the function documentation for `hpath:at-p` for possible delimiters. See the variable documentation for `hpath:suffixes` for suffixes that are added to or removed from the pathname when searching for a valid match. See the function documentation for `hpath:find` for special file display options.

If instead is a PATH-style variable name, .e.g. `MANPATH`, will prompt with completion for one of the paths and will then display that. If it is the colon or semicolon-separated string of paths value from a PATH-style variable, the path at point is displayed; empty paths, e.g. `::` represent the current directory, `..` Must have at least four paths within the variable value for this to work.

`hyperbole-run-test-definition`
: With an Action Key press on the name in the first line of an ert test def, evaluate and run the ERT test. With an Assist Key press instead, edebug the test and step through it.

`hyperbole-run-tests`
: Recognize Action Buttons of the form `<hyperbole-run-tests test-selector>` which when activated run Hyperbole tests using the ERT framework. The `test-selector` argument is as described in `ert-select-tests`.

`hyperbole-run-test`
: Recognize Action Buttons of the form `<hyperbole-run-test test-name>` which when activated run individual Hyperbole tests, each given by the `<test-name>` argument, an unquoted name.

4.3.2 Action Buttons

Explicit buttons all use the same syntax and store their action data in a file separate from the button source file. Implicit buttons have no external data but use a unique syntax per implicit button type to recognize the action to run.

For times when you need a cross between the two, with a universal button syntax and all button data stored in the button source file, there are *action buttons*.

Action Buttons are a form of implicit buttons that can execute any existing action types, Emacs Lisp functions, Emacs Regression Tests (ERT tests) or display the values of Emacs Lisp variables and constants. Such buttons are delimited by angle brackets, `< >`, and come in four types:

action type invocations
: These begin with an action type name (from the list displayed by `{C-h h d t a RET}`) and are followed by any needed arguments to form the action, e.g.

```
<link-to-file-line "${hyperb:dir}/hact.el" 40>
```

function calls
: These are similar to action type invocations but begin with an Emacs Lisp function name rather than an action type name, e.g.

```
<find-file-other-window "/tmp">
```

Generally, such functions are invoked for their side-effects and their return value is silently ignored. But if a function is a boolean predicate whose name ends in '`-p`', then the result is displayed in the minibuffer.

test executions

Each of these consists solely of the name of an ERT test defined with `ert-deftest` and surrounded by angle brackets, e.g.

```
<hbut-tests-ibut-insert-kbd-key>
```

The above example runs a Hyperbole regression test when activated and shows the pass/fail result in a pop-up buffer.

variable displays

These consist of an Emacs Lisp variable name only. They display messages with their variable name and value, e.g.

```
<fill-column>
```

If there is a function binding with the same name as the variable you wish to display, to prevent interpretation as a function call action button, precede the name with a `$`, e.g.

```
<$fill-column>
```

With action buttons you need not remember any special syntax for each type of implicit button. You can freely embed them in any type of text and use the Action and Assist keys on them as you do with any other type of implicit button.

An action button is recognized only if the first name within the angle brackets is an existing action type or Emacs Lisp symbol. Otherwise, other implicit button types will be tested and may activate instead.

To activate a frequently used action button by name independent of your current buffer, simply add it to your global button file and precede it with a label `{C-h h i l}`. Then invoke it by label name with: `{C-h h g a}`.

4.4 Button Files

It is often convenient to create files filled with buttons as a means of navigating distributed information pools or for other purposes. These files can also serve as useful roadmaps that guide a user through both unfamiliar and highly familiar information spaces. Files that are created specifically for this purpose are called *Hyperbole button files*.

The Hyperbole menu system provides quick access to two types of these button files: personal and directory-specific, through the ButFile menu. (The variable, `hbmap:filename`, contains the base name of these button files. Its standard value is `HYPB`.)

A personal button file may serve as a user's own roadmap to frequently used resources, like a personal home page. Selection of the ButFile/PersonalFile menu item, `{C-h h b p}`, displays this file for editing. The default personal button file is stored within the directory given by the `hbmap:dir-user` variable whose standard value is `~/.hyperb`. The default Hyperbole configuration also appends all global buttons to the end of this file, one per line, as they are created. So you can edit or annotate them within the file.

A directory-specific button file may exist for each file system directory. Such files are useful for explaining the contents of directories and pointing readers to particular highlights within the directories. Selection of the ButFile/DirFile menu item, `{C-h h b d}`, displays the button file for the current directory; this provides an easy means of updating this file when working on a file within the same directory. If you want to view some other directory-specific button file, simply use the normal Emacs file finding commands.

If you want group and site-specific button files, simply place links to such files at the top of your personal button file and do so for your colleagues. This provides a flexible means of connecting to such resources.

4.5 Action Types

Action types are Emacs Lisp commands that specify Hyperbole button behaviors. Hyperbole includes a useful set of action types defined within their own namespace and created with the `defact` macro. See the Hyperbole file, `hactypes.el`, for examples of how to define your own Hyperbole action types.

Each action type may be used by any category of button: global, explicit, or implicit. The arguments needed by an action type are prompted for at button creation time or in the case of an implicit button, computed when the button is activated. During button activation, the arguments are fed to the action type's body to achieve the desired result. This body is called the button *action*.

Hyperbole handles all of this processing transparently. As a user, all you need know is the set of action types that you can work with when creating explicit or global buttons.

Hyperbole action types in alphabetical order are:

`annot-bib`
: Follow an internal reference KEY within an annotated bibliography, delimiters = [ ].

`completion`
: Insert a completion at point into the minibuffer or a buffer. Unless point is at the end of buffer or if a completion has already been inserted, in which case, delete the completions window.

`debbugs-gnu-query`
: Display the discussion of Gnu debbugs ID (a positive integer).

`display-boolean`
: Display a message showing the result value of a BOOL-EXPR. Return any non-'`nil`' value or '`t`'.

`display-value`
: Display a message showing VALUE (a symbol) and its value. Return any non-'`nil`' value or '`t`'.

`display-variable`
: Display a message showing the given variable name and its value.

`eval-elisp`
: Evaluate a Lisp expression LISP-EXPR for its side-effects and return any non-nil value.

`exec-kbd-macro`
: Execute a KBD-MACRO REPEAT-COUNT times. KBD-MACRO may be a string of editor command characters, a function symbol or nil to use the last defined keyboard macro. Optional REPEAT-COUNT nil means execute once, zero means repeat until error.

`exec-shell-cmd`
: Execute a SHELL-CMD string asynchronously. Optional non-nil second argument INTERNAL-CMD inhibits display of the shell command line executed. Optional non-nil third argument KILL-PREV means kill the last output to the shell buffer before executing SHELL-CMD.

`exec-window-cmd`
: Asynchronously execute an external window-based SHELL-CMD string.

`git-reference`
: Display the git entity associated with REFERENCE and optional PROJECT. See `${hyperb:dir}/DEMO#Git (Local) References` for examples.

  REFERENCE is a string of one of the following forms:

  - <ref-item>
  - /?<project>/<ref-item>
  - /<project>.

  <ref-item> is one of these:

  one of the words: branches, commits, or tags
  : the associated items are listed

  one of the words: branch, commit, or tag followed by a '/' and item id
  : the item is shown

  a commit reference given by a hex number, 55a1f0
  : the commit diff is displayed

  a branch or tag reference given by an alphanumeric name, e.g. hyper20
  : the files in the branch are listed.

  If given, PROJECT overrides any project value in REFERENCE. If no PROJECT value is provided, it defaults to the value of `hibtypes-git-default-project`.

`github-reference`
: Display the Github entity associated with REFERENCE and optional USER and PROJECT. See `${hyperb:dir}/DEMO#Github (Remote) References` for examples.

  REFERENCE is a string of one of the following forms:

  - <ref-item>
  - <user>/<project>/<ref-item>
  - <project>/<ref-item>
  - /<project>.

<ref-item> is one of these:

• one of the words: branches, commits, issues, pulls, or tags
the associated items are listed

• one of the words: branch, commit, issue, pull or tag followed by a '/' and item id
the item is shown

• an issue reference given by a positive integer, e.g. *92* or prefaced with *GH-*, like GH-92
the issue is displayed

• a commit reference given by a hex number, 55a1f0
the commit diff is displayed

• a branch or tag reference given by an alphanumeric name, e.g. hyper20
the files in the branch are listed.

USER defaults to the value of `hibtypes-github-default-user`. If given, PROJECT overrides any project value in REFERENCE. If no PROJECT value is provided, it defaults to the value of `hibtypes-github-default-project`.

`gitlab-reference`

Display the Gitlab entity associated with REFERENCE and optional USER and PROJECT. See `../DEMO#Gitlab (Remote) References` for examples.

REFERENCE is a string of one of the following forms:

- <ref-item>
- <user>/<project>/<ref-item>
- <project>/<ref-item>
- /<group>/<project>. or
- /<project-or-group> (where a group is a collection of projects)

<ref-item> is one of these:

• one of the words: activity, analytics, boards or kanban, branches, commits, contributors, groups, issues or list, jobs, labels, merge_requests, milestones, pages, pipelines, pipeline_charts, members or people or staff, projects, pulls, schedules, snippets, status or tags
the associated items are listed

• one of the words: branch, commit(s), issue(s), milestone(s), pull(s), snippet(s) or tag(s) followed by a '/' or '=' and an item-id
the item is shown

• an issue reference given by a positive integer, e.g. *92* or prefaced with *GL-*, like GL-92
the issue is displayed

• a commit reference given by a hex number, 55a1f0
the commit diff is displayed

• a branch or tag reference given by an alphanumeric name, e.g. hyper20
the files in the branch are listed.

USER defaults to the value of `hibtypes-gitlab-default-user`. If given, PROJECT overrides any project value in REFERENCE. If no PROJECT value is provided, it defaults to the value of `hibtypes-gitlab-default-project`.

`hyp-config`
: Insert Hyperbole configuration and debugging information at the end of the current buffer or within optional OUT-BUF.

`hyp-request`
: Insert help for composing a Hyperbole support/discussion message into the current buffer or the optional OUT-BUF.

`hyp-source`
: Display a buffer or file from a line beginning with `hbut:source-prefix`.

`kbd-key`
: Execute a normalized KEY-SERIES (series of key sequences) without curly braces. Each key sequence within KEY-SERIES must be a string of one of the following:

  - a Hyperbole minibuffer menu item key sequence,
  - a HyControl key sequence,
  - a M-x extended command,
  - or a valid key sequence together with its interactive arguments.

  Return '`t`' if the sequence appears to be valid, else '`nil`'.

`link-to-bookmark`
: Display an Emacs BOOKMARK. When creating the button, if in Bookmark Menu mode, use the bookmark nearest point as the default. Otherwise, utilize the most recently used bookmark in the current file (bookmark-current-bookmark) as the default, if any.

`link-to-buffer-tmp`
: Display a BUFFER. This type of link is for use in a single editor session. Use `link-to-file` instead for a permanent link.

`link-to-directory`
: Display a DIRECTORY in Dired mode.

`link-to-doc`
: Display an online version of a document given by DOC-ID. If the online version of a document is not found in `doc-id-indices`, signal an error.

`link-to-ebut`
: Perform an action given by an explicit button, specified by KEY and KEY-FILE.

`link-to-elisp-doc`
: Display the documentation for FUNC-SYMBOL.

`link-to-file`
: Display a file given by PATH scrolled to optional POINT. If POINT is given, display the buffer with POINT at the top of the window.

`link-to-file-line`
: Display a file given by PATH scrolled to LINE-NUM.

`link-to-gbut`
: Perform an action given by an existing global button, specified by KEY.

`link-to-Info-index-item`
: Display an Info index ITEM cross-reference. ITEM must be a string of the form (filename)item-name. During button creation, completion for both filename and item-name is available. Filename may be given without the .info suffix."

`link-to-Info-node`
: Display an Info NODE. NODE must be a string of the form (filename)nodename. During button creation, completion for both filename and nodename is available. Filename may be given without the .info suffix.

`link-to-ibut`
: Perform implicit button action specified by KEY, optional BUT-SRC and POINT. BUT-SRC defaults to the current buffers file or if there is no attached file, then to its buffer name. POINT defaults to the current point.

  When the button with this action type is created, point must be on the implicit button to which to link.

`link-to-kcell`
: Display a Hyperbole outline cell, given by FILE and CELL-REF, at the top of a window. See the documentation for `(kcell:ref-to-id)` for valid CELL-REF formats.

  If FILE is '`nil`', use the current buffer. If CELL-REF is '`nil`', show the first cell in the view.

`link-to-kotl`
: Display at the top of a window the referent pointed to by LINK. LINK may be of any of the following forms:

```
< pathname [, cell-ref] >
< [-!&] pathname >
< @ cell-ref >
```

  See the documentation for `(kcell:ref-to-id)` for valid cell-ref formats.

`link-to-mail`
: Display a mail message with MAIL-MSG-ID from optional MAIL-FILE. See the documentation for the variable `hmail:init-function` for information on how to specify the mail reader to use.

`link-to-regexp-match`
: Find REGEXP's Nth occurrence in SOURCE and display the location at the top of the selected window. SOURCE is a pathname unless optional BUFFER-P is non-nil, then SOURCE must be a buffer name or buffer. Return '`t`' if found, signal an error if not.

`link-to-rfc`
: Retrieve and display an Internet rfc given by RFC-NUM. RFC-NUM may be a string or an integer.

`link-to-string-match`
: Find STRING's Nth occurrence in SOURCE and display the location at the top of the selected window. SOURCE is a pathname unless optional BUFFER-P is non-nil, then SOURCE must be a buffer name or buffer. Return '`t`' if found, '`nil`' if not.

`link-to-texinfo-node`
: Display the Texinfo node with NODENAME (a string) from the current buffer.

`link-to-web-search`
: Search web SERVICE-NAME for SEARCH-TERM. Uses `hyperbole-web-search-alist` to match each service to its search url or Emacs command. Uses `hyperbole-web-search-browser-function` and the `browse-url` package to display search results.

`man-show`
: Display a man page on TOPIC, which may be of the form '`<command>(<section>`'). Use `hpath:display-where` setting to control where the man page is displayed.

`org-internal-target-link`
: Follow an optional Org mode <<INTERNAL-TARGET>> back to any first link to it. If INTERNAL-TARGET is nil, follow any internal target link at point. Otherwise, trigger an error.

`org-link`
: Follow an optional Org mode LINK to its target. If LINK is nil, follow any link at point. Otherwise, trigger an error.

`org-radio-target-link`
: Follow an optional Org mode radio <<TARGET>> back to any first link to it. If TARGET is nil, follow any radio target link at point. Otherwise, trigger an error.

`rfc-toc`
: Compute and display a summary of an Internet rfc in BUF-NAME. Assume point has already been moved to the start of the region to summarize. Optional OPOINT is the point to return to in BUF-NAME after displaying the summary.

`text-toc`
: Jump to the text file SECTION referenced by a table of contents entry at point.

`www-url`
: Follow a link given by a URL. The variable, `browse-url-browser-function`, customizes the url browser that is used. Valid values of this variable include `browse-url-default-browser` and `browse-url-generic`. See its documentation string for details.

`yt-info`
: Display a web page with the metadata information about VIDEO-ID.

`yt-play`
: Play a VIDEO-ID from the point specified by optional START-TIME-STRING. If not given, START-TIME-STRING is set to `"0s"` representing the beginning of the video. START-TIME-STRING is a colon-separated hours:minutes:seconds string, e.g. 1:2:44 (1 hour, two minutes, 45 seconds), where the hours and minutes are optional.

`yt-search`
: Search Youtube for SEARCH-TERM.

`yt-url` Return url to play VIDEO-ID from point specified by optional START-TIME-STRING. Return nil if START-TIME-STRING is given but is invalid. If not given, START-TIME-STRING is set to `"0s"` representing the beginning of the video.

START-TIME-STRING is a colon-separated hours:minutes:seconds string, e.g. 1:2:44 (1 hour, two minutes, 45 seconds), where the hours and minutes are optional.

Action types create a convenient way of specifying button behavior without the need to know how to program. Expert users who are familiar with Emacs Lisp, however, may find that they often want to tailor button actions in a variety of ways not easily captured within a type system. In such cases, `hui:ebut-prompt-for-action` should be set to '`t`'. This will cause Hyperbole to prompt for an action to override the button's action type at each explicit button creation. For those cases where the action type is sufficient, a '`nil`' value should be entered for the action. An action may be any Lisp form that Emacs Lisp can evaluate.

4.6 Button Type Precedence

Explicit buttons always take precedence over implicit buttons. Thus, if a button selection is made which falls within both an explicit and implicit button, only the explicit button will be selected. Explicit button labels are not allowed to overlap; Hyperbole's behavior in such cases is undefined.

If there is no explicit button at point during a selection request, then each implicit button type predicate is tested in turn until one returns non-nil or all are exhausted. Since two implicit button types may have overlapping *domains*, those contexts in which their predicates are true, only the first matching type is used. The type predicates are tested in *reverse* order of definition, i.e. most recently entered types are tested first, so that personal types defined after standard system types take precedence. It is important to keep this order in mind when defining new implicit button types. By making match predicates as specific as possible, one can minimize any overlapping implicit button domains.

Once a type name is defined, its precedence relative to other types remains the same even if its body is redefined, as long as its name is not changed. This allows incremental modifications to types without any worry of altering their precedences. See Section 10.2 [Creating Types], page 84, for information on how to develop or modify types.

4.7 Utilizing Explicit Buttons

Explicit buttons are a fundamental building block for creating personal or organizational hypertext networks with Hyperbole. This section summarizes the user-level operations available for managing these buttons.

4.7.1 Creation

Creating explicit buttons is fun and easy. You can always try them out immediately after creating them or can utilize the Assist Key to verify what buttons do.

If you want to create an explicit link button to somewhere within an Emacs window, then simply drag with the Assist Mouse Key from an editable buffer (outside of a draggable

item) to the target buffer. Note, the same Action Mouse Key drag creates an implicit button.

Alternatively, the Hyperbole minibuffer menu item, Ebut/Create, will create any type of explicit button, but requires a few steps.

The next two subsections examine explicit button creation and modification in detail.

4.7.1.1 Creation Via Menus

Explicit buttons are managed with the Hyperbole Ebut/ menu accessed with `{C-h h e}`. The Create item, `{C-h h e c}`, creates any type of explicit button. It prompts for an explicit button label (default is any selected region), an action type, and the action's associated arguments. It then creates the button at point and surrounds the label with <(explicit button delimiters)> like so, to indicate success.

You can use the direct selection techniques mentioned in Section 3.3 [Smart Key Argument Selection], page 15, to select any completion-based arguments. If you do not mark a region before invoking the button create command, you will be prompted for both a label and a target buffer for the button and the delimited label text will be inserted into the target buffer after a successful button creation.

If a previous button with the same label exists in the same buffer, Hyperbole will add an *instance number* to the label when it adds the delimiters so that the name is unique. Thus, you don't have to worry about accidental button name conflicts. If you want the same button to appear in multiple places within the buffer, just enter the label again and delimit it yourself or copy and paste the button with its delimiters. Hyperbole will interpret all occurrences of the same delimited label within a buffer as the same button.

4.7.1.2 Creation Via Buffer Link

If you have exactly two Emacs windows in your current frame or exactly two windows visible across two Emacs frames, you can quickly create explicit link buttons from your current point (source) to the point in the other window (referent). Simply use the Link menu item, `{C-h h e l}`, to create a new explicit link button or to rename the one at point. Hyperbole will either use the selected region as the new button label or will prompt you for it. It will then automatically choose the link type based on the referent location and will either update the button at point or create a new one.

With more than two windows on screen, Hyperbole will prompt you to choose the referent window and its associated point to which to link. If the Ace Window package is installed and active, this will be used to choose the window via keyboard; otherwise, you will be prompted to select it by mouse.

4.7.1.3 Creation Via Assist Key Drags

Alternatively, to create an explicit link button to a referent displayed within an Emacs window, simply drag with the Assist (not the Action) Mouse Key depressed from an editable source window to another window with the desired link referent and then release. The drag must start outside of a draggable item, see Section 3.7.5.4 [Displaying Items], page 21. Hyperbole will either automatically select the button type based on the referent context or will prompt you to select from one of a few possible link types.

In detail, you should split your current Emacs frame into two windows: one which contains the point at which you want a button to be inserted and another which shows the

point to which you want to link. Depress the Assist Mouse Key at the source point for the button (anywhere but on a paired delimiter such as double quotes or parentheses). Then drag to the other window and release the Assist Mouse Key at the start point of the link referent. The process becomes quite simple with a little practice. (See Section 4.7.1.1 [By Menu], page 43, for a more detailed explanation of the explicit button creation process).

If a region was selected prior to the start of the drag, it is used as the button label; otherwise, you are prompted for the label. Hyperbole uses the link referent context to determine the type of link to make. If there are a few different types of links which are applicable from the context, you will be prompted with a list of the types. Simply use the Action Key or the first capital letter of the link type to select one of the type names to finish the link creation. Hyperbole will then insert explicit button delimiters around the button label and will display a message in the minibuffer indicating the button label, its action/link type, and any arguments, notably the thing to which it links.

The following table shows the type of link that will be created based upon the referent context in which the Action Key is released.

Referent Context	Link Type
Org Roam or Org Id	link-to-org-id
Global Button	link-to-gbut
Explicit Button	link-to-ebut
Implicit Button	link-to-ibut
Bookmarks List	link-to-bookmark
Info Index Item	link-to-Info-index-item
Info Node	link-to-Info-node
Texinfo Node	link-to-texinfo-node
Mail Reader Message	link-to-mail
Directory Name	link-to-directory
Filename	link-to-file
Koutline Cell	link-to-kcell
Outline Heading	link-to-string-match
Buffer attached to File	link-to-file
Buffer without File	link-to-buffer-tmp

4.7.2 Renaming

Once an explicit button has been created, its label text must be treated specially. Any inter-word spacing within the label may be freely changed, as may happen when a paragraph is refilled, but a special command must be invoked to rename it.

The rename command operates in two different ways. If point is within a button label when it is invoked, it will tell you to edit the button label and then to invoke the rename command again after the edit. The second invocation will actually rename the button. If instead the command is originally invoked outside of any explicit button, it will prompt for the button label to replace and the label to replace it with and then will perform the renaming. All occurrences of the same button in the buffer will be renamed.

The rename command may be invoked from the Hyperbole menu via Ebut/Rename. Hyperbole does not bind this command to a key by default. `{C-h w hui:ebut-rename`

`RET}` will show what if any key is bound within your Emacs. Bind it within your `~/.emacs` file with: `(hkey-set-key "\C-cr" 'hui:ebut-rename)`, for example.

4.7.3 Deletion

Ebut/Delete works similarly to the Rename command but deletes the selected button. The button's delimiters are removed to confirm the deletion. If the delete command is invoked with a prefix argument, then both the button label and the delimiters are removed as confirmation.

Presently there is no way to recover a deleted button; it must be recreated. Therefore, the `hui:hbut-delete-confirm-flag` variable is true by default, causing Hyperbole to require confirmation before interactively deleting explicit buttons. Set it to '`nil`' if you prefer no confirmation.

4.7.4 Editing

Ebut/Edit prompts you with each of the elements from the button's attributes list and allows you to edit each in turn.

There is a quicker way to edit explicit link buttons, however. Simply drag with the Action Mouse Key from within the button label to a link destination in a different window, just as you would when creating a new button with a mouse drag. Remember that drags may also be emulated from the keyboard. See Section 4.7.1 [Creation], page 42.

4.7.5 Searching and Summarizing

The Ebut/Help menu may be used to summarize either a single explicit button or all such buttons within a buffer. The buttons summarized may then be activated directly from the summary.

Ebut/Help/BufferButs summarizes the explicit buttons in the order in which they appear in the buffer. Ebut/Help/CurrentBut summarizes only the button at point. Ebut/Help/OrderedButs summarizes the buttons in alphabetical order. All of these summary commands eliminate duplicate occurrences of buttons from their help displays.

Ebut/Search prompts for a search pattern and searches across all the locations in which you have previously created explicit buttons. It asks you whether to match to any part of a button label or to whole labels only. It then displays a list of button matches with a single line of surrounding context from their sources. Any button in the match list may be activated as usual. An Action Key press on the surrounding context jumps to the associated source line. A press on the filename preceding the matches jumps to the file without selecting a particular line.

There are presently no user-level facilities for globally locating buttons created by others or for searching on particular button attributes.

4.7.6 Buttons in Mail

Hyperbole supports embedding buttons within electronic mail messages composed in Emacs. An enhanced mail reader may then be used to activate the buttons within messages just like any other buttons. Because this involves complex changes to mail support functions, this feature is disabled by default. Use the Cust/Msg-Toggle-Ebuts minibuffer menu item to enable it.

Hyperbole supports the following mail readers: Rmail (see Section "Reading Mail with Rmail" in *the GNU Emacs Manual*), VM (see Section "Introduction" in *the VM Manual*) and MH-e. Button inclusion and activation within USENET news articles is also supported in the same fashion via the Gnus news reader if available at your site (see Section "The Gnus Newsreader" in *the Gnus Manual*). (The `hmail.el` file defines a generalized interface that can be used to hook in other mail or news readers if the necessary interface functions are written.)

All explicit buttons to be mailed must be created within the outgoing message buffer. There is no present support for including text from other buffers or files which contain explicit buttons, except for the ability to yank the contents of a message being replied to, together with all of its buttons, via the `(mail-yank-original)` command bound to `{C-c C-y}`. From a user's perspective, buttons are created in precisely the same way as in any other buffer. They also appear just like any other buttons to both the message sender and the reader who uses the Hyperbole enhanced readers. Button operation may be tested any time before a message is sent. A person who does not use Hyperbole enhanced mail readers can still send messages with embedded buttons since mail composing is independent of any mail reader choice.

Hyperbole buttons embedded within received mail messages behave as do any other buttons. The mail does not contain any of the action type definitions used by the buttons, so the receiver must have these or she will receive an error when she activates the buttons. Buttons which appear in message *Subject* lines are copied to summary buffers whenever such summaries are generated. Thus, they may be activated from either the message or the summary buffers.

Nothing bad will happen if a mail message with explicit buttons is sent to a non-Hyperbole user. The user will simply see the text of the message followed by a series of lines of button data at its end. Hyperbole mail users never see this data in its raw form.

In order to alert readers of your mail messages that you can handle Hyperbole mail buttons, you can set the variable, `smail:comment`, to an expression that automatically inserts a comment into each outgoing message to announce this fact. See its documentation for technical details. By default, no comment is added. To have a comment line added to your outgoing message, add the following to to your `~/.emacs` file before the point at which you load Hyperbole.

```
(setq smail:comment
 (format "Comments: GNU Hyperbole mail buttons accepted, v%s.\n"
         hyperb:version))
```

This will produce the following line in outgoing messages:

```
Comments: GNU Hyperbole mail buttons accepted, vX.X.X.
```

where the X's indicate your Hyperbole version number. You can cut this out of particular messages before you send them when need be.

A final mail-related facility provided by Hyperbole is the ability to save a pointer to a received mail message by creating an explicit button with a `link-to-mail` action type. When prompted for the mail message to link to, if you press the Action Key within the message, the appropriate link parameters will be copied to the argument prompt, as described in Section 3.3 [Smart Key Argument Selection], page 15.

4.7.7 Buttons in News

Explicit buttons may be embedded within outgoing USENET news articles and may be activated from within the Gnus news reader. Because this involves complex changes to news support functions, this feature is disabled by default. Use the Cust/Msg-Toggle-Ebuts minibuffer menu item to enable it (enabling it for mail also enables it for news and vice versa).

Once enabled, all Hyperbole support should work just as it does when reading or sending mail. See Section 4.7.6 [Buttons in Mail], page 45. When reading news, buttons which appear in message *Subject* lines may be activated within the Gnus subject buffer as well as the article buffer. When posting news, the *post-news* buffer is used for outgoing news articles rather than a mail-related buffer.

Remember that the articles you post do not contain the action type definitions used by the buttons, so the receiver must have these or she will receive an error when she activates the buttons. You should also keep in mind that most USENET readers will not be using Hyperbole, so if they receive a news article containing explicit buttons, they will wonder what the button data at the end of the message is. You should therefore limit distribution of such messages. For example, if most people at your site read news with Gnus and use Hyperbole, it would be reasonable to embed buttons in postings to local newsgroups.

In order to alert readers of your postings that they may send you personal replies with embedded Hyperbole buttons, the system inserts into news postings the same comment that is included within mail messages, if enabled. See Section 4.7.6 [Buttons in Mail], page 45, for details and an explanation of how to turn this feature on.

5 Menus

Pulldown and popup menus are available to invoke Hyperbole commands, including those from the HyRolo and the Koutliner. These menus operate like any other application menus and are fairly self-explanatory. Use the `Remove-This-Menu` command on the Hyperbole menubar menu to get rid of the menu if you do not need it. Invoking Hyperbole from the keyboard, as explained below, will add the menu back to the menubar. Here is the Hyperbole Menubar Menu and its Find submenu.

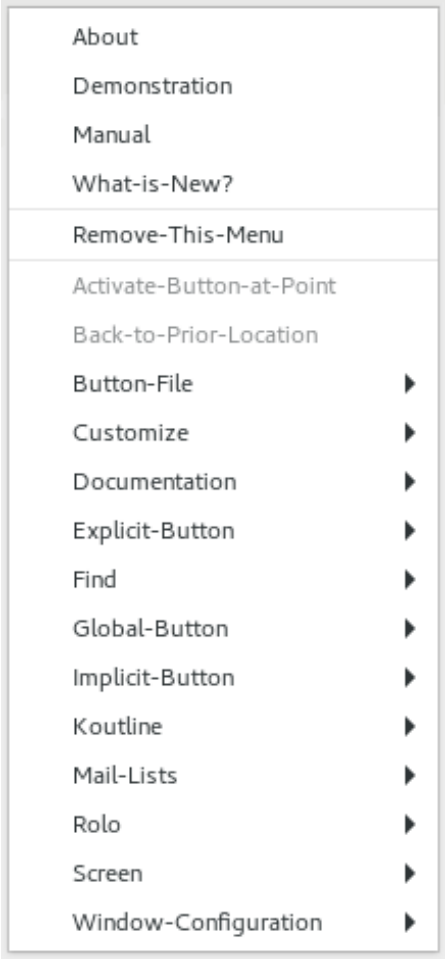

Image 5.1: Hyperbole Menubar Menu

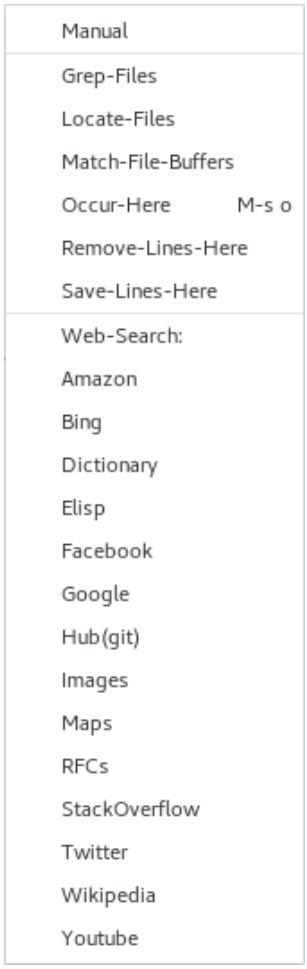

Image 5.2: Find Menubar Menu

The Hyperbole popup menu, `hyperbole-popup-menu`, replicates the Hyperbole menubar menu. It can be bound to a mouse key but is not bound to one by default. It can also be assigned as the default Action or Assist Key action to use when no matching context is found. See Section E.2.51 [Smart Key - Default Context], page 153, for details.

The rest of this section discusses only the specialized *minibuffer menus* which appear in the minibuffer window and work with all emacs versions on all display devices. They provide similar capabilities to those of the Hyperbole menubar but additionally allow for fast menu item selection via the keyboard or mouse. When used with the keyboard, they provide command access similar to key bindings. In fact, any menu item can be bound to a global key sequence. See Section C.1 [Binding Minibuffer Menu Items], page 113.

The top-level Hyperbole minibuffer menu is invoked from a key given in your `hyperbole.el` file (by default, `{C-h h}`) or with a click of the Action Mouse Key in the minibuffer when it is inactive. It should look like this:

```
Hy>  Act Butfile/ Cust/ Doc/ Ebut/ Find/ Gbut/ Hist Ibut/ Kotl/ Msg/ Rolo/ Screen/ Win/
```

A menu item can be selected in a number of ways:

- from the keyboard, by typing the first capitalized character of its name,
- with a press of `{RET}` or the Action Key or Action Mouse Key on the name,
- by pressing `{TAB}` or `{M-f}` to move forward an item,
- or by pressing `{Shift-TAB}` or `{M-b}` to move backward an item.

A prefix argument given to one of the movement commands, moves by that number of items within the menu. A press of the Assist Key on an item displays help for the item, including the action that it performs. `"/"` at the end of an item name indicates that it brings up a submenu.

While a menu is active, to re-activate the top-level Hyperbole menu, use `{C-t}` or press the Action Key while on the menu prefix (before the '`>`' character). This allows you to browse the submenus and then return to the top menu.

You can reload the Hyperbole minibuffer menus and Smart Key handlers to reflect any recent edits when on the top-level Hyperbole menu by pressing `{RET}` or the Action Key on the menu name (first item that ends with '`>`'). This will also quit from the menu.

You can quit from the minibuffer menus without selecting an item by using `{Q}`, or by pressing `{RET}` or `{M-RET}` when at the end of a menu. `{C-g}` aborts from the minibuffer whether you are at a menu prompt or any other Hyperbole prompt. `{X}` both quits the menus and disables the Hyperbole global minor mode; `{C-h h}` restores the menus and re-enables Hyperbole minor mode.

The top-level Hyperbole minibuffer menu items serve the following purposes:

Act Activate button at point or if there is no button at point, prompt for a labeled explicit or implicit button from the current buffer to activate.

Butfile/ Easy access to a directory-specific or personal file of buttons. `HYPB` is the name of the directory-specific button file and `~/.hyperb/HYPB` is the personal file of global buttons. These are good places to begin experimenting with button creation.

Cust/ Hyperbole option customization. This includes whether ftp and www URLs are recognized by the `find-file` commands, where Hyperbole link referents are displayed, where URLs are displayed, where web search results are displayed, whether date stamps are added to rolo entries, and whether to use proportional or windowful scrolling when a Smart Key is pressed at the end of a line. See Section B.2 [Customization], page 105.

The '`KeyBindings/`' submenu allows individual changes to each keyboard key that Hyperbole binds for its commands, notably the Action Key. See Section 3.1 [Smart Key Bindings], page 12, for more information.

See Appendix C [Hyperbole Key Bindings], page 113, for complete descriptions of Hyperbole's key bindings and how to manage them.

Ebut/ All explicit button commands. The window-system-based Hyperbole menu includes an activation menu item for each explicit button found in the current buffer.

Doc/ Hyperbole documentation quick access. This menu contains an About item which describes Hyperbole; a Concepts item that discusses how Hyperbole features all interrelate; a Demo item which demonstrates a number of interactive Hyperbole features; a New item that details new Hyperbole features, as well as a WhyUse item with use cases. It also contains the Types/ submenu for documentation on Hyperbole implicit button and action types.

Find/ Buffer and file line finding commands and web searching. This menu brings together many existing line finding commands that are difficult to recall quickly when needed, simplifying finding and then jumping to matching lines by using the Action Key. It includes commands for filtering a buffer to just those lines that either match or do not match a regular expression. It also includes a submenu for quick access to popular web search engines.

Below are each of the commands on the Find menu.

- GrepFiles - Show numbered line matches for a regexp in all non-backup, non-auto-save files below the current directory. If in an Emacs Lisp mode buffer and no PREFIX-ARG is given, limit search to only .el and .el.gz files. Set `hypb:rgrep-command` to change the grep command or options.
- LocateFiles - Prompt for a pattern and display a list of all matching pathnames found throughout the file system. On Mac OS X, this uses Spotlight (the `mdfind` command); on UNIX, it uses the `locate` command. Within the resulting *Locate* buffer, Find/Grep-Files will find matching lines within only these paths (files and directories).
- MatchFileBuffers - Show numbered line matches for regexp in all file-based buffers.
- OccurHere - Show numbered line matches for regexp from this buffer.
- RemoveLines - Following point, remove all lines that match regexp.
- SaveLines - Following point, keep only lines that match regexp.
- Web/ - Select a search engine and term and search with them or use Jump to go to a named URL (using webjump library).

  Hyperbole binds the key `{C-c /}` for quick access to this menu, if it is not already bound prior to Hyperbole's initialization. The Cust/Web-Search-Search menu sets the option, `hyperbole-web-search-browser-function`, which determines whether web search results are displayed within Emacs or with an external web browser. A short video introduction to the Find/Web menu may be found at `https://youtu.be/8lMlJed0-OM`.

  The Find/Web menu looks like this:

```
Web>  Amazon Bing Dictionary Elisp Facebook Google gitHub Images
      Jump Maps RFCs StackOverflow Twitter Wikipedia Youtube
```

Gbut/ All global button commands. Global buttons are accessed by name rather than by direct selection. The Hyperbole menubar menu also includes an activation menu item for each global button.

Hist Return to previous positions in the button traversal history.

Ibut/ All implicit button commands.

Msg/ Hyperbole-specific email messaging commands. Use this to send mail to a Hyperbole discussion mailing list.

Kotl/ Autonumbered, structured outliner commands with per-node hyperlink anchors. See Chapter 7 [Koutliner], page 59.

Rolo/ Hierarchical, multi-file contact manager lookup and edit commands. See Chapter 8 [HyRolo], page 73.

Screen/ Window, frame and buffer display control commands. See Chapter 6 [HyControl], page 53.

Win/ Window configuration management commands, such as adding and restoring window configurations by name. See Chapter 9 [Window Configurations], page 81.

6 HyControl

Hyperbole includes the fastest, easiest-to-use Emacs window and frame management system available, HyControl, found under the Hyperbole Screen menu. If you use a lot of Emacs windows or frames (typically, window system windows) then this chapter is for you.

HyControl interactively adjusts the layout of your windows and frames down to the pixel-level if desired. You adjust the location, size and display elements of your windows and frames until they look as you like and then simply quit HyControl and go back to work.

Hyperbole binds the key `{C-c \}` for quick access to HyControl's window control menu, if it was not already bound prior to Hyperbole's initialization; otherwise, the Screen/WindowsControl minibuffer menu item, `{C-h h s w}`, will do the same thing. To start HyControl with the frames menu instead, use Screen/FramesControl, `{C-h h s f}`.

Once in HyControl, your minibuffer window at the bottom of the selected frame will display a summary of keys you may use to adjust your windows until you press `{q}` or `{Q}` to quit from HyControl. The key, `{t}`, will always toggle between controlling frames and windows, the *submodes* of HyControl, with the upper left of the minibuffer prompt showing which type of control is active.

A number of commands take a single numeric argument, e.g. movement and sizing, which you can enter by typing a period to clear the argument, followed by any positive number up to 1000. You may also use the `{C-u}` universal argument key to apply a multiplier of 4 to the argument, any number of times. Any entry that pushes the argument over 1000, restarts it, so 10005 would produce an argument of 5.

The table below explains what each key does in HyControl mode. If the explanation does not say otherwise, then the key applies in both window and frame submodes.

`{?}` Toggle whether HyControl displays key binding help in the minibuffer.

`{.}` Clear the prefix argument to a value of 0.

`{0-9}` Multiply the prefix argument by 10 and add the digit pressed (or subtract it if prefix argument is negative).

`{-}` If HyControl mode was just enabled or the last command was prefix arg-related, invert the value of the prefix argument or if 0, set it to -1. Otherwise, depending on whether in Frames or Windows mode, shrink the frame or window to the minimum size needed to display its text.

`{C-u}` Multiply the prefix argument by 4 each time this is pressed.

`{@}`

Display a *grid of windows* in the selected frame sized according to the prefix argument or via a prompted input. Left digit of the argument is the number of grid rows and the right digit is the number of grid columns to display. The buffers displayed in the grid are determined by the value of the prefix argument given to the command or by the selected items in the current window if in Buffer Menu, Ibuffer Menu or Dired mode.

With no prefix argument and no items chosen, the selected frame's buffer list is filtered through `hycontrol-display-buffer-predicate-list`, a list of predicate/boolean filter functions. The default predicate selects existing buffers with attached files and displays those.

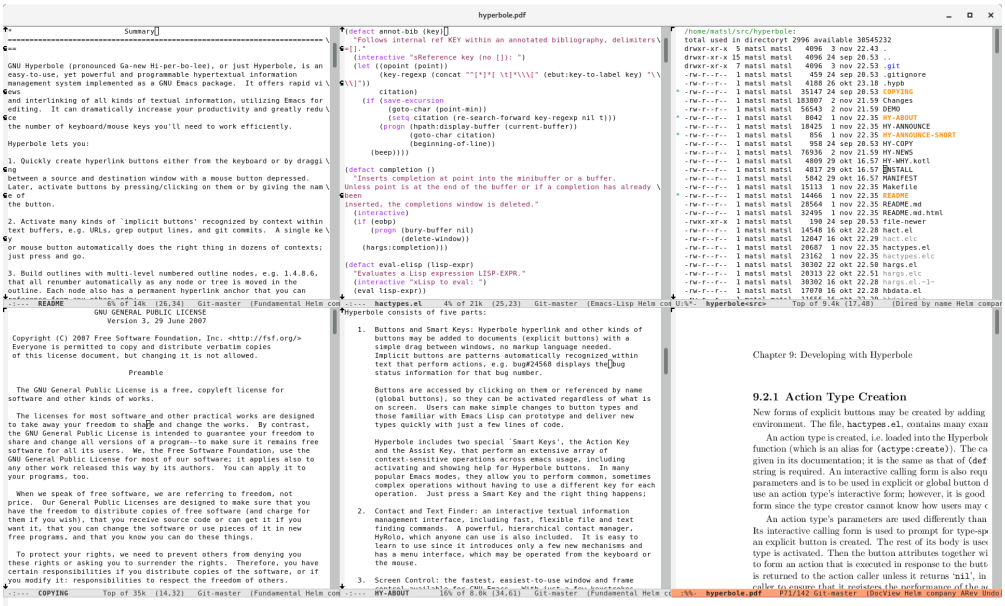

Image 6.1: 2x3 Windows Grid

With a prefix argument of 0, the user is prompted for a major mode name and the windows grid size. Only those buffers with the named major mode are displayed.

With a prefix argument `<` 0, the user is prompted for a shell glob-type file pattern; matching files are read into buffers and displayed in an auto-sized windows grid.

Otherwise, when the prefix argument is an invalid size, the windows grid command prompts for the grid size.

When done, this resets the persistent prefix argument to 1 to prevent following commands from using the often large grid size argument.

If you ever need to experiment with different sized window grids, use `{M-x hycontrol-window-grid-repeatedly RET}`. It will repeatedly prompt you for a grid size and then display it. When you are done, simply press `{RET}` to exit.

Programmatically, there are a number of ways to generate and display a windows grid. `hycontrol-windows-grid-by-file-pattern` creates a windows grid from a glob file pattern. It is bound to `{C--1 C-c @}`. `hycontrol-windows-grid-by-buffer-list` creates a windows grid from a list of buffers or buffer names. `hycontrol-windows-grid-by-file-list` creates a windows grid from a list of file names.

`{a}` Cycle through common width adjustments of a frame, such as 25% and 50%. Widths are given in screen percentages by the list `hycontrol-frame-widths` and typically go from widest to narrowest.

`{A}` Cycle through common height adjustments of a frame, such as 33.3% and 75%. Heights are given in screen percentages by the list `hycontrol-frame-heights` and typically go from tallest to shortest.

`{h}` Increase height by argument lines (line height determined by buffer character height).

`{s}` Shorten height by argument lines.

`{w}` Widen by argument characters.

`{n}` Narrow by argument characters.

`{%}` In FRAMES mode, resize frame's height and width to about argument percent of the screen size.

`{H}` In FRAMES mode, resize frame's height to about argument percent of the screen size.

`{I/J/K/M}`
In WINDOWS mode, the keys I, J, K, M move directionally (based on QUERTY key layout) between windows in the selected frame. In FRAMES mode, they move directionally through visible frames. These use the `windmove` and `framemove` libraries. When any of these keys are pressed, Hyperbole will prompt to install the needed library if not already installed.

`{W}` In FRAMES mode, resize frame's width to about argument percent of the screen size.

`{up}`
`{down}`
`{left}`
`{right}` Move frame in the specified direction by argument pixels.

`{c}` With each press, cycle the selected frame's position clockwise through the middle of edges and corners of the screen. With an argument of 0, reset the cycle position to the upper left corner. Respects the pixel edge offsets returned by `hycontrol-get-screen-offsets`.

`{d}` Delete selected window or frame based on mode.

`{D}` Prompt for confirmation and then delete non-selected windows or frames based on mode.

`{l}` In FRAMES mode, lower the selected frame below all other Emacs session frames.

`{o}` Select the next window in the window list, across all visible frames.

`{O}` Select the next visible frame.

`{keypad number}`
In FRAMES mode, move the frame directly to the screen edge position given by the numeric keypad layout. For example, 3 moves the frame to the bottom right corner and 8 moves it to the middle of the top edge. Keypad numeric keys do not adjust the argument. Respects the pixel edge offsets returned by `hycontrol-get-screen-offsets`.

`{p}` Display a virtual numeric keypad for emulating a keypad on keyboards without one. Each digit key operates just as a numeric keypad key would.

`{r}` In FRAMES mode, raise the selected frame above all other Emacs session frames.

`{[}` Create a new atop window or frame depending on mode. If a frame, it is sized to the same size as the selected window and offset from the selected frame by the pixel amounts given by `hycontrol-frame-offset`.

`{]}` Create a new sideways window or frame depending on mode.

`{(}` Save the current window or frame configuration based on mode. Whenever, HyControl is invoked, the current window and frame configurations are saved automatically. So use this command only if you have changed the configuration and wish to save it temporarily.

`{)}` After confirmation, restore the last saved window or frame configuration based on mode.

`{f}` Clone the selected window to a new similarly sized frame.

`{F}` Clone the selected window to a new similarly sized frame. Delete the original window unless there is only one window in the source frame or if `hycontrol-keep-window-flag` is non-nil.

`{I}`
`{J}`
`{K}`
`{M}` Select another window or frame in the given direction depending on the current HyControl mode. I=above, J=left, K=right and M=below.

`{i}`
`{j}`
`{k}`
`{m}` Expand the selected frame to the respective screen edge based on U.S. keyboard key layout. i=top, j=left, k=right and m=bottom screen edge. If already at the edge, adjusts the perpendicular dimension to ARG percent of the screen (50% by default if ARG is 1 or nil) but keep it at the screen edge. Respects the pixel edge offsets returned by `hycontrol-get-screen-offsets`.

`{=}` After confirmation, in WINDOWS mode, make the current frame's windows approximately the same size. In FRAMES mode, make all visible frames the size of the selected frame.

`{-}` In WINDOWS mode, shrink window to its smallest possible number of lines to display the entire buffer, if possible. Otherwise or if the window is already displaying all of its lines, shrink it to about one line, if possible.

In FRAMES mode, make the frame as small as possible while still displaying it.

`{+}` Make the window or frame (based on mode) as large as possible. In FRAMES mode, a second press of this key restores its size to whatever it was prior to the first use of this command.

`{b}` Bury the selected buffer within the buffer list, displaying the next buffer.

`{u}` Unbury the bottom buffer in the buffer list and display it in the selected window.

`{~}` Swap two buffers between the selected window or frame and one other. In WINDOWS mode, there must be precisely two windows in the selected frame. In FRAMES mode, the second frame must have a single window.

`{Z}` Zoom in selected window or frame text based on mode, increasing default face size.

`{z}` Zoom out selected window or frame text based on mode, increasing default face size. Zooming supports an argument of between 1 and 9 (any other value sets the argument to 1). The argument determines the number of sizes by which to zoom.

FRAMES mode zooming requires the separately available `zoom-frm.el` library. WINDOWS zooming works without this library.

`{t}` Toggle between WINDOWS and FRAMES submodes.

`{Q}`

`{q}` Press `{Q}` to globally quit HyControl mode and restore normal key bindings. Typically `{q}` works as well, unless in a help buffer where `{q}` is bound to `quit-window`, then that is run instead of quitting HyControl. A second press of `{q}` will then quit HyControl.

The rest of this section goes into some technicalities about HyControl settings. You may ignore it if you are not familiar with Emacs variables and functions or with customized Emacs.

HyControl allows placement of frames at screen edges and corners with the frame cycle command, `{c}`, and direct placement using the layout of the numeric keypad keys, if available, or the `p` virtual keypad key otherwise. (Note that a screen may span multiple physical monitors).

To prevent widgets and toolbars at the corners of the screen from being obscured, HyControl can offset each frame from each screen edge by a fixed number of pixels. These offsets are specified by the variable,`hycontrol-screen-offset-alist` and can differ for each type of screen; see its documentation for details. If you change its value, then call `hycontrol-set-screen-offsets` to set any new offset values. `hycontrol-get-screen-offsets` returns the list of offsets in clockwise order starting from the top edge. Both functions display a minibuffer message with the current offsets when called interactively.

When HyControl creates a new frame, it automatically sizes it to the same size as the previously selected frame and offsets it from that frame by the (X . Y) number of pixels given in the variable, `hycontrol-frame-offset`.

The source code for the HyControl system is in `hycontrol.el` within your Hyperbole source directory, given by `hyperb:dir`. HyControl uses standard Emacs keymaps, so any keys can be rebound. Remember that Hyperbole typically binds `{C-c \}` to the windows control menu, but if you would like to bind either of the two HyControl minor mode invocation commands to keys, they are, `hycontrol-enable-windows-mode` and

`hycontrol-enable-frames-mode`. Generally, you need only one of these bound to a key since when you press that key, the other command can be reached by pressing `{t}`.

7 Koutliner

The Hyperbole outliner, the Koutliner (pronounced Kay-outliner), produces structured, autonumbered documents composed of hierarchies of cells. Each *cell* has two identifiers, a *relative identifier* indicating its present position within the outline and a *permanent identifier* called an *idstamp*, suitable for use within hyperlink references to the cell. The idstamp is typically not displayed but is available when needed. See Section 7.3 [Autonumbering], page 62.

Cells also store their time of creation and the user who created the cell. User-defined attributes may also be added to cells. See Section 7.8 [Cell Attributes], page 71.

This chapter expands on the information given in the `EXAMPLE.kotl` file included with Hyperbole. Use `{C-h h k e}` to display that file, as pictured on the following page. It is an actual outline file that explains major outliner operations. You can test out the viewing, editing and motion commands with this file since a personal copy is made when you invoke this command. If you have already edited this file and want to start with a fresh one, give the command a prefix argument: `{C-u C-h h k e}`.

See Appendix D [Koutliner Keys], page 117, for a full summary of the key bindings and commands available in the Koutliner.

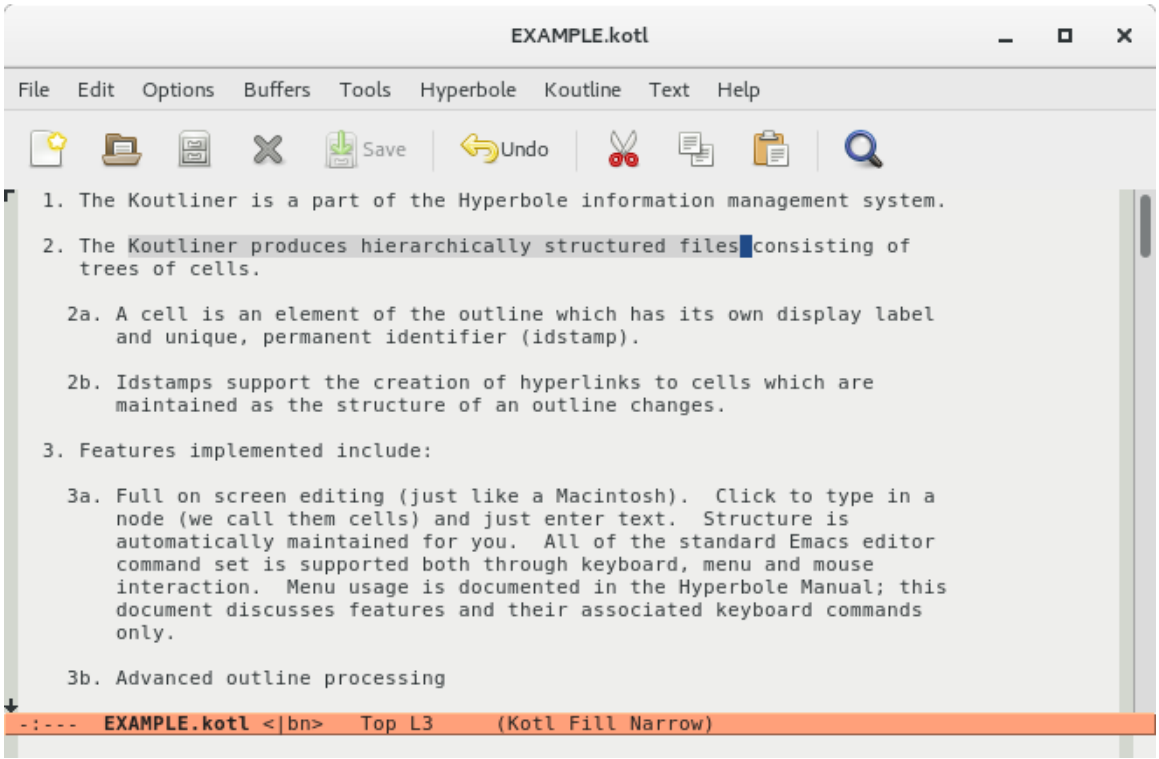

Image 7.1: Koutliner Screenshot

7.1 Menu Commands

The Kotl/ menu entry on the Hyperbole minibuffer menu provides access to a number of major Koutliner commands:

Menu Item	Command	Description
All	kotl-mode:show-all	Expand all cells
Blanks	kvspec:toggle-blank-lines	Toggle blank lines on or off
Create	kfile:find	Edit or create an outline
Downto	kotl-mode:hide-sublevels	Hide cells deeper than a level
Examp	<sample outliner file>	Show self-descriptive example
Format/	Submenu	Import/Export commands
Hide	kotl-mode:hide-tree	Hide tree with root at point
Info	<outliner documentation>	Show outliner manual section
Kill	kotl-mode:kill-tree	Kill the current tree
Link	klink:create	Create a link to another cell
Overvw	kotl-mode:overview	Show first line of each cell
Show	kotl-mode:show-tree	Show tree with root at point
Top	kotl-mode:top-cells	Collapse to top-level cells
Vspec	kvspec:activate	Set a view specification

The popup and menubar Koutline menu, as displayed here, offers a more complete set of the Koutliner commands. `{C-mouse-3}` pops up the mode-specific menu in Emacs. Experiment with the menu or read the following sections explaining commands.

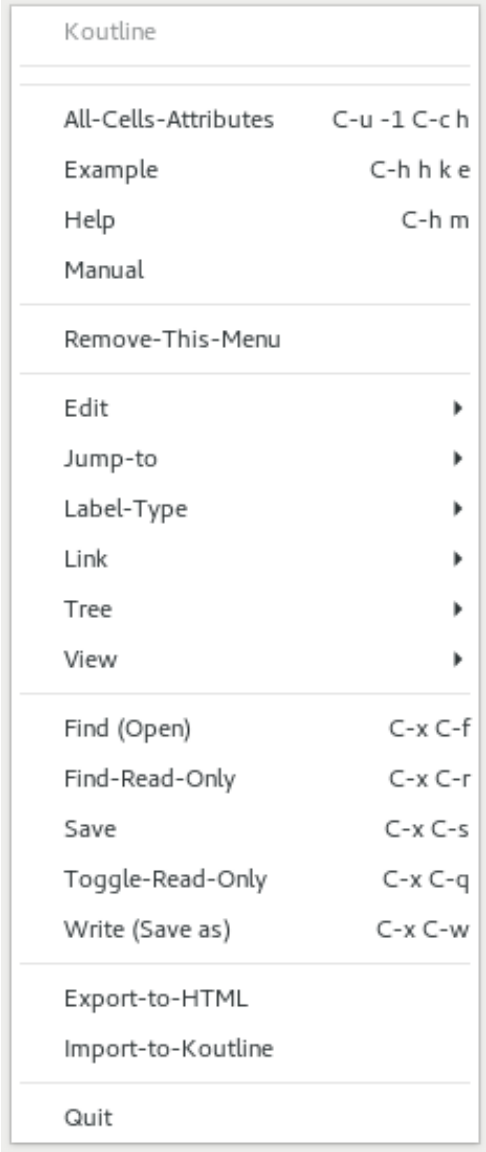

Image 7.2: Koutline Menu

7.2 Creating Outlines

In addition to the Kotl/Create menu item, you can create and experiment with outline files simply by finding a file, `{C-x C-f}`, with a `.kotl` suffix. `.kot` will also work for users impaired by operating systems with 3-character suffix limitations.

When a new koutline is created, an invisible root cell is added. Its permanent and relative ids are both 0, and it is considered to be at level 0 in the outline. All visible cells in the outline are at level 1 or deeper, and thus are descendants of this root cell. Some koutliner commands prompt for cell numbers as arguments. An argument of 0 makes commands operate upon the entire outline.

An initial level 1 cell is also created to make it easy to start entering text in the outline. A koutline always has at least one visible cell in it.

See Section 7.3 [Autonumbering], page 62, which explains how cells are labeled according to their respective levels in the outline and how these labels are updated as the structure of the outline changes.

7.3 Autonumbering

See Section 7.5.1 [Adding and Killing], page 63, for information on how to add new cells to or remove cells from a koutline. As you do this, or as you promote or demote cells within the outline, the labels preceding the contents of each cell automatically update to reflect the new structure. These labels are also known as *autonumbers* and as *relative ids* because they change as the structure changes.

The outline structure is shown by these labels and by the indentation of each outline level. Normally, each deeper level is indented another three characters, to reflect the nesting.

The default autonumbers are called *alphanumeric labels* because they alternate between using numbers and letters to distinguish each successive level. Each alphanumeric label uniquely identifies a cell's position in an outline, so that there is no need to scan back to prior cells to see what the current section number of an outline is. This is similar to a legal numbering scheme but without all the period characters between level numbers. As an example, 1b3 is equivalent to a legal label of 1.2.3. Both refer to the 3rd cell at level 3, below the 2nd child of the first cell at level 1. Said another way, this is the 3rd child of the 1st cell's 2nd child. In other words, it is easier to visualize hierarchies than to talk about them.

Alphanumeric labels are the default because they are shorter and easier to read aloud than equivalent legal ones. They also simplify distinguishing between even and odd level labels because of the alternating character set.

You can change the labeling scheme used in a particular outline with the command `{C-c C-l}`. A `{?}` will show all of the labeling options. The default, alpha labels, legal labels, and permanent idstamps (permanent cell ids) are all available.

A cell label is normally followed by a period and a space, called the *label separator*, prior to the start of the cell contents. You can change the separator for the current outline with `{C-c M-l}`. `{C-u C-c M-l}` will additionally change the default separator value used when new outlines are created (for the current session only). For example, use the value `" "` (two spaces) to get eliminate the trailing period after each cell label. The separator must be at least two characters long but may be longer.

If you find a separator that you prefer for all outlines, change the separator setting permanently by adding the following line to your Emacs initialization file, `~/.emacs`, substituting for 'your-separator':

```
(setq kview:default-label-separator "your-separator")
```

7.4 Idstamps

Idstamps (permanent ids) are associated with each cell. They maintain hyperlinks as cells are reordered within a koutline. See Section 7.7 [Klinks], page 70. Idstamps may be displayed in place of the outline level relative ids. Use `{C-c C-l id RET}`.

An idstamp counter for each outline starts at 0 and is incremented by one each time a cell is added to the outline. This idstamp stays with the cell no matter where it is moved within the outline. If the cell is deleted, its idstamp is not reused.

The 0 idstamp is always assigned to the root node of the entire outline. This node is never visible within the outline, but is used so that the outline may be treated as a single tree when needed. Idstamps always begin with a 0, as in 012, to distinguish them from relative ids.

7.5 Editing Outlines

Text editing within the Koutliner works just as it does for other buffers, except when you need to deal with the structural components of an outline. Within the contents of a cell, all of your standard editing keys should work properly. You can just type in text and the left and right margins of the lines will be maintained for you. See Section 7.5.5 [Filling], page 66, for the times when you need to refill a paragraph or to control when filling occurs.

Don't invoke editing commands with `{M-x command-name RET}` since the Koutliner uses differently named commands made to act like the regular editing commands. Koutliner commands, however, account for the structure and indentation in koutlines.

You may use the mouse to select parts of the contents of a single cell for editing. But don't drag across cell boundaries and then edit the selected region, since that will destroy the outline structure.

7.5.1 Adding and Killing

`{C-j}` adds a new cell as a successor sibling of the current cell, that is, the next cell at the same level as the current cell. If you enter a positive number as a prefix argument, that number of cells will be inserted, all at the same level. `{C-u C-j}` is handled specially. It adds a single cell as a child of the current cell. `{C-c a}` does the same thing. `{C-c p}` adds the cell as the successor of the current cell's parent.

`{C-c C-k}` kills the current cell and its entire subtree. `{C-c k}` kills the contents of a cell from point through the end of the cell; it does not remove the cell itself. `{C-u C-c k}` kills the entire contents of the cell regardless of the location of point. You may then yank the contents into another cell or another buffer with `{C-y}`.

7.5.2 Promoting and Demoting

Demotion is the act of moving a tree down one or more levels in the outline. The new tree will become either the successor or the first child of the cell which precedes it in the outline. *Promotion* is the inverse operation. Note that trees (cells and their entire substructure) are promoted and demoted, not individual cells.

```
|-----------------------------+-----------------------------|
| Promotion Outside Org Table | Demotion Outside Org Table |
```

M-TAB or Shift-TAB	TAB
M-<left>	M-<right>
M-Shift-<left>	M-Shift-<right>
C-c C-,	C-c C-.
C-c C-<	C-c C->

Trees may be demoted or promoted by pressing `TAB` or `{M-TAB}`. `{M-0 TAB}` and `{M-0 M-TAB}` demote and promote trees and additionally refill each cell that is not specially marked to prevent refilling. See Section 7.5.5 [Filling], page 66. A positive or negative prefix argument to these commands promotes or demotes the tree up to a maximum of the number of levels given by the argument. The outline may not support movement of the tree by the number of levels requested, however, in which case the maximal possible adjustment is made.

`{M-1 TAB}` behaves specially. It toggles the function of `TAB` and `{M-TAB}` so that they insert a tab and remove the previous character, respectively. This is useful when one is formatting information within a single cell. When in this mode, `{TAB}` inserts a literal TAB character, by default. Set the variable, `kotl-mode:indent-tabs-mode`, to '`nil`' if you want space characters used to form the tab. Use `{M-1 TAB}` to toggle the `TAB` and `{M-TAB}` keys back to promoting and demoting trees.

The Koutliner also supports Org Table editing, see Section "Tables" in *the Org Mode Manual*, via Org table minor mode. Use `{M-x orgtbl-mode RET}` to toggle this on and off. A press of the Action Key on a `|` symbol, also toggles this minor mode on or off.

Tree demotion and promotion keys match the defaults in Org mode and Outline mode, plus some easier to type ones. The tables below summarize which keys work whether inside an Org table or outside.

Note that you must use `{M-0 TAB}` and `{M-0 M-TAB}` to demote/promote Koutline trees when in a table since `TAB` and `{M-TAB}` move between fields within a table.

Promotion Inside Org Table	Demotion Inside Org Table
M-0 M-TAB	M-0 TAB
C-c C-,	C-c C-.
C-c C-<	C-c C->

7.5.3 Relocating and Copying

Like Org mode, you can move the tree rooted at point past trees rooted at the same level with `{M-<down>}` and before trees with `{M-<up>}`. Give a prefix argument to move past that many other trees. (A 0 valued argument is automatically changed to 1).

For maximum flexibility in rearranging outlines, there are commands that move or copy entire trees anywhere within the outline as described in the table below. Each of these commands prompts for the label of the root cell to move or copy and for a second cell which specifies the new location for the moved or copied tree. You may either accept the default

provided, type in the cell label, or when a mouse is available, simply double click with the Action Key on the contents of a cell. The Koutliner knows to use the cell's label in such cases.

In the following commands, words delimited with <> represent the arguments for which each command prompts. Note how the use of prefix arguments changes each command's behavior from insertion at the sibling level to insertion at the child level.

`{M-<down>}`
: Move current tree past prefix arg same level trees.

`{M-<up>}` Move current tree back prefix arg same level trees.

`{C-c c}` Copy <tree> to be the successor of <cell>.

`{C-u C-c c}`
: Copy <tree> to follow as the first child of <cell>.

`{C-c C-c}` Copy <tree> to be the predecessor of <cell>.

`{C-u C-c C-c}`
: Copy <tree> to be the first child of the parent of <cell>.

`{C-c m}` Move <tree> to be the successor of <cell>.

`{C-u C-c m}`
: Move <tree> to follow as the first child of <cell>.

`{C-c C-m}` Move <tree> to precede <cell>.

`{C-u C-c C-m}`
: Move <tree> to be the first child of the parent of <cell>.

If you have mouse support under Hyperbole, you can move entire trees with mouse clicks. Click the Assist Key within the indentation to the left of a cell and you will be prompted for a tree to move. Double click the Action Key within the contents of the root cell of the tree to move and then double click within the root contents of the tree you want it to follow as a successor.

The Koutliner supports copying and moving within a single outline only right now, so don't try to to move trees across different outline files. You can, however, copy an outline tree to a non-outline buffer with:

`{C-c M-c}` Copy a <tree> to a non-koutline buffer.

`{C-c C-@}` Copy a <tree> to an outgoing mail message.

You may also import cells into the current koutline from another koutline with the `{M-x kimport:text RET}` command. See Section 7.5.8 [Inserting and Importing], page 67.

7.5.4 Moving Around

In addition to normal emacs movement commands, you can move within a cell or from one cell or tree to another.

`{C-c ,}` Move to the beginning of the current cell.

`{C-c .}` Move to the end of the current cell.

{C-c C-n} Move to the next visible cell, regardless of level.

{C-c C-p} Move to the previous visible cell, regardless of level.

{C-c C-f} Move forward to this cell's successor, if any.

{C-c C-b} Move backward to this cell's predecessor, if any.

{C-c C-d} Move to the first child of the current cell, if any.

{C-c C-u} Move to the parent cell of the current cell, if any.

{C-c <} Move to the first sibling at the current level within this tree.

{C-c >} Move to the last sibling at the current level within this tree.

{C-c ^} Move to the level 1 root cell of the current tree.

{C-c $} Move to the last cell in the tree rooted at point, regardless of level.

7.5.5 Filling

Filling is the process of distributing words among lines to extend short lines and to reduce long ones. Commands are provided to fill a paragraph within a cell or to fill a whole cell, which may have multiple paragraphs.

{M-q} or {M-j} refills a paragraph within a cell so that its lines wrap within the current margin settings. {C-c M-q} or {C-c M-j} refills all paragraphs within a cell. {C-M-q} or {C-M-j} refills all cells within a tree. See the GNU Emacs manual for information on how to set the left and right margins.

Set the variable, `kotl-mode:refill-flag`, to 't' if you want moving, promoting, demoting, exchanging, splitting and appending cells to also automatically refill each cell, aside from any that have a 'no-fill' property. Generally, this is not recommended since if you happen to move a cell that you carefully formatted yet forgot to give a 'no-fill' property, then your formatting will be lost.

7.5.6 Transposing

The Koutliner move and copy commands rearrange entire trees. The following two commands, in contrast, exchange the locations of two individual cells.

{C-c e} prompts for two cell addresses and exchanges the cell locations.

{C-c t} does not prompt. It exchanges the current and immediately prior cell, regardless of their levels. If there is no prior cell it exchanges the current and next cell.

{M-0 C-c t} exchanges the cells in which point and mark fall. {C-c t} with a non-zero numeric prefix argument, N, moves the current tree maximally past the next N visible cells. If there are fewer visible, it makes the current cell the last cell in the outline.

7.5.7 Splitting and Appending

One cell may be split into two adjacent sibling cells with {C-c s}. This leaves the cell contents preceding point in the current cell, minus any trailing whitespace, and moves the contents following point to a new sibling cell which is inserted into the outline. {C-u C-c s} instead adds the new cell as the first child of the original cell, rather than as its successor.

All cell attributes in the original cell are propagated to the new one, aside from the creation attributes and idstamp.

{C-c +} appends the contents of a specified cell to the end of another cell. It has no effect on cell attributes, except that if one cell has a 'no-fill' attribute, which prevents all but user requested filling of a cell, then the cell appended to inherits this property. This helps maintain any special formatting the appended text may have.

7.5.8 Inserting and Importing

The paragraphs of another buffer or file may be inserted into a koutline as a set of cells by using the {C-x i} command. When prompted, you may use a buffer name or filename from which to insert; completion is provided for filenames only.

The elements from the original buffer are converted into kcells and inserted as the successors of the current cell. If {C-u C-x i} is used, they are instead inserted as the initial children of the current cell.

For information on mode and suffix-specific conversions performed on file elements before they are inserted, see the documentation for the variables, kimport:mode-alist and kimport:suffix-alist. This same conversion process applies if you invoke {M-x kotl-mode RET} in a non-koutline buffer or if you perform a generic file import as described later in this section.

Use {M-x kimport:insert-file-contents RET} to insert an entire file into the current cell following point.

The outliner supports conversion of three types of files into koutline files. You can import a file into an existing koutline, following the tree at point, or can create a new koutline from the imported file contents. {C-h h k f f} or {M-x kimport:file RET} selects the importation type based on the buffer or filename suffix of the file to import.

If you want to convert a buffer from some other mode into a koutline and then want to save the converted buffer back to its original file, thereby replacing the original format, use {M-x kotl-mode RET}. Remember that you will lose the old format of the buffer when you do this.

Use one of the following commands when you need explicit control over the type of importation used on some text. With these commands, your original file remains intact.

Use {M-x kimport:text RET} and you will be prompted for a text buffer or file to import and the new koutline buffer or file to create from its text. Each paragraph will be imported as a separate cell, with all imported cells at the same level, since indentation of paragraphs is presently ignored. This same command can be used to import the contents, attributes and level structure of cells from another koutline.

Star outlines are standard emacs outlines where each entry begins with one or more asterisk characters. Use {M-x kimport:star-outline RET} and you will be prompted for the star outline buffer or file to import and the new koutline buffer or file to create.

(Skip this if you are unfamiliar with the Augment/NLS system originally created at SRI.) Files exported from the Augment system as text often have alphanumeric statement identifiers on the right side. You can import such files while maintaining their outline structure. Use {M-x kimport:aug-post-outline RET} and you will be prompted for the Augment buffer or file to import and the koutline to create. See https://dougengelbart.org/content/view/148/ for more information.

7.5.9 Exporting

Koutlines may be *exported* to other file formats. Presently, the only format supported is conversion to HTML for publishing on the World-Wide Web. Use the Kotl/Format minibuffer menu, `{C-h h k f}`, for this.

`{C-h h k f d}` or `{M-x kexport:display RET}` exports the current Koutline buffer to a temporary HTML file and displays the file in the web browser given by `browse-url-browser-function`. Any tree in the HTML outline may be expanded or collapsed by clicking the left mouse button on its root cell, for ease of viewing.

Alternatively, `{C-h h k f h}` or `{M-x kexport:html RET}` prompts for the koutline buffer or file to export, the HTML file or buffer to which to output, and the title to use for the HTML file. Completion of filenames is provided. The conversion will then be done and the output file or buffer will be written; the output file will not be displayed. You must display it manually, if desired.

`{C-h h k f k}` or `{M-x kexport:koutline RET}` exports the current Koutline buffer to a `.html` file of the same name. The output file will not be displayed; you must display it manually, if desired.

7.6 Viewing Outlines

The Koutliner has very flexible viewing facilities to allow you to effectively browse and study large amounts of material.

7.6.1 Hiding and Showing

Individual cells, branches, or particular levels in the outline may be hidden or shown. These commands work even when an outline buffer is read-only, e.g. when its file is not checked out of a version control system yet, so that you can get effective views of an outline without editing it. Some of these commands affect the current view spec. See Section 7.6.2 [View Specs], page 69.

Here are the major commands for showing and hiding Koutline cells.

`{C-c C-h}` Hide (collapse) the tree rooted at point.

`{C-c C-s}` Show (expand) the tree rooted at point.

`{C-c C-a}` Show (expand) all of the cells in the outline. With a prefix arg, also toggle the display of blank lines between cells.

`{C-x $}` Show all of the cells down to a particular <level>. You are prompted for the level or a prefix argument may be given.

`{C-M-h}` Hide the subtree at point, excluding the root cell.

`{M-x kotl-mode:show-subtree}`
Show the subtree at point. Use `{C-c C-s}` to achieve a similar effect; the only difference is that it will additionally expand the root cell.

`{C-c C-o}` Show an overview of the outline by showing only the first line of every cell. With a prefix arg, also toggle the display of blank lines between cells.

`{C-c C-t}` Show a top-level view of the outline by hiding all cells but those at level 1 and collapsing the visible cells so that only their first lines are visible. With a prefix arg, also toggle the display of blank lines between cells.

A click or a press of the Action Key within a cell's body, but not on a Hyperbole button, toggles between hiding and showing the tree rooted at point. Try it with either your mouse or with `{M-RET}`.

7.6.2 View Specs

View specifications (view specs, for short) are short codes used to control the view of a koutline. The view specs in effect for an outline are always displayed in the modeline of the outline's window, following the outline buffer name, unless the variable, `kvspec:string`, has been set to '`nil`' to disable view spec display. The modeline display appears as `<|viewspec>` to aid rapid visual location. The `|` (pipe character) is also used in links that specify view specs to indicate the start of a view spec sequence. See Section 7.7 [Klinks], page 70.

The current view spec is saved whenever the outline is saved. The next time the outline is read in, the same view spec will be applied.

The rest of this section documents the view spec characters that are presently supported and explains how to invoke a view spec. There is no user-level means of adding your own view spec characters, so all other character codes are reserved for future use.

`{C-c C-v}` prompts for a new view spec setting in which the following codes are valid. Any invalid characters in a view spec are ignored. Characters are evaluated in an order meant to do the right thing, even when you use conflicting view spec characters. The standard initial view spec is `<|ben>`.

`a` Show all cell levels and all lines in cells.

`b` Turn on blank lines between cells. Without this character, blank lines will be turned off. You may also use the `{C-c b}` key binding to toggle blank lines on and off independently of any other view settings.

`cN` Hide any lines greater than N in each cell. 0 means don't cutoff any lines.

`e` Show ellipses when some content of a cell or its subtree is hidden. This cannot be turned off.

`lN` Hide cells at levels deeper than N. 0 means don't hide any cells.

`n` Turn on the default label type, as given by the variable, `kview:default-label-type`. Normally, this is alphanumeric labels.

`n0` Display idstamps, e.g. 086.

`n1` Display alpha labels, e.g. 1d3

`n.` Display legal labels, e.g. 1.4.3

As a test, use `{C-h h k e}` to display the example koutline. Then use `{C-c C-v}` to set a view spec of 'c2l1'. This will turn off blank lines, clip each cell after its second line, and hide all cells below level one.

7.7 Klinks

Cells may include hyperlinks that refer to other cells or to external sources of information. Explicit Hyperbole buttons may be created as usual with mouse drags (see Section 4.7.1.3 [By Dragging], page 43). Implicit Hyperbole buttons may be added to Koutline text as well. A *klink* is a special implicit link button, delimited by `<>` separators, that jumps to a koutline cell and may also adjust the current outline viewspecs. This section discusses klinks.

There are three forms of klinks:

internal '`<#2b=06>`' is an internal klink, since it refers to the koutline in which it is embedded. When activated, it jumps to the cell within the current outline which has permanent id '06' and relative id '2b'. '`<#06>`' does the same thing, as does '`<#2b>`', though this latter form will not maintain the link properly if the cell is moved elsewhere within the outline. The form, '`<#2b=06|ben>`' additionally sets the view spec of the current outline back to the default value, with a blank line between each cell and the whole outline visible.

external The second klink format is an external link to another koutline, such as, '`<EXAMPLE.kotl#3=012|c1e>`', which displays the named file, starting at the cell 3 (whose permanent identifier is 012), with the view specification of: blank lines turned off, cutoff after one line per cell, and showing ellipses for cells or trees which are collapsed.

view spec The third format sets a view spec for the current koutline. For example, '`<|ben>`', when activated, sets the view in the current outline to display blank lines, to use ellipses after collapsed lines and to label cells with the alphanumeric style.

Press the Action Key over a klink to follow it. This will flash the klink as a button and then will display its referent in the other window. If the klink contains a view spec, it will be applied when the referent is displayed.

There are a number of easy ways to insert klinks into koutlines. If you have mouse support under Hyperbole, simply click the Action Key within the indentation to the left of a cell text. If you then double click on some cell, a link to that cell will be inserted where you started. From a keyboard, use `{C-c l}` when in a koutline or `{C-h h k l}` when not in a koutline to insert a klink. Since klinks are implicit buttons, you may instead type in the text of the klink just as you saw them in the examples above and they will work exactly as if they had been entered with the insert link command.

If you prefer the standard copy and yank model that Emacs provides, place point within a klink when there is no active region and use `{M-w}` to copy the klink. To instead copy a reference to the current Koutline cell, use `{M-w}` *outside of* a klink when no region is active or `{M-x kotl-mode:copy-absolute-klink-to-kill-ring RET}` anywhere within a cell. Then `{C-y}` will yank the last copied text into any buffer you desire. Of course, when a region is active, `{M-w}` will copy the region as it does normally in Emacs.

Similarly, you can copy to an Emacs register rather than to the kill ring. When no region is active/highlighted, `{C-x r s}` prompts for an Emacs register and saves to it either the current klink or, when outside of a klink, a reference to the current cell. `{M-x`

`kotl-mode:copy-absolute-klink-to-register RET}` anywhere within a cell saves a reference to the current cell to a register.

`{C-x r i}` with the same register then inserts at point the Koutline reference previously saved. When a region is active, these operate on the region instead.

There are also commands without any builtin key bindings that always copy a klink reference to the current cell:

```
kotl-mode:copy-absolute-klink-to-kill-ring
kotl-mode:copy-relative-klink-to-kill-ring
kotl-mode:copy-absolute-klink-to-register
kotl-mode:copy-relative-klink-to-register
```

Because klinks use a very generic syntax, surrounded by <angle brackets>, in certain modes, mostly C-based programming modes, certain non-klink syntax can be mistakenly identified as klinks. Therefore, the Koutliner provides two customizable variables which disable klink recognition in selected major modes, `klink:ignore-modes` and `klink:c-style-modes`. Add a mode to one of these if you find any syntax that improperly registers as a klink.

`klink:ignore-modes` is for non-programming modes, as Hyperbole ensures that within all programming major modes, klinks are recognized only when point is within a comment.

`klink:c-style-modes` is rarely needed but is there if Hyperbole ever mistakenly recognizes a pattern within a comment as a klink when it isn't.

7.8 Cell Attributes

Attributes are named properties whose values are specific to an outline cell. Thus, each cell, including the invisible 0 root cell, has its own attribute list. Every cell has three standard attributes:

idstamp The permanent id of the cell, typically used in cross-file hyperlinks that reference the cell, this is a whole number that starts from 0, which is always the hidden root cell of the outline tree.

creator The e-mail address of the person who created this cell.

create-time
The time at which the cell was created. This is stored in a form that allows for easy data comparisons but is displayed in a human readable format, such as '`Jan 28 18:27:59 CST 2021`'.

`{C-c C-i}` adds, modifies or removes an attribute from a cell. The prefix argument given to this command determines what it does.

`{C-c C-i}` sets an attribute of the cell at point; setting an attribute's value to '`nil`' is the same as removing it.

`{C-u C-c C-i}`
removes an attribute of the cell at point

`{C-0 C-c C-i}`
sets an attribute of the invisible 0 root cell

`{C--1 C-c C-i}`
: removes an attribute of the invisible 0 root cell

The 'no-fill' attribute is special. When set to '`t`', it prevents movement, promotion, demotion, exchange, split or append commands from refilling the cell, even if the variable, `kotl-mode:refill-flag`, is set to '`t`'. It does not prevent you from invoking explicit commands that refill the cell. See Section 7.5.5 [Filling], page 66.

`{C-c h}` prompts for a cell label and displays the cell's attributes. `{C-u C-c h}` prompts for a cell label and displays the attributes for it and its subtree; use 0 as the kcell id to see attributes for all visible cells in the outline.

7.9 Koutliner History

Much of the Hyperbole outliner design is based upon concepts pioneered in the Augment/NLS system, *[Eng84a]*. Augment treated documents as a hierarchical set of nodes, called statements, rather than cells. Every Augment document utilized this intrinsic structure.

The system could rapidly change the view of a document by collapsing, expanding, generating, clipping, filtering, including or reordering these nodes. It could also map individual views to multiple workstation displays across a network to aid in distributed, collaborative work.

These facilities aided greatly in idea structuring, cross-referencing, and knowledge transfer. The Koutliner is a start at bringing these capabilities back into the mainstream of modern computing culture.

8 HyRolo

Hyperbole includes a complete, advanced rolo system, HyRolo, for convenient management of hierarchical, record-oriented information. Most often this is used for contact management but it can quickly be adapted to most any record-oriented lookup task requiring fast retrieval.

Hyperbole buttons may be included within rolo records and then manually activated whenever their records are retrieved in a search.

The following subsections explain use and basic customization of this tool.

8.1 HyRolo Concepts

HyRolo manages and searches a list of rolo files stored in the `hyrolo-file-list` custom option. A *rolo file* consists of an optional header that starts and ends with a line of equal signs (at least three equal signs starting at the beginning of a line), followed by zero or more rolo records which we call entries.

The first file in the list should be a user-specific hyrolo file, typically in the home directory and must have a suffix of either .org (Org mode) or .otl (Emacs Outline mode). Other files in the list may use suffixes of .org, .otl, .md (Markdown mode) or .kotl (Koutline mode).

Rolo *entries* begin with optional space, followed by a delimiter of one or more special characters followed by another space. Delimiters vary based on the type of file, for example level 3 entry delimiters look like this:

```
Emacs Outline Mode: ***
Koutline Mode:      1b3 or 1.2.3
Markdown Mode:      ###
Org Mode:           ***
```

Entries may be arranged in a hierarchy, where child entries start with at least one more delimiter characters than do their parents. Top-level entries use either a single delimiter character or a sequence of digits in the case of Koutlines.

Beyond this initial delimiter, entries are completely free-form text. It is best to use a "lastname, firstname" format, however, when adding contact entries into a rolo. Then HyRolo will automatically keep your entries alphabetized as you enter them. Then you can sort the entries if you ever need. This ordering is what the rolo will use if you accept the default entry with which it prompts you when adding a new entry.

Here is an example of a simple rolo file. The date at the end is automatically added by HyRolo whenever a new record is added.

```
==========================================================================
                              PERSONAL ROLO
<Last-Name>, <First>  <Email>        W<Work#>       F<Fax#>
==========================================================================
*   Smith, John       <js@hiho.com> W708-555-2001  F708-321-1492
        Chief Ether Maintainer, HiHo Industries
        05/24/2020
```

Any search done on the rolo scans the full text of each entry. During a search, the rolo file header separator lines and anything in between are appended to the buffer of matched

entries before any entries are retrieved from the file. Whenever an entry is matched, it and all of its descendant entries are retrieved. If your emacs version supports textual highlighting, each search match is highlighted for quick, visual location.

For example, a search on "Company" could retrieve the following:

```
=========================================================================
                          COMPANY ROLO
=========================================================================
*    Company
**     Manager
***      Staffer
```

Thus, searching for Company retrieves all listed employees. Searching for Manager turns up all Staffer entries.

8.2 Rolo Menu

The Rolo submenu of the Hyperbole menu offers a full set of commands for searching and maintaining a personal address book. It looks like so.

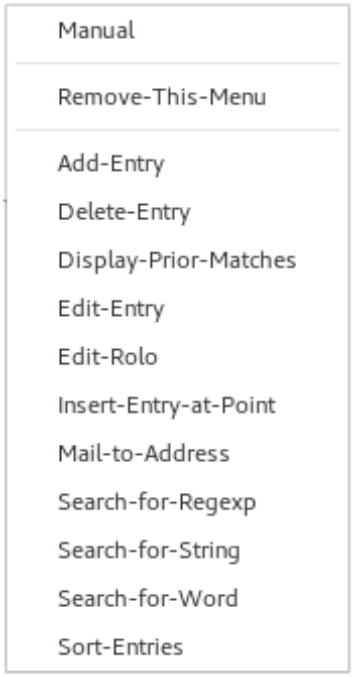

Image 8.1: HyRolo Menu

The Rolo/ menu entry on the Hyperbole minibuffer menu provides the same set of commands as the menubar Rolo menu but with more concise labels.

The minibuffer Rolo/ menu offers the following commands (ConsultFind and HelmFind appear only when associated packages are loaded but are especially noteworthy as they allow for line-level searching with interactive search pattern narrowing):

Menu Item	Command	Description
Add	hyrolo-add	Adds a hyrolo entry
ConsultFind	hyrolo-consult-grep	Interactively narrow grep matches
Display	hyrolo-display-matches	Displays last matches again
Edit	hyrolo-edit	Edits an existing hyrolo entry
File	hyrolo-find-file	Edits a hyrolo-file-list file
HelmFind	hyrolo-helm-org-rifle	Interactively narrow entry matches
Info	id-info	Displays a hyrolo manual entry
Kill	hyrolo-kill	Deletes a hyrolo entry
Mail	hyrolo-mail	Mails to an address at point
Order	hyrolo-sort	Sorts all hyrolo levels
RegexFind	hyrolo-grep	Finds all entries containing a regular expression
StringFind	hyrolo-fgrep	Finds all entries containing a string (or logical expression)
WordFind	hyrolo-word	Finds all entries containing a string of whole words
Yank	hyrolo-yank	Inserts the first matching hyrolo entry at point

The 'File' menu item displays and edits the first file listed in `hyrolo-file-list` unless given a prefix argument, in which case it prompts with completion for the file to edit.

A prefix argument used with any of the above menu items that have 'Find' in their names limits the search to a maximum number of matches given by the argument. The search is terminated whenever that number of matches is found.

With any of the above commands that prompt for a HyRolo name, such as Edit or Add (not the Find commands), you may use the form parent/child to locate a child entry below a specific parent. Hence, for a HyRolo which looks like so:

```
*    Company
**     Manager
***      Staffer
```

you can refer to the Staffer entry with the following hierarchical notation, Company/Manager/Staffer. This hierarchical notation is not used in search expressions since they search the entire HyRolo anyway. Thus, "Staffer" as a search pattern will find an entry containing "Staffer" at any level in a hierarchy, like so:

```
***      Staffer
```

8.3 HyRolo Searching

See Section 8.2 [HyRolo Menu], page 74, for the list of HyRolo search commands. In this section, the menu item names from the minibuffer menu are used to refer to each command.

The `RegexFind` menu item searches the rolo list for all entries which contain matches for a given regular expression. The regular expression syntax used is the same as the one used within Emacs and across the GNU set of tools. See Section "Syntax of Regular Expressions" in *the GNU Emacs Manual*, for full documentation on this format.

The `WordFind` menu item locates full-word matches so that if you search for '`product`', it won't match to occurrences of '`production`'. It is also handy for more precise name matching.

The `StringFind` menu item has two uses. It can find all entry matches for a string or can execute logical queries for more precise matching. The format of logical queries is explained here; a simple parenthesis delimited prefix format is used with the following logical operators.

```
Operator Name   Num of Args   Description
=========================================================================
and             two or more   Match entries with all str args
or              two or more   Match entries with any str args
xor             two or more   Match entries with exactly 1 str arg
not             one           Match entries without the str arg

r-and           two or more   Match entries with all regexp args
r-or            two or more   Match entries with any regexp args
r-xor           two or more   Match entries with exactly 1 regexp arg
r-not           one           Match entries without the regexp arg
=========================================================================
```

For example:

```
(and Company (not Vice-President))
```

would match those entries for people associated with '`Company`' who do not have '`Vice-President`' titles.

The following example would provide a list of all people marked as clients whose area codes are outside of 408 and all non-clients within the 408 area code. This could be useful after all clients within the 408 area code have been contacted and you want to see who else you should contact.

```
(xor client 408- )
```

When using the regular expression operators, your operands are sent as regular expressions without the need to quote single words or special regular expression characters like '*' and '?'. Use double quote marks to include a phrase or multi-word regular expression pattern to match. For example:

```
(r-and HyRolo "Red Buttons?")
```

would match entries that contain both "HyRolo" and either "Red Button" or "Red Buttons".

8.4 HyRolo Keys

After a rolo search is performed, point is left in the *rolo match buffer*, `*HyRolo*`, which uses `hyrolo-mode` to simplify browsing many HyRolo matches. Press `{?}` when in the match buffer for a summary of available keys, all of which are documented in this section.

If your HyRolo search did not match what you want, use `{r}` to start a new regular expression query or `{C-u r}` for a string query. The rest of the match buffer keys work with the search results currently displayed.

If your emacs version supports textual highlighting, each search match is highlighted for quick, visual location. `{TAB}` moves point forward to successive spans of text which match the search expression. `{M-TAB}` or `{SHIFT-TAB}` move point backward to earlier matches. These keys allow you to quickly find the matching entry of most interest to you if your search expression failed to narrow the matches sufficiently.

If you want to extend the match expression with some more characters to find a particular entry, use `{M-s}`. This performs an interactive search forward for the match expression. You may add to or delete characters from this expression to find different occurrences or move to the next match with `{C-s}`. `{C-r}` reverses the direction of the search.

If you would like to search for a specific entry name in the match buffer, use `{l}` to interactively locate the text immediately following the entry start delimiter, typically one or more asterisks. This lets you find entries by last name quickly, eliminating other matches. Standard string, `{C-s}`, and regular expression, `{C-M-s}`, interactive search commands are also available within the rolo match buffer.

Single key outlining commands are also available for browsing matches. If your search matches a large number of entries, use `{t}` to get a top-level summary of entries. Only the first line of each first-level match is shown. If you want to see an overview of all the levels, use `{o}` which shows the first line of every entry level. If you want an overview of just the first two levels, `{C-u 2 o}` will work.

Press `{s}` to show (expand) the entry at point if it is hidden (collapsed). If point is on a file header, this will expand the header and show the entire set of matched entries for the file. The `{h}` does the reverse and hides entries. Within file headers it hides the file from the end of the current line forward, so you can leave parts of the header displayed, if desired. Press `{a}` to expand all entries in the buffer across all matched files.

Please note that to facilitate further use of movement by entry commands, the `{h}` hide entry subtree command leaves point at the beginning of the entry (does not apply in file headers).

Other keys are defined to help you work with matching entries.

`{b}` Move to the previous entry at the same level as the current entry.

`{f}` Move to the next entry at the same level as the current entry.

`{n}` Move to the next entry at any level.

`{p}` Move to the previous entry at any level.

`{u}` Move to the previous higher entry one level up.

`{,}` Move to the beginning of the entry. With a prefix argument, move to the beginning of highest ancestor level.

`{.}` Move to the end of the entry. With a prefix argument, move to the end of the entire subtree.

`{[}` Move to previous file/buffer location header beginning with @loc>.

`{]}` Move to next file/buffer location header beginning with @loc>.

`{<}` Move to the beginning of the buffer.

`{>}` Move to the end of the buffer.

`{DEL}` Scroll backward a windowful.

`{SPC}` Scroll forward a windowful.

Use the `{e}` key to jump to and edit the current line in its original source file. If on a rolo entry and it contains a datestamp at its end, update the datestamp, unless this feature has been turned off via the Cust/Toggle-Rolo-Dates menu item. The variable, `hyrolo-edit-hook`, performs this update. This allows programmed modification of the way rolo edits work. The variable, `hyrolo-add-hook`, works the same way but is evaluated when a new entry is first added. The format of the datestamp is specified by `hyrolo-date-format`.

Once you have found an entry of interest and you want to remove the rolo match buffer, use `{q}` to quit. This will restore your current frame to its state prior to the rolo search.

8.5 HyRolo Settings

The files used in any rolo search are given by the `hyrolo-file-list` variable, whose default value is typically `"~/.rolo.otl"`, in which case, searches scan only your personal rolo file. But you can customize this to include files with variables in them, wildcard patterns and directories, as explained below. Any paths added to this list should be absolute.

If you include file wildcards in paths for this variable and `find-file-wildcards` is non-nil (the default), then any files matching the pattern (which can include [char-matches] or * wildcards and regular text) when the variable is set will be included in HyRolo searches. For more on wildcards, see Section "Wildcards" in *the GNU Emacs Manual*.

If you include an Environment variable or Emacs Lisp variable with the `${var}` format in a path, they also are resolved when `hyrolo-file-list` is set. Variables with values that include multiple paths, e.g. PATH, are resolved to the first existing entry that matches.

If you include an existing directory (invalid ones are ignored) in your `hyrolo-file-list`, HyRolo will expand it recursively across all of its files that match `hyrolo-file-suffix-regexp`. By default, this is Org files (.org), Emacs outlines (.otl), Koutlines (.kotl), or Markdown files (.md). See `hpath.el#hpath:expand-list`.

Once expanded, if a file in the list does not exist or is not readable, it is dropped. Paths are searched in the order in which they appear in the list. You should leave your personal rolo file as the first entry in the list, since this is the only file to which the HyRolo menu Add command adds entries.

Hyperbole releases earlier than 4.17 used a different filename for the personal rolo. If such a file exists, you will be prompted to rename it whenever the HyRolo system is loaded.

If you want to have HyRolo search your directory of Org files, add the following to your Emacs initialization file:

```
(add-hook 'hyperbole-init-hook
```

```
(lambda ()
  (require 'org)
  (setq hyrolo-file-list (append (hyrolo-initialize-file-list)
                                 (list org-directory)))))
```

If you use the Big Brother DataBase (BBDB) Emacs package to capture email addresses and store contact information, the rolo automatically works with it. If the BBDB package is loaded before HyRolo, then your `bbdb-file` of contacts is added as the second entry in `hyrolo-file-list` and will be searched automatically for any matches by the rolo find commands. Presently there is no support for editing BBDB entries, just finding them.

For finding matches within only BBDB, there are the commands `hyrolo-bbdb-fgrep` (string finding) and `hyrolo-bbdb-grep` (regular expression finding). They may be bound to keys if desired.

If you use Google/Gmail Contacts, you can configure the HyRolo to query your Google Contacts for matches. First you must download and install the external `google-contacts` package using the Emacs Package Manager. Then you must install the non-Emacs GNU Privacy Guard (GPG) package from `https://gnupg.org` so that the `gpg` or `gpg2` executable is in your command-line search path. Once these are in place, either restart Emacs or use `{M-x hyrolo-initialize-file-list RET}` to add Google Contacts to your searches.

When you next do a search, you will be prompted for your Google Contacts password and may also have to enter an authorization code that will be displayed on your screen. After authorization, your your information will be cached so that you are not prompted for it again within this Emacs session.

For finding matches within only Google Contacts, there are the commands `hyrolo-google-contacts-fgrep` (string finding) and `hyrolo-google-contacts-grep` (regular expression finding). They may be bound to keys if desired.

If you ever need to disable Google Contacts usage, there is a flag, `hyrolo-google-contacts-flag`, which when set to '`nil`' disables searching of your Google Contacts.

Below are the rest of the settings available with HyRolo:

`hyrolo-highlight-face`
: If textual highlighting is available in your emacs on your current display type, the rolo uses the value of `hyrolo-highlight-face` as the face which highlights search matches.

`hyrolo-kill-buffers-after-use`
: HyRolo file buffers are left around after they are searched, on the assumption that another search is likely to follow within this emacs session. You may wish to change this behavior with the following setting: `(setq hyrolo-kill-buffers-after-use t)`.

`hyrolo-save-buffers-after-use`
: After an entry is killed, the modified rolo file is automatically saved. If you would rather always save files yourself, use this setting: `(setq hyrolo-save-buffers-after-use nil)`.

`hyrolo-email-format`
: When an entry is being added from within a mail reader buffer, the rolo extracts the sender's name and e-mail address and prompts you with the name

as a default. If you accept the default, it will enter the name and the email address using the format given by the `hyrolo-email-format` variable. See its documentation if you want to change its value.

`hyrolo-hdr-regexp`
: A rolo file may begin with an optional header section which is copied to the match display buffer whenever any matches are found during a search. The start and end lines of this header are controlled by the regular expression variable, `hyrolo-hdr-regexp`, whose default value is `"^==="`. This allows lines of all equal signs to visually separate matching entries retrieved from multiple files during a single search.

`hyrolo-hdr-and-entry-regexp`
: The rolo entry start delimiter is given by the regular expression variable, `hyrolo-hdr-and-entry-regexp`, whose default value is `"^\*+"`, i.e. one or more asterisks at the beginning of a line.

`hyrolo-display-format-function`
: When a rolo search is done, each matching entry is passed through the function given by the variable, `hyrolo-display-format-function`, before it is displayed. This should be a function of one argument, namely the matching rolo entry as a string. The string that this function returns is what is displayed in the rolo match buffer. The default function used is `identity` which passes the string through unchanged. If you use the rolo code to search other kinds of record-oriented data, this variable can be used to format each entry however you would like to see it displayed. With a little experience, you can quickly write functions that use local bindings of the rolo entry and file settings to search all kinds of record-oriented data. There is never a need to learn a complicated query language.

9 Window Configurations

This chapter explains Hyperbole's `hywconfig.el` library. It lets you save and restore window configurations, i.e. the layout of windows and buffers displayed within an emacs frame. This is useful to save a particular working context and then to jump back to it at a later time during an emacs session. It is also useful during demonstrations to display many informational artifacts all at once, e.g. all of the windows for a particular subsystem. None of this information is stored between emacs sessions, so your window configurations will last through only a single session of use. Each window configuration is tied to the emacs frame in which it is created.

The hywconfig library offers two independent ways of managing window configurations. The first way associates a name with each stored window configuration. The name may then be used to retrieve the window configuration later. The second way uses a ring structure to save window configurations and then allows cycling through the ring of saved configurations, finally wrapping around to the first entry after the last entry is encountered. Simply stop when the desired configuration is displayed.

The Win/ menu entry on the Hyperbole top-level menu displays a menu of hywconfig window configuration commands:

```
WinConfig>  AddName  DeleteName  RestoreName  PopRing  SaveRing  YankRing
```

The operations on this menu are defined as follows.

Menu Item	Command	Description
AddName	hywconfig-add-by-name	Name current wconfig
DeleteName	hywconfig-delete-by-name	Delete wconfig by name
RestoreName	hywconfig-restore-by-name	Restore wconfig by name
PopRing	hywconfig-delete-pop	Restore and delete wconfig
SaveRing	hywconfig-ring-save	Store wconfig to the ring
YankRing	hywconfig-yank-pop	Restore the next wconfig

The easiest method to save and restore window configurations shown here is by name, but it requires that you type the chosen name. Instead, the ring commands permit saves and restores using only the mouse. Since the ring commands are a bit more complex than their by-name counterparts, the following paragraphs explain them in more detail.

HyWconfig creates a ring structure that operates just like the Emacs `kill-ring` (see Section "Kill Ring" in *the GNU Emacs Manual*) but its elements are window configurations rather than text regions. You can add an element to the ring to save the current window configuration in the selected frame. After several elements are in the ring, you can walk through all of them in sequence until the desired configuration is restored.

SaveRing executes the `hywconfig-ring-save` command which saves the current window configuration to the ring.

YankRing executes the `hywconfig-yank-pop` command. It restores the window configuration currently pointed to within the ring. It does not delete this configuration from the ring but it does move the pointer to the prior ring element. Repeated calls to this command

thus restore successive window configurations until the ring pointer wraps around. Simply stop when a desired configuration appears and use `{q}` to quit from the minibuffer menu.

PopRing calls the `hywconfig-delete-pop` command. It is used to restore a previously saved configuration and to delete it from the ring. Simply stop when a desired configuration appears and use `{q}` to quit from the minibuffer menu.

The maximum number of elements the ring can hold is set by the `hywconfig-ring-max` variable whose default is 10. Any saves beyond this value will delete the oldest element in the ring before a new one is added.

10 Developing with Hyperbole

This chapter is for people who wish to customize Hyperbole, to extend it, or to develop other systems using Hyperbole as a base. Most of it requires a basic level of familiarity with Emacs Lisp, though new implicit button types may be created with knowledge of only Emacs regular expressions.

10.1 Hook Variables

Hyperbole supplies a number of hook variables that allow you to adjust its basic operations to meet your own needs, without requiring you to change the code for those operations.

We find it best to always set the value of hook variables either to '`nil`' or to a list of function names of no arguments, each of which will be called in sequence when the hook is triggered. If you use the `add-hook` function to adjust the value of hooks, it will do this automatically for you.

Given the name of a function, a Hyperbole hook variable triggered within that function has the same name as the function with a '`-hook`' appended. Hyperbole includes the following hook variables:

`hyperbole-init-hook`
: For customization at Hyperbole initialization time. Use this to load any personal Hyperbole type definitions or key bindings you might have. It is run after Hyperbole support code is loaded but before Hyperbole is initialized, i.e. prior to keyboard and mouse bindings.

`action-key-depress-hook`
`assist-key-depress-hook`
: Run after an Action or Assist Mouse Key depress is detected.

`action-key-release-hook`
`assist-key-release-hook`
: Run after an Action or Assist Mouse Key release is detected, before any associated action is executed.

`action-act-hook`
: Run before each Hyperbole button activation. The variable `hbut:current` contains the button to be activated when this is run.

`ebut-create-hook`
: Adds to the Hyperbole explicit button creation process.

`ebut-delete-hook`
: Adds to the Hyperbole explicit button deletion process.

`ebut-modify-hook`
: Executed when an explicit button's attributes are modified.

`hibtypes-begin-load-hook`
: Executed prior to loading of standard Hyperbole implicit button types. Used to load site-specific low priority implicit button types since lowest priority ibtypes are loaded first.

`hibtypes-end-load-hook`
: Executed after loading of standard Hyperbole implicit button types. Used to load site-specific high priority implicit button types since highest priority ibtypes are loaded last.

`htype-create-hook`
: Executed whenever a Hyperbole type (e.g. action type or implicit button type) is added to the environment.

`htype-delete-hook`
: Executed whenever a type is deleted from the environment.

`kotl-mode-hook`
: Executed whenever a koutline is created or read in or when kotl-mode is invoked.

`hyrolo-add-hook`
: Executed after the addition of a new rolo entry.

`hyrolo-display-hook`
: Executed when rolo matches are displayed.

`hyrolo-edit-hook`
: Executed after point is successfully moved to an entry to be edited.

`hyrolo-mode-hook`
: Executed when a rolo match buffer is created and put into hyrolo-mode.

`hyrolo-yank-reformat-function`
: A variable whose value may be set to a function of two arguments, START and END, which give the region of the rolo entry yanked into the current buffer by the hyrolo-yank command. The function may reformat this region to meet user-specific needs.

Hyperbole also makes use of a number of standard Emacs hook variables.

`find-file-hook`
: This is called whenever a file is read into a buffer. Hyperbole uses it to highlight any buttons within files.

`write-file-hooks`
: This is called whenever a buffer is written to a file. Hyperbole uses it to save modified button attributes associated with any file from the same directory as the current file.

  Hyperbole mail and news facilities also utilize a number of Emacs hook variables. These hide button data and highlight buttons if possible. See the Hyperbole files with 'mail' and 'gnus' in their names for specific usage of such hooks.

10.2 Creating Types

To define or redefine a single Hyperbole type, you may either:

- move your Emacs point to within the type definition and use `{C-M-x} (eval-defun)` (only works in Emacs Lisp mode);

- or move your point to the end of the last line of the type definition and use `{C-x C-e}` `(eval-last-sexp)` (works in most modes).

The functions from the '`htype`' class may be applied to any Hyperbole types, if needed.

The following subsections explain the specifics of Hyperbole type definitions which are beyond standard practice for Emacs Lisp programming. See the definitions of the standard types in `hactypes.el` and `hibtypes.el` for examples.

10.2.1 Creating Action Types

New forms of explicit buttons may be created by adding new action types to a Hyperbole environment. The file, `hactypes.el`, contains many examples of working action types.

An action type is created, i.e. loaded into the Hyperbole environment, with the `(defact)` function (which is an alias for `(actype:create)`). The calling signature for this function is given in its documentation; it is the same as that of `(defun)` except that a documentation string is required. An interactive calling form is also required if the action type has formal parameters and is to be used in explicit or global button definitions. Implicit buttons never use an action type's interactive form; however, it is good practice to include an interactive form since the type creator cannot know how users may choose to apply the type.

An action type's parameters are used differently than those of a function being called. Its interactive calling form is used to prompt for type-specific button attributes whenever an explicit button is created. The rest of its body is used when a button with this action type is activated. Then the button attributes together with the action type body are used to form an action that is executed in response to the button activation. The action's result is returned to the action caller unless it returns '`nil`', in which case '`t`' is returned to the caller to ensure that it registers the performance of the action.

An action type body may perform any computation that uses Emacs Lisp and Hyperbole functions.

The interactive calling form for an action type is of the same form as that of a regular Emacs Lisp function definition (see the documentation for the Emacs Lisp `(interactive)` form or see Section "Code Characters for 'interactive"' in *the GNU Emacs Lisp Reference Manual*. It may additionally use Hyperbole command character extensions when the form is given as a string. Each such extension character *must* be preceded by a plus sign, '`+`', in order to be recognized, since such characters may also have different standard interactive meanings.

The present Hyperbole extension characters are:

`+I` Prompts with completion for an existing Info (filename)nodename.

`+K` Prompts for an existing kcell identifier, either a full outline level identifier or a permanent idstamp.

`+L` Prompts for a klink specification. See the documentation for the function `(kcell-view:reference)` for details of the format of a klink.

`+M` Prompts for a mail message date and the filename in which it resides. The mail parameters prompted for by this character code may change in the future.

`+V` Prompts for a Koutliner view specification string, with the current view spec, if any, as a default.

`+X` Prompts with completion for an existing Info index (filename)itemname.

Arguments are read by the functions in Hyperbole's `hargs` class, rather than the standard Lisp `read` functions, in order to allow direct selection of arguments via the Action Key.

If an action type create is successful, the symbol that Hyperbole uses internally to reference the type is returned. On failure, '`nil`' is returned so that you may test whether or not the operation succeeds.

Once you have defined an action type within your present Hyperbole environment, you can create new explicit buttons which use it. There is no explicit button type beyond its action type, so no other work is necessary.

Call `(actype:delete)` to remove an action type from a Hyperbole environment. It takes a single parameter which should be the same type symbol used in the type definition call (not the Hyperbole symbol returned by the call).

10.2.2 Creating Implicit Button Types

Implicit buttons leverage the same action types used by explicit and global buttons but each carries an additional implicit button type that defines the contexts in which it is active, e.g. major modes or surrounding text. Once an implicit button type definition is loaded into Hyperbole, the Action and Assist Keys automatically recognize all buttons of that type. The Action Key activates the buttons and the Assist Key summarizes their behavior and attributes. With a single definition, you can bring your text to life, activating implicit hyperbuttons in thousands of documents with no other effort.

There are three ways to create new implicit button types; the first two are meant to allow non-programmers to extend Hyperbole with simplified types.

Action Button Link Types
: The first is very simple but can create only link buttons with a specific textual form, i.e. <action-type button-text>.

Implicit Button Link Types
: The second is also limited to link buttons and requires regular expression knowledge; it allows for any string or regular expression button delimiters and regular expression or function link specifications.

Programmatic Implicit Button Types
: The third requires ELisp programming knowledge but can create any implicit button type.

The sections below examine these three implicit button type creation techniques.

10.2.2.1 Action Button Link Types

The simplest way to create a new implicit link type (from which any number of buttons can be recognized within text) is to create an *action button link type*.

A call to the `defal` macro of the form:

```
(defal TYPE LINK-EXPR &optional DOC)
```

will create a Hyperbole action button link TYPE (an unquoted symbol) whose buttons always take the form of: `<TYPE link-text>` where `link-text` is substituted into LINK-EXPR as grouping 1 (wherever %s or \\1 is found) to form the link referent that is displayed

for each button. Hyperbole automatically creates a doc string for the type but you can override this by providing an optional DOC string.

When the Action Key is pressed in a buffer between the start and end delimiters and the text in-between matches to TEXT-REGEXP, then the button is activated and does one of four things with LINK-EXPR:

1. executes it as a brace-delimited key series;
2. displays it in a web browser as a URL;
3. displays it as a path (possibly with trailing colon-separated line and column numbers);
4. invokes a function or action type of one argument, the button text sans the function name, to display it.

For example, if you use Python and have a '`PYTHONLIBPATH`' environment variable, then pressing `{C-x C-e} eval-last-sexp` after this expression:

```
(defal pylib "${PYTHONLIBPATH}/%s")
```

defines a new action button link type called pylib whose buttons take the form of:

```
<pylib PYTHON-LIBRARY-FILENAME>
```

and display the associated Python libraries (typically Python source files). Optional colon separated line and column numbers may be given as well.

Therefore an Action Key press on:

```
<pylib string.py:5:7>
```

would display the source for `string.py` (wherever it is installed on your system) from the Python standard library with point on the fifth line at the seventh character.

See Section 10.2.2.2 [Implicit Button Link Types], page 87, for more flexible regular expression-based link type creation. See Section 10.2.2.3 [Programmatic Implicit Button Types], page 88, for the most general implicit button type creation.

10.2.2.2 Implicit Button Link Types

If you understand Emacs regular expressions (see Section "Syntax of Regular Expressions" in *the GNU Emacs Manual*), you can create new implicit button types without understanding how to program in Emacs Lisp, aside from the instructions provided here.

A call to the `defil` macro of the form:

```
(defil TYPE START-DELIM END-DELIM TEXT-REGEXP LINK-EXPR &optional
START-REGEXP-FLAG END-REGEXP-FLAG DOC)
```

will create a new Hyperbole implicit button link TYPE (an unquoted symbol), recognized in a buffer via START-DELIM and END-DELIM (strings) and the TEXT-REGEXP pattern between the delimiters. With optional START-REGEXP-FLAG true, START-DELIM is treated as a regular expression. Similarly, a true value of END-REGEXP-FLAG treats END-DELIM as a regular expression. Hyperbole automatically creates a doc string for the type but you can override this by providing an optional DOC string.

When the Action Key is pressed in a buffer between the start and end delimiters and the text in-between matches to TEXT-REGEXP, then the button is activated and does one of four things with LINK-EXPR:

1. executes it as a brace-delimited key series;

2. displays it in a web browser as a URL;
3. displays it as a path (possibly with trailing colon-separated line and column numbers);
4. invokes a function or action type of one argument, the button text (sans the function name if an Action Button), to display it.

Prior to activation, for the first three kinds of LINK-EXPR, a `replace-match` is done on the expression to generate the button-specific referent to display. Thus, either the whole button text ('`\\&`') or any numbered grouping from TEXT-REGEXP, e.g. '`\\1`', may be referenced in the LINK-EXPR to form the link referent.

Here is a sample use case. Let's create a button type whose buttons perform a grep-like function over a current repo's git log entries. The buttons use this format: [<text to match>].

The following defines the button type called `search-git-log` with a a key series action surrounded by braces:

```
(defil search-git-log "[<" ">]" ".*" "{M-: (hypb:fgrep-git-log \"\\&\")
RET}")
```

or this simpler version skips the explicit text substitution (\\\\&) and instead uses the function that takes the button text as an argument:

```
(defil search-git-log "[<" ">]" ".*" #hypb:fgrep-git-log)
```

Place point after one of the above expressions and evaluate it with `{C-x C-e}` `eval-last-sexp` to define the implicit button type. Then if you have cloned the Hyperbole repo and are in a Hyperbole source buffer, an Action Key press on a button of the form:

```
;; [<test release>]
```

will display one line per commit whose change set matches 'test release'. An Action Key press on any such line will then display the commit changes.

If you don't mind extra text for every button, you could instead use Action Buttons of the form: <hypb:fgrep-git-log "string"> to do the same thing without any special definitions.

10.2.2.3 Programmatic Implicit Button Types

An implicit button type is created or loaded via the `(defib)` function (which is an alias for `(ibtype:create)`). The calling signature for this function is given in its documentation; it is the same as that of `(defun)`, but with a number of constraints. The parameter list should always be empty since no parameters will be used. A documentation string is required; it is followed by the body of the type.

The body of an implicit button type is a predicate which determines whether or not point is within an implicit button of the type. If not, the predicate returns '`nil`'. If the type is delimited, Hyperbole automatically sets up to flash the button when activated. Action invocations have the form: `(hact 'actype &rest actype-arguments)` where `actype` is a Hyperbole action type symbol or an Emacs Lisp function name or lambda; `actype-arguments` are the arguments fed to the action invocation when an implicit button of the type is activated.

It is imperative that all actions (non-predicate code) be invoked through the `(hact)` function or your ibtypes will not work properly. (Hyperbole first tests to see if any ibtype matches the current context before activating any type, so it ensures that `(hact)` calls are

disabled during this testing.) Any action types used in the definition of an implicit button type may be created before or after the definition, but obviously, must be defined before any implicit buttons of the given type are activated; an error will result, otherwise.

If an implicit button type create is successful, the symbol that Hyperbole uses internally to reference the type is returned. On failure, '`nil`' is returned so that you may test whether or not the operation succeeds. Implicit button type names and action type names may be the same without any conflict. In fact, such naming is encouraged when an implicit button type is the exclusive user of an action type.

Call `(ibtype:delete)` to remove an implicit button type from a Hyperbole environment. It takes a single parameter which should be the same type symbol used in the type definition call (not the Hyperbole symbol returned by the call). This will not delete the action type used by the implicit button; that must be done separately.

By default, a request for help on an implicit button will display the button's attributes in the same manner as is done for explicit buttons. For some implicit button types, other forms of help will be more appropriate. If an Emacs Lisp function is defined whose name is formed from the concatenation of the type name followed by '`:help`', e.g. `my-ibtype:help`, it is used as the assist-action whenever the Assist Key is pressed, to respond to requests for help on buttons of that type. Any such function should take a single argument of an implicit button construct. (This is what `(ibut:at-p)` returns when point is within an implicit button context). The button may be queried for its attributes using functions from the '`hbut`' and '`hattr`' classes. See the `hib-kbd.el` file for an example of a custom help function.

10.3 Explicit Button Technicalities

10.3.1 Button Label Normalization

Hyperbole uses a normalized form of button labels called button keys (or label keys) for all internal operations. See the documentation for the function `(hbut:label-to-key)` for details of the normalization process. The normalized form permits Hyperbole to recognize buttons that are the same but whose labels appear different from one another, due to text formatting conventions. For example, all of the following would be recognized as the same button.

```
<(fake button)>     <( fake      button)>

Pam>  <(fake
Pam>    button)>

;; <(fake
;;   button)>

/* <( fake      */
/*    button )> */
```

The last three examples demonstrate how Hyperbole ignores common fill prefix patterns that happen to fall within the middle of a button label that spans multiple lines. As long as such buttons are selected with point at a location within the label's first line, the button

will be recognized. The variable `hbut:fill-prefix-regexps` holds the list of fill prefixes recognized when embedded within button labels. All such prefixes are recognized (one per button label), regardless of the setting of the Emacs variable, `fill-prefix`, so no user intervention is required.

10.3.2 Operational and Storage Formats

Hyperbole uses a terse format to store explicit buttons and a more meaningful one to show users and to manipulate during editing. The terse format consists solely of button attribute values whereas the edit format includes an attribute name with each attribute value. A button in edit format consists of a Lisp symbol together with its attribute list which holds the attribute names and values. In this way, buttons may be passed along from function to function simply by passing the symbol to which the button is attached. Most functions utilize the pre-defined `hbut:current` symbol by default to store and retrieve the last encountered button in edit format.

The '`hbdata`' class handles the terse, stored format. The '`hbut`', '`ebut`', and '`ibut`' classes work with the name/value format. This separation permits the wholesale replacement of the storage manager with another, with any interface changes hidden from any Hyperbole client programming.

10.3.3 Programmatic Button Creation

A common need when developing with Hyperbole is to create or to modify explicit buttons without user interaction. For example, an application might require the addition of an explicit summary button to a file for each new mail message a user reads that contains a set of keywords. The user could then check the summary file and jump to desired messages quickly.

The Hyperbole class '`ebut`' supports programmatic access to explicit buttons. Examine it within the `hbut.el` file for full details.

The simplest way to create explicit buttons programmatically is to call `ebut:program`. This generates an explicit button at point from LABEL, ACTYPE (action type) and any optional ACTYPE ARGS. It inserts the LABEL text at point surrounded by `<( )>` delimiters, adding any necessary instance number of the button after the LABEL. ACTYPE may be a Hyperbole action type name (from defact) or an Emacs Lisp function, followed by a list of arguments for the actype, aside from the button LABEL which is automatically provided as the first argument.

For interactive explicit creation, use `hui:ebut-create` instead.

The documentation for `(ebut:create)` explains the set of attributes necessary to create an explicit button. For operations over the whole set of buttons within the visible (non-narrowed) portion of a buffer, use the `(ebut:map)` function.

Similarly, `gbut:ebut-program` programmatically adds global explicit buttons at the end of the personal button file.

10.4 Encapsulating Systems

A powerful use of implicit button types is to provide a Hyperbole-based interface to external systems. The basic idea is to interpret patterns output by the application as implicit buttons.

See the `hsys-*` files for examples of how to do this. Encapsulations are provided for the following systems (the systems themselves are not included with Hyperbole):

World-Wide Web
: The world-wide web system originally developed at CERN, that now spans the Internet universe. This is automatically loaded by Hyperbole so that a press of the Action Key follows a URL.

10.5 Embedding Hyperbole

The standard Hyperbole user interface has purposely been separated from the Hyperbole backend to support the development of alternative interfaces and the embedding of Hyperbole functionality within other system prototypes. The Hyperbole backend functionality that system developers can make use of is called its Application Programming Interface (API). The API may be used to make server-based calls to Hyperbole when Emacs is run as a non-interactive (batch) process, with its input/output streams attached to another process.

The public functions and variables from the following files may be considered the present Hyperbole API:

`hact.el`, `hargs.el`, `hbmap.el`, `hbut.el`, `hhist.el`, `hmail.el`, `hmoccur.el`, `hpath.el`, `htz.el`, `hypb.el`, `hyrolo.el`, `hyrolo-logic.el`, `hywconfig.el` and `set.el`.

Note when looking at these files, that they are divided into sections that separate one data abstraction (class) from another. A line of dashes within a class separates public parts of the class from the private parts that follow the line.

This API does not include the Hyperbole Koutliner, as it has been designed for interactive use, rather than programmatic extensibility. You are welcome, however, to study its code, below the `hyperbole-${hyperb:version}/kotl/` directory.

Appendix A Glossary

Concepts pertinent to operational usage of Hyperbole are defined here. See Section "Glossary" in *the GNU Emacs Manual*, if any emacs-related terms are unfamiliar to you.

Ace Window
: Emacs extension package that labels windows with letters and allows quick keyboard selection or other operations on a specific window. Hyperbole extends this with a number of additional commands like throw a buffer to a window or replace a windows's contents. See Section 3.7.5.5 [Keyboard Drags], page 21.

Action
: An executable behavior associated with a Hyperbole button. *Links* are a specific class of actions which display existing entities, such as files. See also **Action Type**.

Action Button
: An implicit button that uses a universal button syntax delimited by <angle brackets> to invoke any available Hyperbole action type or Emacs Lisp function. Alternatively, if it is an Emacs Lisp variable name, its action is to display the variable value.

Action Key
: See **Smart Key**.

Action Type
: Emacs Lisp commands that specify Hyperbole button behaviors. Action types contain zero or more arguments which must be given values for each button with which they are associated. An action type together with a set of values is an *action*. *Actype* is a synonym for action type.

  Internally, Hyperbole defines its own namespace for action types defined with its `defact` macro by prefixing them with `ibtypes::`. Symbols with this prefix are regular Emacs Lisp commands.

Activation
: A request to a Hyperbole button to perform its action. Ordinarily the user presses a key which selects and activates a button.

Argument
: A button-specific value fed to a Hyperbole type specification when the button is activated.

Assist Key
: See **Smart Key**.

Attribute
: A named parameter slot associated with a category or type of Hyperbole button. An *attribute value* is typically specific to a particular button instance.

Augment
: The Augment system, originally named NLS, was a pioneering research and production system aimed at augmenting human intellect and group knowledge processing capabilities through integrated tools and organizational development strategies. This approach led to the invention of much of interactive computing technology decades ahead of other efforts, including: the mouse, chord keyboards, screen windows, true hypertext, outline processors, groupware, and digitally signed documents. See Appendix I [References], page 159, which cites

several Douglas Engelbart papers on the subject. The Koutliner demonstrates a few of the concepts pioneered in Augment.

Buffer An Emacs buffer is an editable or viewable text, possibly with special formatting such as an outline or table. It may also be attached to a process, receiving and updating its text as the process handles changing information.

Button A selectable Hyperbole construct which performs an action. A button consists of a set of attributes that includes: a textual label, a category, a type and zero or more arguments. *Explicit buttons* also have creator, create time, last modifier, and last modifier time attributes.

Buttons provide user gateways to information. Users see and interact with button labels; the rest of the button attributes are managed invisibly by Hyperbole and displayed only in response to user queries.

Button Activation
See **Activation**.

Button Attributes
See **Attributes**.

Button Data
Lists of button attribute values explicitly saved and managed by Hyperbole. One list for each button created by Hyperbole.

Button File, local
A per-directory file named `HYPB` that may be used to store any buttons that link to files within the directory. It may be displayed via a menu selection whenever a user is within the directory.

Button File, personal
A per-user file named `HYPB` that stores all global buttons for the user and any other buttons used to navigate to other information spaces. It may be displayed via a menu selection at any time.

Button Key
A normalized form of a **button label** used internally by Hyperbole.

Button Label
A text string that visually indicates a Hyperbole button location and that serves as its name and unique identifier. Within a buffer, buttons with the same label are considered separate views of the same button and so behave exactly alike. Since button labels are simply text strings, they may be embedded within any text to provide non-linear information or operational access points.

Button Selection
The act of designating a Hyperbole button upon which to operate. Use the Action Key to select a button.

Category A class of Hyperbole buttons: implicit, explicit or global.

Cell See `Kcell`.

Children The set of koutline cells which share a common parent cell and thus, are one level deeper than the parent.

Class A group of functions and variables with the same prefix in their names, used to provide an interface to an internal or external Hyperbole abstraction.

Consult An Emacs extension package that provides asynchronous search and narrow wrappers around common search commands like grep, ripgrep, find and locate.

Hyperbole uses this package to provide convenience commands for line-oriented searches.

`{M-x hsys-org-roam-consult-grep RET}`
: Searches Org Roam notes in `org-roam-directory` with consult.

`{M-x hsys-org-consult-grep RET}`
: Searches Org notes in `org-directory` with consult.

Context A programmatic or positional state recognized by Hyperbole. We speak of Smart Key and implicit button contexts. Both are typically defined in terms of surrounding patterns within a buffer, but may be defined by arbitrary Emacs Lisp predicates.

Display See **Screen**.

Domain The contexts in which an implicit button type may be found, i.e. where its predicate is true.

Drag A mouse button press in one location and following release in another location.

Elink
link-to-ebut
: An Action Button that links to an explicit button. It begins with <elink: followed by an explicit button label, an optional ebut file and ends with a closing >.

Environment
: See **Hyperbole Environment**.

Explicit Button
: A button created and managed by Hyperbole, associated with a specific action type. By default, explicit buttons are delimited like this '`<(fake button)>`'. Direct selection is used to operate upon an explicit button.

Frame An Emacs frame displays one or more Emacs windows and widgets (menubars, toolbars, scrollbars). Under a graphical window system, this is a single window system window. On a dumb terminal, only one frame is visible at a time as each frame generally fills the whole terminal display, providing a virtual screen capability. Emacs windows exist within a frame.

Global Button
: A Hyperbole button which is accessed by name rather than direct selection. Global buttons are useful when one wants quick access to actions such as jumping to common file locations or for performing sequences of operations. One need not locate them since they are always available by name, with full completion offered. All global buttons are stored in the file returned by the function call, `(gbut:file)`, and may be activated with the Action Key when editing this file. By default, this is the same as the user's personal button file.

Glink
link-to-gbut
: An Action Button that links to a global button. It begins with <glink: followed by a global button label and then a closing >.

Global Button File
: See **Button File, personal** and **Global Button**.

Grid
: See **Windows Grid**.

  The maximum length of a button label is limited by the variable `hbut:max-len`. If 0, there is no limit and searches for button end delimiters can go as far as the end of the buffer. Use the function, `(hbut:max-len)`, to read the proper value.

Helm
: An Emacs extension package that provides asynchronous search and narrow wrappers around many Emacs commands. Hyperbole optionally utilizes this together with the `org-rifle` package to interactively search the HyRolo. Use `M-x hyrolo-helm-org-rifle` to search your HyRolo file list with these packages.

Hook Variable
: A variable that permits customization of an existing function's operation without the need to edit the function's code. See also the documentation for the function `(run-hooks)`.

HyControl
: HyControl, the Hyperbole window and frame control manager, offers fast, single key manipulation of window and frame creation, deletion, sizing, position and face zooming (enlarging/shrinking).

Hyperbole
: The flexible, programmable information management and viewing system documented by this manual. It utilizes a button-action model and supports hypertextual linkages. Hyperbole is all things to all people.

Hyperbole Environment
: A programmatic context within which Hyperbole operates. This includes the set of Hyperbole types defined and the set of Hyperbole code modules loaded. It does not include the set of accessible buttons. Although the entire Emacs environment is available to Hyperbole, we do not speak of this as part of the Hyperbole environment.

Hypertext
: A text or group of texts which may be explored in a non-linear fashion through associative linkages embedded throughout the text. Instead of simply referring to other pieces of work, hypertext references when followed actually take you to the works themselves.

HyRolo
: HyRolo, the Hyperbole record/contact manager, provides rapid lookup of multi-line, hierarchically ordered free form text records. It can also lookup records from Google/GMail Contacts and the Big Brother DataBase (BBDB) package.

Ilink
link-to-ibut

An Action Button that links to another implicit button. It begins with <ilink: followed by an implicit button label, an optional ibut file and ends with a closing >.

Implicit Button

A button recognized contextually by Hyperbole. Such buttons contain no button data but may have an optional preceding label that looks like this: '`<[label]>`'. See also **implicit button type**.

Implicit Button Type

A specification of how to recognize and activate implicit buttons of a specific kind. Implicit button types often utilize structure internal to documents created and managed by tools other than Hyperbole, for example, programming documentation. **Ibtype** is a synonym for implicit button type. See also **system encapsulation**.

Internally, Hyperbole defines its own namespace for ibtypes defined with its `defib` macro by prefixing them with `ibtypes::`. Symbols with this prefix are invokable Emacs Lisp functions.

InfoDock InfoDock is an older integrated productivity toolset for software engineers and knowledge workers built atop XEmacs; it is no longer maintained or updated, though many of its packages can be used with GNU Emacs. An older version from 1999 may be found at infodock.sf.net.

InfoDock has much of the power of GNU Emacs, but with an easier to use and more comprehensive menu-based user interface. Most objections people raise to using emacs have already been addressed in InfoDock. InfoDock is meant for people who prefer a complete, pre-customized environment in one package.

Instance Number

A colon prefaced number appended to the label of a newly created button when the button's label duplicates the label of an existing button in the current buffer. This number makes the label unique and so allows any number of buttons with the same base label within a single buffer.

Jedi See also `https://tkf.github.io/emacs-jedi/latest/`.

Jedi is a Emacs package for Python completion, definition and documentation lookup.

Key Sequence

A single sequence of keys that can invoke an Emacs command.

Key Series

A series of one or more Emacs key sequences delimited by braces that Hyperbole processes when activated as an implicit button, as if the keys were typed in by the user.

Kcell Ref A reference to a Koutline cell. Such a reference may be:

12 - a whole number representing a permanent idstamp

or any of the following string forms:

1 or 1b - relative id, augment style 1.2 - relative id, legal style 012 - permanent idstamp 1a=012 - both relative and permanent ids (in that order) separated by = |viewspec - a viewspec setting, rather than a cell reference

Optionally, any of these id forms (or the relative form) may be followed by zero or more whitespace characters, a | and some view specification characters. See Section 7.6.2 [View Specs], page 69.

Klink An angle bracket, <>, delimited implicit button type that displays a koutline cell referent at the top of a window. The link may be of any of the following forms:

```
< pathname [, kcell-ref] >
< [-!&] pathname >
< @ kcell-ref >
```

See the above definition of *Kcell Ref* for kcell-ref formats.

Koutline A hierarchically ordered grouping of cells which may be stored as a file and viewed and edited as an outline.

Koutliner Koutliner, the Hyperbole outliner, is a powerful autonumbering outliner with permanent hypertext anchors for easy hyperlinking and view specs for rapid outline view alteration.

Kcell Cells or kcells are elements within koutlines. Each cell may contain textual and graphical contents, a relative identifier, a permanent identifier and a set of attributes such as the user who created the cell and the time of creation. See also **Koutliner**.

Link A reference from a Hyperbole button to an existing (non-computed) entity. The referenced entity is called a *referent*. Links are a subset of the types of actions that Hyperbole buttons support.

Local Button File
See **Button File, local**.

Minibuffer Window
The one line window at the bottom of a frame where messages and prompts are displayed.

Minibuffer Menu
A Hyperbole menu displayed in the minibuffer window. Each menu item within a minibuffer menu begins with a different letter that can be used to invoke the item (case doesn't matter). Items that display other menus end with a forward slash, '/'.

Mouse Key
Mouse Button
See **Smart Key**.

NLS See **Augment**.

Node See **Link** or **Cell**.

The OO-Browser
: See also `https://www.gnu.org/software/oo-browser`.

  The GNU OO-Browser is a multi-windowed, interactive object-oriented class browser similar in use to the well-known Smalltalk browsers. It runs inside Emacs. It is unique in a number of respects foremost of which is that it works well with most major object-oriented languages in use today. You can switch from browsing in one language to another in a few seconds. It provides both textual views within an editor and graphical views under the X window system and Windows. It includes support for C, C++, Common Lisp and its Object System (CLOS), Eiffel, Java, Objective-C, Python and Smalltalk.

  Hyperbole provides the mouse support for the OO-Browser, providing Smart Keys that utilize the OO-Browser's capabilities both when it is displayed on screen and when editing code.

Org Mode
: A built-in Emacs mode for outlining, note taking and scientific publishing. Hyperbole simplifies access to a number of its features and integrates its own hypermedia capabilities with those of Org mode. Hyperbole can display the referent of any Org Id. See Section E.2.2 [Smart Key - Org Mode], page 131.

Org Roam
: An Emacs extension package that inserts ids into Org mode files and indexes them within a Sqlite database for rapid note taking and lookup by title. Hyperbole can display the referent of any Org Roam Id and provides full-text searching of Org Roam nodes utilzing the interactive grep commands from the Consult extension package.

Outline
: See **Koutline**.

Parent
: Any koutline cell which has children.

Predecessor
: The previous same level koutline cell with the same parent.

Predicate
: A boolean ('`nil`' = false, non-nil = true = '`t`') Lisp expression typically evaluated as part of a conditional expression. Implicit button types contain predicates that determine whether or not a button of that type is to be found at point.

Referent
: See **Link**.

Remote Pathname
: A file or directory on a system not shared within the local area network. The built-in Emacs library, **Tramp**, handles remote pathnames and Hyperbole uses it to enable viewing and editing of remote paths of the form: `/<protocol>:<user>@<host>:<path>` as well as web URLs. Use the Cust/Find-File-URLs menu option to enable this feature.

Rolo
: See **HyRolo**.

Root Cell
: A koutline cell which has cells below it at lower outline levels. All such cells share the same root cell.

Screen
: The total display area available to Emacs frames. This may consist of multiple physical monitors arranged into a single virtual display. Screen edges are thus the outer borders of the virtual display.

Smart Key
: A context-sensitive key used within Hyperbole and beyond. There are two Smart Keys, the Action Key and the Assist Key. The Action Key activates Hyperbole buttons and scrolls the current buffer line to the top of the window when pressed at the end of a line.

  The Assist Key shows help for Hyperbole buttons and scrolls the current line to the bottom of the window when pressed at the end of a line.

  The `{C-h h d s}` Doc/SmartKeys menu item displays a full summary of Smart Key capabilities. See Chapter 3 [Smart Keys], page 12, for complete details.

Smart Menus
: Smart Menus are an older in-buffer menu system that work on dumb terminals and pre-dated Emacs' own dumb terminal menu support. They are included with InfoDock (which is no longer maintained) and are not available separately. They are not a part of Hyperbole and are not necessary for its use but are still supported by the Smart Keys.

Source Buffer / File
: The buffer or file within which a Hyperbole button is embedded.

Subtree
: All of the cells in a koutline which share the same root cell, excluding the root cell.

Successor
: The next same level koutline cell which follows the current cell and shares the same parent.

System Encapsulation
: Use of Hyperbole to provide an improved or consistent user interface to another system. Typically, implicit button types are defined to recognize and activate button-type constructs managed by the other system.

Tramp
: A remote file access library built-in to Emacs. It uses secure transfer and works with many types of hosts. It allows you to use remote pathnames that are accessible via Internet protocols just like other pathnames, for example when finding a file. Hyperbole recognizes pathnames of the form, `/<protocol>:<user>@<host>:<path>` and web URLs.

Tree
: The set of cells in a koutline that share a common root cell, including the root cell.

URL
: A Universal Resource Locator specification used on the World-Wide web to access documents and services via a multiplicity of protocols.

View
: A perspective on some information. A view can affect the extent of the information displayed, its format, modes used to operate on it, its display location and so forth.

View Spec
: A terse string that specifies a particular view of a koutline or a link referent. If a view spec is active for a buffer, the view spec appears within the modeline like so, `<|view spec>`. See Section 7.6.2 [View Specs], page 69.

Window
: An Emacs window displays a single Emacs buffer within a single frame. Frames may contain many windows.

Windows Grid

A feature of HyControl invoked with `{@}` which creates, lays out and populates a grid of a specified size of new Emacs windows, e.g. 4 rows by 3 columns, each displaying a different buffer chosen by a set of user specifiable filters or from a list.

Appendix B Setup

Hyperbole must be obtained and setup at your site before you can use it. Instructions are given below. If you are using InfoDock version 4.0.7 or higher, Hyperbole is pre-installed so you may skip the installation instructions and simply continue with the next section about customizing Hyperbole's behavior.

B.1 Installation

There are multiple package managers you can use to install Hyperbole once you have GNU Emacs set up at your site. Choose one based on your needs.

After installing Hyperbole, read the next section on Invocation.

B.1.1 Elpa Stable Package Installation (Emacs Package Manager)

Once you have Emacs set up at your site, the stable, released version of GNU Hyperbole may be installed by using the Emacs Package Manager. If you are not familiar with it, see Section "Packages" in *the GNU Emacs Manual*. Releases are very rare and the in-development branch may be many months and features ahead, so you may want to consider using either the Elpa In-Development or Git In-Development installation instead.

If you have Hyperbole installed and simply want to upgrade it, invoke the Emacs Package Manager with `{M-x list-packages RET}`, then use the `{U}` key followed by the `{x}` key to upgrade all out-of-date packages, Hyperbole among them. Then skip the text below and move on to the next section, see Section 2.1 [Invocation], page 10.

Otherwise, to download and install the Hyperbole package, you should add several lines to your personal Emacs initialization file, `~/.emacs`. (For further details, see Section "The Emacs Initialization File" in *the GNU Emacs Manual*).

```
;; Below are the lines to add:

(when (< emacs-major-version 27)
  (error "Hyperbole requires Emacs 27 or above, not %d"
         emacs-major-version))
(require 'package)
(unless (package-installed-p 'hyperbole)
  (package-refresh-contents)
  (package-install 'hyperbole))
(hyperbole-mode 1)
```

Now save the file and restart Emacs. Hyperbole will then be downloaded and compiled for use with your version of Emacs; give it a minute or two. You may see a bunch of compilation warnings but these can be safely ignored.

B.1.2 Elpa In-Development Package Installation

The Elpa In-Development package pulls from the latest Hyperbole development branch tip and does not require installation of any new package manager software. Since Hyperbole is a mature package, this is usually fine to use and update on a day-to-day basis. But new features are tested on this branch and once in awhile it may break for a short time before a fix is pushed. With this branch you'll be able to submit bug reports and feature

requests but will not be able to submit pull requests for changes to the developers; use the Git In-Development Package instead for that.

If you have Hyperbole installed and simply want to upgrade it, invoke the Emacs Package Manager with `{M-x list-packages RET}`, then use the `{U}` key followed by the `{x}` key to upgrade all out-of-date packages, Hyperbole among them. Then skip the text below and move on to the next section, see Section 2.1 [Invocation], page 10.

Otherwise, to download and install the Hyperbole package, you should add several lines to your personal Emacs initialization file, `~/.emacs`. (For further details, see Section "The Emacs Initialization File" in *the GNU Emacs Manual*).

```
;; Below are the lines to add:

(when (< emacs-major-version 27)
  (error "Hyperbole requires Emacs 27 or above, not %d"
         emacs-major-version))
(require 'package)
(add-to-list 'package-archives
             '("gnu-devel" . "https://elpa.gnu.org/devel/"))
(unless (package-installed-p 'hyperbole)
  (package-refresh-contents)
  (package-install 'hyperbole))
(hyperbole-mode 1)
```

Now save the file and restart Emacs. Hyperbole will then be downloaded and compiled for use with your version of Emacs; give it a minute or two. You may see a bunch of compilation warnings but these can be safely ignored.

B.1.3 Git In-Development Package Installation (Straight Package Manager)

If you potentially want to contribute to Hyperbole development and send pull requests to the Hyperbole development team or to try out new features still in testing, you can use the Straight package manager. It pulls the latest Hyperbole source code directly from its git repository. This also gives you a clean installation process without showing you any minor byte compilation warnings.

If you have Hyperbole installed and simply want to upgrade it, invoke the Emacs Package Manager with `{M-x list-packages RET}`, then use the `{U}` key followed by the `{x}` key to upgrade all out-of-date packages, Hyperbole among them. Then skip the text below and move on to the next section, see Section 2.1 [Invocation], page 10.

Otherwise, to download and install the Hyperbole package, you should add several lines to your personal Emacs initialization file, `~/.emacs`. (For further details, see Section "The Emacs Initialization File" in *the GNU Emacs Manual*).

```
;; Use this in your Emacs init file to install Straight
(progn
  (when (< emacs-major-version 27)
    (error "Hyperbole requires Emacs 27 or above, not %d"
           emacs-major-version))
  (defvar bootstrap-version)
  (setq package-enable-at-startup nil)
  (let ((bootstrap-file
         (expand-file-name "straight/repos/straight.el/bootstrap.el"
                           user-emacs-directory))
        (bootstrap-version 5))
    (unless (file-exists-p bootstrap-file)
      (with-current-buffer
          (url-retrieve-synchronously
           "https://raw.githubusercontent.com/raxod502/straight.el/develop/install.el"
           'silent 'inhibit-cookies)
        (goto-char (point-max))
        (eval-print-last-sexp)))
    (load bootstrap-file nil 'nomessage)))

;; Then use this to install Hyperbole
(straight-use-package
 '(hyperbole
   :host nil
   :repo "https://git.savannah.gnu.org/git/hyperbole.git"
   :config (hyperbole-mode 1)))
```

Now save the file and restart Emacs. Hyperbole will then be downloaded and compiled for use with your version of Emacs; give it a minute or two.

B.1.4 Manual Tarball Archive Installation

If you are old-school, don't like package managers, and prefer doing everything by hand, then you can obtain Hyperbole from a tarball:

Download either:

1. a stable release tar.gz source archive from either:
   `ftp://ftp.gnu.org/gnu/hyperbole/` or `http://ftpmirror.gnu.org/hyperbole/`, which will find the closest mirror of the GNU ftp site and show it to you.

2. the latest in-development pre-release tar.gz source archive linked to at the top of this web page:
   `https://elpa.gnu.org/devel/hyperbole.html`.

Then decompress and unpack the archive to a directory of your choosing. Move into the `hyperbole-<version>/` directory and execute the following Posix shell command:

```
make bin
```

to byte-compile the Hyperbole lisp files. Then add the following lines to your personal Emacs initialization file, `~/.emacs`:

```
(unless (and (featurep 'hyperbole) hyperbole-mode)
  (when (< emacs-major-version 27)
    (error "Hyperbole requires Emacs 27 or above, not %d"
           emacs-major-version))
  (push "<directory-ending-with-hyperbole-where-you-unpacked>"
        load-path)
  (require 'hyperbole)
  (hyperbole-mode 1))
```

Restart Emacs and you should see the `Hypb` hyperbole minor mode indicator in your modeline after startup.

B.2 Customization

Major Hyperbole user options may be set from the Customize submenu below the Hyperbole menubar menu, as seen here.

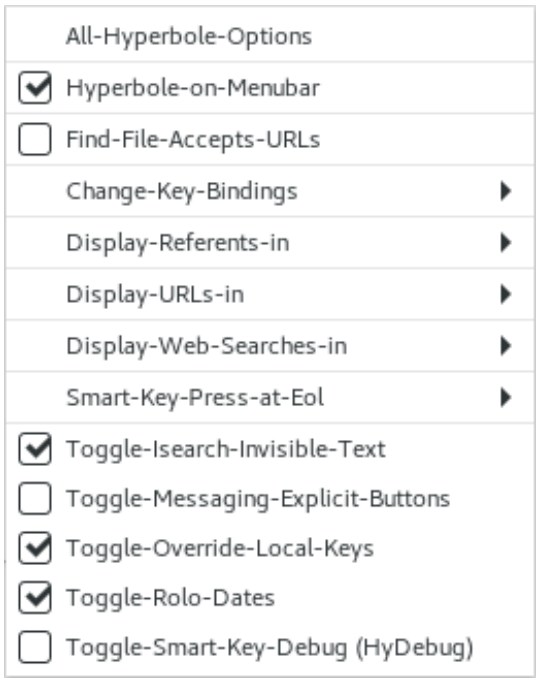

Image B.1: Hyperbole Customize Menu

Alternatively, the minibuffer-based menu, Cust/ may be used.

Generally, you should not need to change anything other than these options. However, if you like to customize your environment extensively, there are many additional Hyperbole customization options that may be changed with the Emacs customization interface, see Section "Easy Customization Interface" in *the GNU Emacs Manual*. When you save any changes within this interface, the changes are saved permanently to your personal Emacs initialization file and are available in future Emacs sessions.

Use Cust/All-Options `{C-h h c a}` to display an expandable tree of customizable Hyperbole options. Hyperbole's customizations are further grouped into several sub-categories, one for the Koutliner, one for the HyRolo, etc. You can select either an entire category or a specific option and they will appear in another window for editing. Simply follow the instructions on screen and then press the "Apply and Save" button to make any changes permanent.

If you know the name of the option you want to edit, you can edit it at any time without going through the tree of options. Use `{M-x customize-variable RET}` and then type the name of the variable and press `RET` to edit it.

The following sections discuss the customization options most likely to be of interest to users.

B.2.1 Referent Display

Hyperbole lets you control where link referents are displayed. It also permits setting a specific Emacs function or external program to display them. There are four categories of referents, each with its own customizable display setting, listed in decreasing order of priority. All of these variables are defined within `hpath.el`.

Referent Category	Variable Setting
Internal Image Display	hpath:native-image-suffixes
Internal Custom Display	hpath:internal-display-alist
External Display	hpath:external-display-alist
Internal Standard Display	hpath:display-where

Continue reading the next sections for information on how referents are displayed internally and externally.

B.2.2 Internal Viewers

When given a filename to display, Hyperbole first checks if its suffix is matched by `hpath:native-image-suffixes`. If so and if the function `image-mode` is defined, it uses that mode together with the value of `hpath:display-where` to display the image within an Emacs buffer.

If no match is found, the `hpath:internal-display-alist` variable is checked for a filename match. Its value is an association list whose elements are (<file-name-regular-expression> . <function-of-one-arg>) pairs. Any path whose name matches a <file-name-regular-expression> will be displayed by calling the associated <function-of-one-arg> with the filename as the argument. The first regular expression that matches each filename is the one used. This can be used to format raw data files for convenient display.

By default, this setting handles the following types of files:

- *Audio Files*
  Major audio format files are played with the `play-sound-file` command.
- *Info Manuals*
  Files with a `.info` suffix (may also be compressed) are displayed in the Info browser.
- *RDB Files*
  Files with an `.rdb` suffix are displayed as relational databases using the RDB package available with InfoDock.

Links to standard files, those which don't match any special referent category described earlier, are displayed in an Emacs window specified by the `hpath:display-where` setting. It may be changed with the Cust/Referents `{C-h h c r}` menu.

Available options are:

- *Any-Frame*
  Display in the selected window of another existing frame
- *Current-Win*
  Display in the selected (current) window

- *Diff-Frame-One-Win*
  Display in the selected window of another existing frame, deleting its other windows
- *New-Frame*
  Display in a new single window frame
- *Other-Win*
  Display in another, possibly new window of the selected frame (this is the default)
- *Single-Win*
  Display in a window of the selected frame and delete its other windows

Alternatively, you can use the Hyperbole menubar menu as shown here:

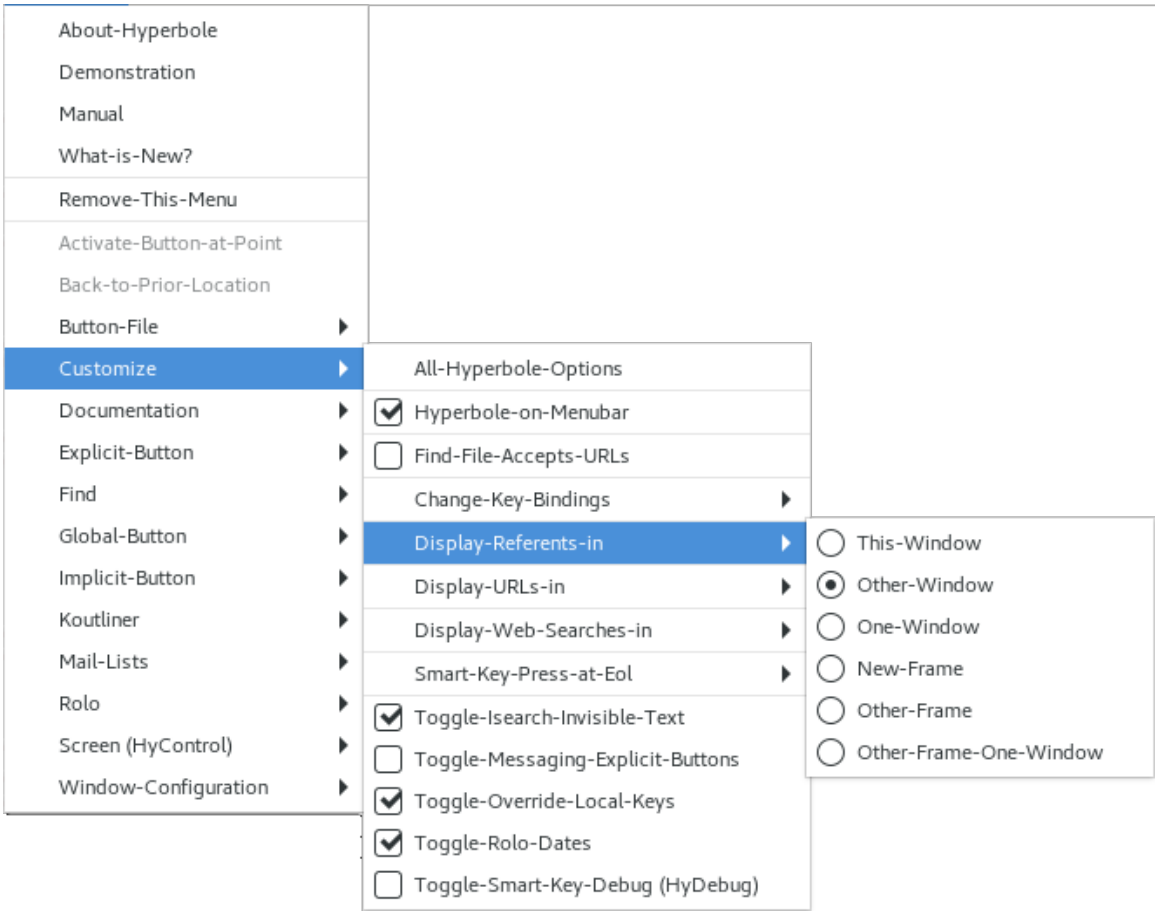

Image B.2: Display Referents Menu

See Section B.2.3 [External Viewers], page 108, for instructions on associating filenames with external, window-system specific viewers.

B.2.3 External Viewers

If you use Hyperbole under a window system, the `hpath:get-external-display-alist` function in `hpath.el` supports hyperlinks that open files using external, non-Emacs tools, e.g. a pdf reader or a vector graphics viewer.

The value returned by `hpath:get-external-display-alist` is determined based on the window system supported by the current frame and the version of Emacs in use. This value is an association list whose elements are (<file-name-regular-expression> . <viewer-program-or-list>) pairs. Any path whose name matches a <file-name-regular-expression> will be displayed using the corresponding viewer-program or the first viewer-program found on the system from a list of programs. If a <viewer-program> entry contains a '`%s`' string, the filename to display is substituted at that point within the string. Otherwise, the filename

is appended to the <viewer-program> entry. Alternatively, the viewer-program may be a Lisp function that takes a single filename argument.

The association lists used by this function are stored in variables for each available window system: `hpath:external-display-alist-macos`, `hpath:external-display-alist-mswindows`, and `hpath:external-display-alist-x`. Examine and modify these values to suit your needs.

Part of these values for each operating system come from the variable, `hpath:external-file-suffixes`', which holds a regular expression of operating system independent file suffixes to open outside Emacs.

B.2.4 Link Variable Substitution

Another option to consider modifying is `hpath:variables`. This option consists of a list of Emacs Lisp variable names, each of which may have a pathname or a list of pathnames as a value. Whenever a Hyperbole file or directory link button is created, its pathname is compared against the values in `hpath:variables`. The first match found, if any, is selected and its associated variable name is substituted into the link pathname, in place of its literal value. When a link button is activated, potentially at a different site, Hyperbole replaces each variable in the link pathname with the first matching value from this list to recreate the literal pathname. Environment variables and Emacs Lisp variables delimited by `\"${variable-name}\"` are also replaced whenever link paths are resolved.

This permits sharing of links over wide areas, where the variable values differ between link creator and link activator. The entire process is wholly transparent to the user; it is explained here simply to help you in deciding whether or not to modify the value of `hpath:variables`.

B.2.5 Web Search Engines

The Find/Web menu offers quick access to major web search engines. It is typically bound to `{C-c /}` or if not, then `{C-h h f w}` is always available. Your standard web browser will be used to return the search results.

The `hyperbole-web-search-alist` variable controls the items in this menu. Elements of this alist are of the form: (<web-service-name> . <url-with-%s-parameter-or-command>). The first capitalized character of each <web-service-name> must be unique for minibuffer menu selection. The second part of an element is either:

1. a URL with an embedded %s indicating where to substitute a search term that is interactively prompted for when the menu item is activated;
2. or an Emacs command symbol that interactively prompts for a URL and a search term and then displays the search results.

Advanced users can change the search engines listed in the Find/Web menu with `{M-x customize-variable RET hyperbole-web-search-alist RET}`. Changes are automatically reflected in the Hyperbole menus once applied. Remember each search engine name must begin with a unique letter and each URL must have a %s format field indicating where to place the web search term when a search is performed.

You can change which browser is used with `{C-h h c w}`, the Cust/Web-Search menu. Below is the equivalent Hyperbole menubar menu.

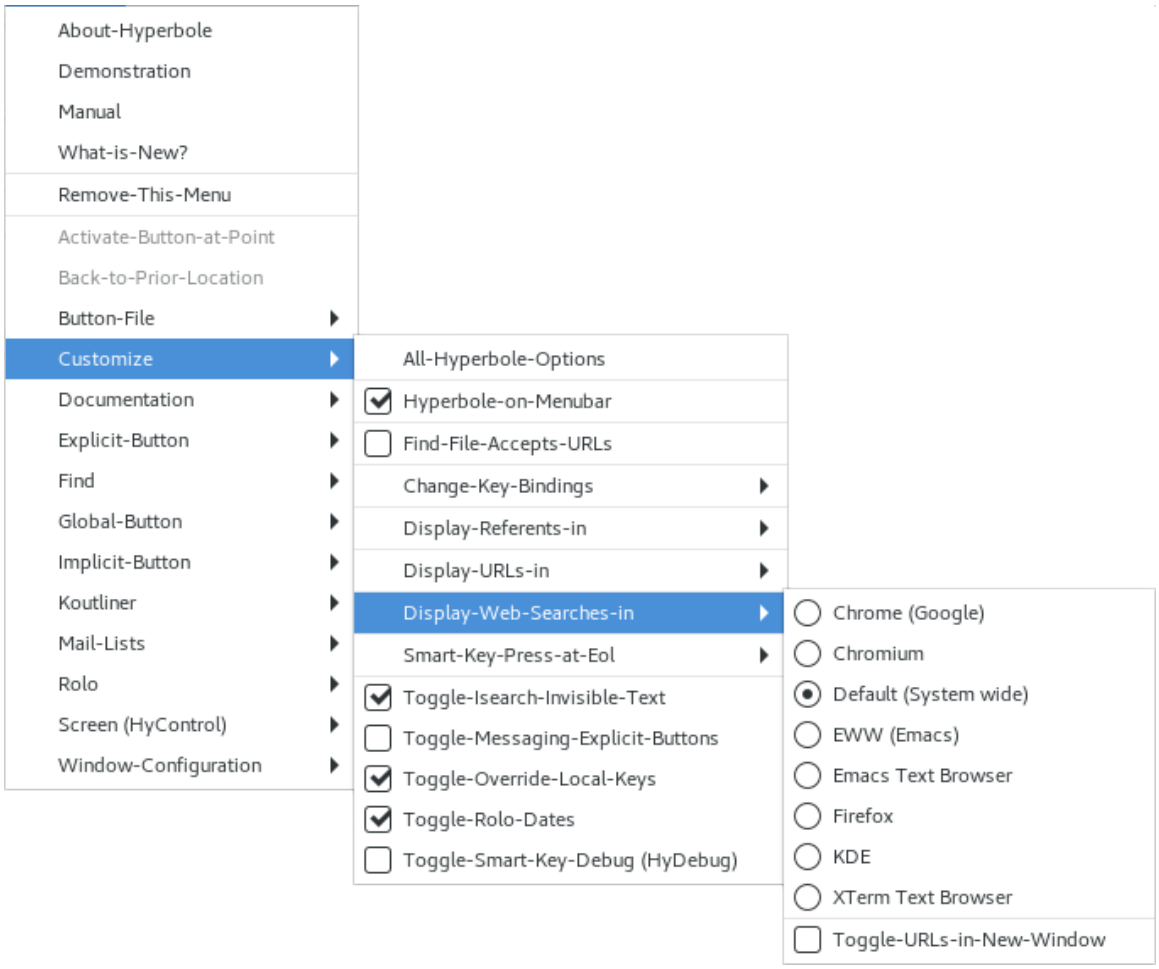

Image B.3: Web Search Browser Menu

B.2.6 Using URLs with Find-File

Hyperbole always recognizes URLs within buffers when the Action Key is pressed on them. But sometimes it is useful to enter a URL at a prompt and have it displayed. Hyperbole can recognize s/ftp and www URLs given to the `find-file` command (or any other `find-file-*` commands). But because there is added overhead with this feature, it is not enabled by default.

To enable the feature, use the Hyperbole menu item Cust/Find-File-URLs (or Find-File-Accepts-URLs on the Hyperbole/Customize pulldown menu). Either of these toggles acceptance of URLs. When enabled the string, URLs, appears in the parenthesized minor-mode section of the modeline.

To enable this feature each time you start the editor, add the following to your personal initialization file after initializing Hyperbole: `(hpath:find-file-urls-mode 1)`.

Both full URLs and abbreviated ones, like `www.gnu.org`, are recognized. filename completion does not work with URLs; you have to type or paste in the entire URL. This feature will work only if you have the builtin Tramp Emacs Lisp package; if you don't have Tramp, an error message will be displayed when you try to enable find-file URLs.

The web browser used to display URLs may be set with the minibuffer menu Cust/URL-Display `{C-h h c u}` or with this Hyperbole menubar menu.

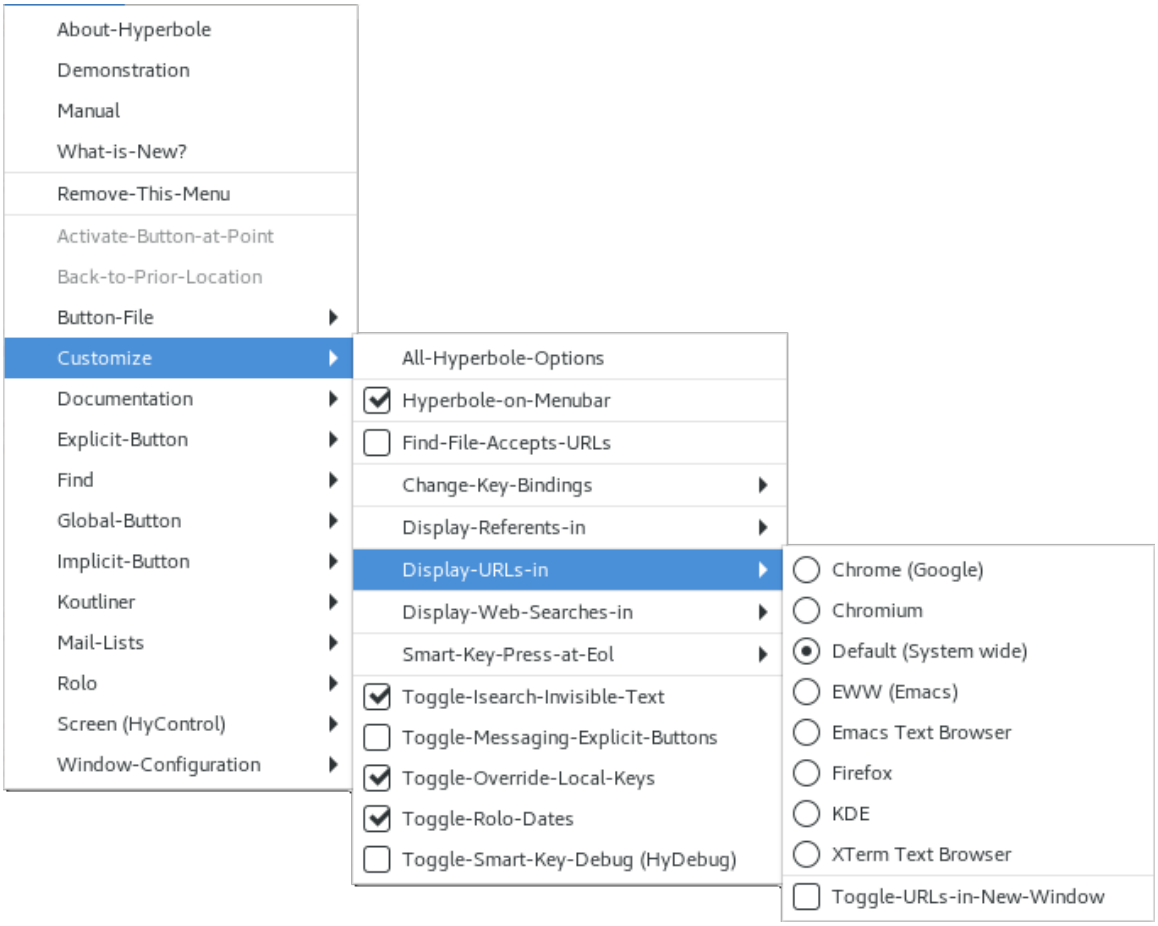

Image B.4: URL Browser Menu

B.2.7 Invisible Text Searches

This is largely for outline modes such as the Koutliner. By default, character-by-character interactive search on `{C-s}` will search through invisible/hidden text, making the text temporarily visible until point moves past that hidden part. When a search match is selected, the surrounding text remains visible.

You can temporarily disable searching of hidden text by typing `{M-s i}` while in an incremental search. This key sequence toggles that setting and makes searches look at only visible text (or the reverse when invoked again). The setting lasts only through the current interactive search.

B.2.8 Configuring Button Colors

When Hyperbole is run under a window system, it automatically highlights any explicit buttons in a buffer and makes them flash when selected. The main setting you may want change is the selection of a color (or style) for button highlighting and button flashing. See the `hui-*-b*.el` files for lists of potential colors and the code which supports this behavior. A call to `(hproperty:cycle-but-color)` in the `hsettings.el` file changes the color used to highlight and flash explicit buttons.

You may also change the length of time in fractions of a second that a button flashes by setting `hproperty:but-flash-time-seconds`.

Whether or not buttons are highlighted is controlled by `hproperty:but-highlight-flag`, which defaults to '`t`'. To disable highlighting, change this setting in `hsettings.el` or use Hyperbole menu item, Cust/All-Options, and select the Hyperbole Buttons group to edit its options.

If you read in a file with explicit buttons before you load Hyperbole, these buttons won't be highlighted. Load Hyperbole and then use `{M-x hproperty:but-create RET}` to highlight the buttons in the current buffer.

Additionally, if `hproperty:but-emphasize-flag` is set to '`t`', then whenever the mouse pointer moves over an explicit button, it will be emphasized in a different color or style. This emphasis is in addition to any non-mouse-sensitive button highlighting.

Appendix C Hyperbole Key Bindings

This appendix covers two topics: 1. how to bind Hyperbole minibuffer menu items to global keys and 2. summaries of all of Hyperbole's default key bindings. User-specific Hyperbole key binding customizations override Hyperbole's defaults.

C.1 Binding Minibuffer Menu Items

Use `{M-x hyperbole-set-key RET}` to bind any global key to any Hyperbole minibuffer menu item. This command will first prompt for the key sequence you want to use to activate the menu item. Immediately after, it will display the Hyperbole top-level minibuffer menu. Simply select the item you want to bind to your key.

C.2 Default Hyperbole Bindings

Hyperbole's default key bindings can be viewed and edited from either the Cust/KeyBindings minibuffer menu or from the Hyperbole menubar menu as shown here:

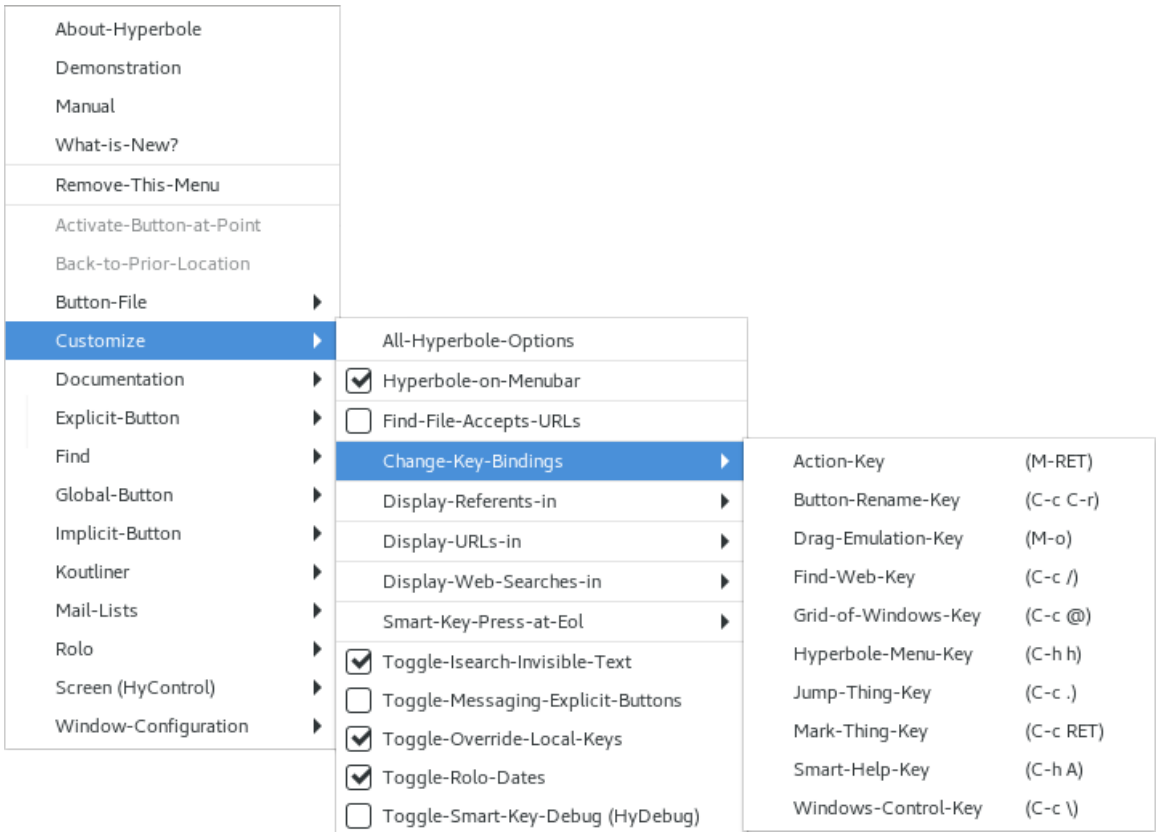

Image C.1: Hyperbole Key Bindings Menu

Below are descriptions of Hyperbole's default keyboard key bindings. All except `{C-h h}` (the global key used to enable Hyperbole and display its minibuffer menu) are bound within Hyperbole's minor mode keymap, `hyperbole-mode-map`.

`{M-RET}` Action Key: Invoke the Action Key in the present context.

`{C-u M-RET}`
: Assist Key: Invoke the Assist Key in the present context.

`{C-c \}` HyControl: Control windows, frames and buffer display. This binding is made only if the key is not bound prior to initializing Hyperbole.

`{C-c /}` Search the Web: Display a minibuffer menu of web search engines. Once an engine is selected, prompt for a search term and perform the associated search.

This binding is made only if the key is not bound prior to initializing Hyperbole; it also defers to any `major-mode` binding. When needed, the Find/Web minibuffer menu item, `{C-h h f w}`, will do the same thing.

`{C-c @}` Display a grid of windows in the selected frame, sized according to the prefix argument. The left digit of the argument is the number of grid rows and the right digit is the number of grid columns. Use `{C-h h h}` to restore the prior frame configuration.

If the argument is 0, prompt for a major mode whose buffers should be displayed first in the grid windows, then prompt for the grid size.

If the argument is < 0, prompt for a shell glob-type file pattern and display files that match the pattern in an auto-sized windows grid.

This binding is made only if the key is not bound prior to initializing Hyperbole; it also defers to any `major-mode` binding and when `outline-minor-mode` is active.

For further details, see the `{@}` key binding description in Chapter 6 [HyControl], page 53.

`{M-o}` Drag Operation: Keyboard emulation of the start and stop of mouse drags to invoke Smart Key actions. This binding is made only if the key is not bound prior to initializing Hyperbole and if Emacs is run under a window system. If the Ace Window package is loaded, then Ace Window commands are typically bound to `{M-o}` instead. Then `{M-o w}` may be used to quickly create an implicit link button in the selected window that links to a referent in any other window chosen via the Ace Window prompt.

`{C-h h}`

`{C-h h X}` Hyperbole Mini Menu: Enable Hyperbole minor mode and invoke the Hyperbole minibuffer menu, giving access to many Hyperbole commands. This is bound globally. Use `{C-h h X}` to close the Hyperbole minibuffer menu and disable Hyperbole minor mode.

`{C-h A}` Action Key Help: Show what the Action Key will do in the current context.

`{C-u C-h A}`
: Assist Key Help: Show what the Assist Key will do in the same context.

`{C-c RET}` Mark Things: Mark larger and larger syntactical units in a buffer when invoked repeatedly, showing in the minibuffer the type of unit marked each time. For example, if on an opening brace at the start of a C, Java or Javascript function, this marks the whole function.

This binding is made only if the key is not bound prior to initializing Hyperbole; it also defers to any `major-mode` binding.

`{C-c .}` Delimited Thing Jump: Jump between the start and end of a delimited thing, which may be an HTML tag pair.

This binding is made only if the key is not bound prior to initializing Hyperbole; it also defers to any `major-mode` binding. See Section 3.5 [Smart Key Thing Selection], page 17, for more information.

`{M-w}` Delimited Thing, Koutline Cell Reference or Region Copy: While Hyperbole is active, it sets `mark-even-if-inactive` to `nil` and overrides `{M-w}` with its own command, `hui-kill-ring-save`, which copies the region only when it is active/highlighted. When there is no active region, `{M-w}` does one of the following:

1. in a Koutline klink, copies the klink;
2. in a Koutline cell, outside any klink, copies a klink reference to the current cell;
3. on a Hyperbole button, copies the text of the button excluding delimiters;
4. at the start of a paired delimiter, copy the text including the delimiters.

`{C-x r s}` Delimited Thing, Koutline Cell Reference or Region Save to Register: This does the same thing as `{M-w}` except it copies to an Emacs register given by a letter or number rather than the kill ring. While Hyperbole is active, it overrides `{C-x r s}` with its own command, `hui-copy-to-register`. which copies the region only when it is active/highlighted.

The variable, `hkey-init`, controls whether or not any Hyperbole key bindings are made when `hyperbole-mode` is active. It is set to '`t`' (true) by default in `hyperbole.el`. This setting means all Hyperbole key bindings will be initialized when Hyperbole is loaded. If you want to disable these bindings permanently, simply add `(setq hkey-init nil)` to your `~/.emacs` file prior to the point at which you load Hyperbole; then restart Emacs. Henceforth, you will have to choose the Hyperbole commands that you want to use and bind those to keys.

If you ever want to temporarily disable Hyperbole key and mouse bindings, simply toggle Hyperbole minor mode off with the `hyperbole-mode` command. There is no default key binding for this command; use `{M-x hyperbole-mode RET}`. Alternatively, you may select a key and bind it as part of any setting of `hyperbole-init-hook` within your personal `~/.emacs` file. For example, `(add-hook 'hyperbole-init-hook (lambda () (global-set-key "\C-ct" 'hyperbole-mode)))`.

C.3 Testing

Hyperbole includes over 200 automated test cases in the `test/` subdirectory. You can run all of them by moving to the Hyperbole home directory in a Posix shell and run `make`

`test-all` or `make test` to run just non-interactive tests. If any tests fail, you can press the Action Key to see the source of the failure. Full testing is supported under POSIX systems only.

With Hyperbole active, you can also define implicit buttons that run individual or sets of Hyperbole tests. The file `hypb-ert.el` contains two action link types:

```
hyperbole-run-test  - run a single Hyperbole test by name
hyperbole-run-tests - run one more tests matching a pattern


Example uses with a press of the Action Key:

  Run the test hbut-defal-url:
    <hyperbole-run-test hbut-defal-url>

  Run the tests specified by the test selector hbut-defal:
    <hyperbole-run-tests hbut-defal>

  Run all tests:
    <hyperbole-run-tests t>
```

Appendix D Koutliner Keys

This appendix summarizes the specialized key bindings available when editing a koutline with Hyperbole. Each key is shown together with its command binding and the documentation for that command. Normal emacs editing keys are modified to account for the structure within outlines. An outliner command which overloads an emacs command named *cmd* is named *kotl-mode:cmd*.

`kfile:write` `{C-x C-w}`
: Write the current outline to FILE.

`klink:create` `{C-c l}`
: Insert at point an implicit link to REFERENCE. REFERENCE should be a cell-ref or a string containing "filename, cell-ref". See the documentation for `(kcell:ref-to-id)` for valid cell-ref formats.

`kotl-mode:add-cell` `{C-j}`
: Add a cell following current cell at optional RELATIVE-LEVEL with CONTENTS string. Optional prefix arg RELATIVE-LEVEL means add as sibling if nil or >= 0, as child if equal to universal argument, `{C-u}`, and as sibling of current cell's parent, otherwise. If added as sibling of current level, RELATIVE-LEVEL is used as a repeat count for the number of cells to add.

  Return last newly added cell.

`kotl-mode:add-child` `{C-c a}`
: Add a new cell to current kview as first child of current cell.

`kotl-mode:add-parent` `{C-c p}`
: Add a new cell to current kview as sibling of current cell's parent.

`kotl-mode:append-cell` `{C-c +}`
: Append the CONTENTS-CELL to APPEND-TO-CELL. If neither cell has a no-fill property and `kotl-mode:refill-flag` is enabled, then APPEND-TO-CELL is refilled.

`kotl-mode:back-to-indentation` `{M-m}`
: Move point to the first non-read-only non-whitespace character on this line.

`kotl-mode:backward-cell` `{C-c C-b}`
: Move to prefix ARGth prior cell (same level) within current view. Return number of cells left to move.

`kotl-mode:backward-char` `{C-b}`
: Move point backward ARG (or 1) characters and return point.

`kotl-mode:backward-kill-word` `{M-DEL}`
: Kill up to prefix ARG (or 1) words preceding point within a single cell.

`kotl-mode:backward-sentence` `{M-a}`
: Move point backward ARG (or 1) sentences and return point.

`kotl-mode:backward-word` `{M-b}`
: Move point backward ARG (or 1) words and return point.

`kotl-mode:beginning-of-buffer {M-<}`
Move point to beginning of buffer and return point.

`kotl-mode:beginning-of-cell {C-c ,}`
Move point to beginning of current or ARGth - 1 prior cell and return point.

`kotl-mode:beginning-of-line {C-a}`
Move point to beginning of current or ARGth - 1 line and return point.

`kotl-mode:beginning-of-tree {C-c ^}`
Move point to the level 1 root of the current cell's tree. Leave point at the start of the cell.

`kotl-mode:cell-help {C-c h}`
Display a temporary buffer of CELL-REF's attributes. CELL-REF defaults to current cell. Optional prefix arg CELLS-FLAG selects the cells to print:

```
If = 1, print CELL-REF's cell only;
If > 1, print the visible tree rooted at CELL-REF;
If < 1, print all visible cells in current view
  (In this last case, CELL-REF is not used).
```

See also the documentation for `kotl-mode:cell-attributes`.

`kotl-mode:center-line {M-s}`
Center the line point is on, within the width specified by `fill-column`. This means adjusting the indentation so that it equals the distance between the end of the text and `fill-column`.

`kotl-mode:center-paragraph {M-S}`
Center each nonblank line in the paragraph at or after point. See `center-line` for more information.

`kotl-mode:copy-after {C-c c}`
Copy tree rooted at FROM-CELL-REF to follow tree rooted at TO-CELL-REF. If prefix arg CHILD-P is non-nil, make FROM-CELL-REF the first child of TO-CELL-REF, otherwise make it the sibling following TO-CELL-REF.

Leave point at the start of the root cell of the new tree.

`kotl-mode:copy-before {C-c C-c}`
Copy tree rooted at FROM-CELL-REF to precede tree rooted at TO-CELL-REF. If prefix arg PARENT-P is non-nil, make FROM-CELL-REF the first child of TO-CELL-REF's parent, otherwise make it the preceding sibling of TO-CELL-REF.

Leave point at the start of the root cell of the new tree.

`kotl-mode:copy-tree-or-region-to-buffer {C-c M-c}`
If no usable active region, prompt for and copy a Koutline tree to a specified buffer, otherwise, copy the active region.

Use 0 to copy the whole outline buffer. Prompt for whether or not to expand and include any hidden/invisible text within the copied text.

`kotl-mode:copy-to-register {C-x x}`
Copy into REGISTER the region START to END. With optional prefix arg DELETE-FLAG, delete region.

`kotl-mode:delete-backward-char {DEL}`
: Delete up to the preceding prefix ARG characters. Return number of characters deleted. Optional KILL-FLAG non-nil means save in kill ring instead of deleting. Do not delete across cell boundaries.

`kotl-mode:delete-blank-lines {C-x C-o}`
: On blank line within a cell, delete all surrounding blank lines, leaving just one. On isolated blank line, delete that one. On nonblank line, delete all blank lines that follow it.

  If nothing but whitespace follows point until the end of a cell, delete all whitespace at the end of the cell.

`kotl-mode:delete-char {C-d}`
: Delete up to prefix ARG characters following point. Return number of characters deleted. Optional KILL-FLAG non-nil means save in kill ring instead of deleting. Do not delete across cell boundaries.

`kotl-mode:delete-indentation {M-^}`
: Join this line to previous and fix up whitespace at join. If there is a fill prefix, delete it from the beginning of this line. With argument, join this line to the following line.

`kotl-mode:demote-tree {TAB}`
: Move current tree a maximum of prefix ARG levels lower in current view. Each cell is refilled iff its *no-fill* attribute is nil and `kotl-mode:refill-flag` is non-nil. With prefix ARG = 0, cells are demoted up to one level and `kotl-mode:refill-flag` is treated as true.

`kotl-mode:down-level {C-c C-d}`
: Move down prefix ARG levels lower within current tree.

`kotl-mode:end-of-buffer {M->}`
: Move point to the end of buffer and return point.

`kotl-mode:end-of-cell {C-c .}`
: Move point to end of current or ARGth - 1 succeeding cell and return point.

`kotl-mode:end-of-line {C-e}`
: Move point to end of current or ARGth - 1 line and return point.

`kotl-mode:end-of-tree {C-c $}`
: Move point to the last cell in tree rooted at the current cell. Leave point at the start of the cell.

`kotl-mode:example`
: Display the Koutliner example file for demonstration use by a user.

`kotl-mode:exchange-cells {C-c e}`
: Exchange CELL-REF-1 with CELL-REF-2 in current view. Don't move point.

`kotl-mode:fill-cell {C-c M-j}`
: Fill current cell if it lacks the *no-fill* attribute. With optional JUSTIFY, justify cell as well. IGNORE-COLLAPSED-P is used when caller has already expanded cell, indicating it is not collapsed.

`kotl-mode:fill-paragraph {C-x f}`
Fill current paragraph within cell. With optional JUSTIFY, justify paragraph as well. Ignore any non-nil *no-fill* attribute attached to the cell.

`kotl-mode:fill-tree {C-M-j}`
Refill each cell within the tree whose root is at point.

`kotl-mode:first-sibling {C-c <}`
Move point to the first sibling of the present cell. Leave point at the start of the cell or at its present position if it is already within the first sibling cell.

`kotl-mode:fkey-backward-char {C-b} or {left}`
Move point backward ARG (or 1) characters and return point.

`kotl-mode:fkey-forward-char {C-f} or {right}`
Move point forward ARG (or 1) characters and return point.

`kotl-mode:fkey-next-line {C-n} or {down}`
Move point to ARGth next line and return point.

`kotl-mode:fkey-previous-line {C-p} or {up}`
Move point to ARGth previous line and return point.

`kotl-mode:forward-cell {C-c C-f}`
Move to the prefix ARG following cell (same level) within current view. Return number of cells left to move.

`kotl-mode:forward-char {C-f}`
Move point forward ARG (or 1) characters and return point.

`kotl-mode:forward-para {M-n}`
Move to prefix ARGth next cell (any level) within current view.

`kotl-mode:forward-paragraph {M-]}`
Move to prefix ARG next cell (any level) within current view.

`kotl-mode:forward-sentence {M-e}`
Move point forward ARG (or 1) sentences and return point.

`kotl-mode:forward-word {M-f}`
Move point forward ARG (or 1) words and return point.

`kotl-mode:goto-cell {C-c g}`
Move point to start of cell given by CELL-REF. (See the documentation for `(kcell:ref-to-id)`, for valid formats). Return point iff CELL-REF is found within current view. With a prefix argument, CELL-REF is assigned the argument value for use as an idstamp.

Optional second arg, ERROR-P, non-nil means signal an error if CELL-REF is not found within current view. Will signal same error if called interactively when CELL-REF is not found.

`kotl-mode:hide-sublevels {C-X $}`
Hide all cells in outline at levels deeper than LEVELS-TO-KEEP (a number). Show any hidden cells within LEVELS-TO-KEEP. 1 is the first level.

`kotl-mode:hide-subtree {C-M-h}`
: Hide subtree, ignoring root, at optional CELL-REF (defaults to cell at point).

`kotl-mode:hide-tree {C-c BS}`
: Collapse tree rooted at optional CELL-REF (defaults to cell at point).

`kotl-mode:indent-line {TAB}`
: Indent line relative to the previous one. With optional prefix ARG greater than 1, tab forward ARG times. See the documentation string of 'kotl-mode:indent-tabs-mode' for details on when tabs are used for indenting.

`kotl-mode:indent-region {C-M-\}`
: Indent each nonblank line in the region from START to END. If there is a fill prefix, make each line start with the fill prefix. With argument COLUMN, indent each line to that column. Called from a program, takes three args: START, END and COLUMN.

`kimport:insert-file {C-x i}`
: Insert each paragraph in IMPORT-FROM as a separate cell in the current view. Insert as sibling cells following the current cell. IMPORT-FROM may be a buffer name or filename (filename completion is provided).

`kimport:insert-register {C-x r i}`
: Insert contents of REGISTER at point in current cell. REGISTER is a character naming the register to insert. Normally puts point before and mark after the inserted text. If optional second arg is non-nil, puts mark before and point after. Interactively, second arg is non-nil if prefix arg is supplied.

`kotl-mode:just-one-space {M-\}`
: Delete all spaces and tabs around point and leave one space.

`kotl-mode:kill-contents {C-c k}`
: Kill contents of cell from point to cell end. With prefix ARG, kill entire cell contents.

`kotl-mode:kill-line {C-k}`
: Kill ARG lines from point.

`kotl-mode:kill-region {C-w}`
: Kill region between START and END within a single kcell. With optional COPY-P equal to t, copy region to kill ring but don't kill it. With COPY-P any other non-nil value, return region as a string without affecting the kill ring.

  If called interactively and there is no active region, copy any delimited selectable thing at point; see the documentation for `hui:delimited-selectable-thing`.

  If the buffer is read-only and COPY-P is nil, the region will not be deleted but it will be copied to the kill ring and then an error will be signaled.

  If a completion is active, this aborts the completion only.

`kotl-mode:kill-ring-save {M-w}`
: Copy region between START and END within a single kcell to kill ring.

`kotl-mode:kill-sentence {M-k}`
: Kill up to prefix ARG (or 1) sentences following point within a single cell.

`kotl-mode:kill-tree {C-c C-k}`
: Kill ARG following trees starting with tree rooted at point. If ARG is a non-positive number, nothing is done.

`kotl-mode:kill-word {M-d}`
: Kill up to prefix ARG words following point within a single cell.

`kotl-mode:last-sibling {C-c >}`
: Move point to the last sibling of the present cell. Leave point at the start of the cell or at its present position if it is already within the last sibling cell.

`kotl-mode:mail-tree {C-c C-@}`
: Mail outline tree rooted at CELL-REF. Use "0" for whole outline buffer.

`kotl-mode:move-after {C-c m}`
: Move tree rooted at FROM-CELL-REF to follow tree rooted at TO-CELL-REF. If prefix arg CHILD-P is non-nil, make FROM-CELL-REF the first child of TO-CELL-REF, otherwise make it the sibling following TO-CELL-REF. With optional COPY-P, copy tree rather than moving it.

  Leave point at original location but return the tree's new start point.

`kotl-mode:move-before {C-c RET}`
: Move tree rooted at FROM-CELL-REF to precede tree rooted at TO-CELL-REF. If prefix arg PARENT-P is non-nil, make FROM-CELL-REF the first child of TO-CELL-REF's parent, otherwise make it the preceding sibling of TO-CELL-REF. With optional COPY-P, copy tree rather than moving it.

  Leave point at original location but return the tree's new start point.

`kotl-mode:newline {RET}`
: Insert a newline. With ARG, insert ARG newlines. In Auto Fill mode, if no numeric arg, break the preceding line if it is too long.

`kotl-mode:next-cell {C-c C-n}`
: Move to prefix ARG next cell (any level) within current view.

`kotl-mode:next-line {C-n}`
: Move point to ARGth next line and return point.

`kotl-mode:open-line {C-o}`
: Insert a newline and leave point before it. With arg N, insert N newlines.

`kotl-mode:overview {C-c C-o}`
: Show only the first line of each cell in the current outline. With a prefix arg, also toggle the display of blank lines between cells.

`kotl-mode:previous-cell {C-c C-p}`
: Move to prefix ARG previous cell (any level) within current view.

`kotl-mode:previous-line {C-p}`
: Move point to ARGth previous line and return point.

`kotl-mode:promote-tree {M-TAB} or {SHIFT-TAB}`
: Move current tree a maximum of prefix ARG levels higher in current view. Each cell is refilled iff its *no-fill* attribute is nil and `kotl-mode:refill-flag`

is non-nil. With prefix ARG = 0, cells are promoted up to one level and `kotl-mode:refill-flag` is treated as true.

`kotl-mode:scroll-down {M-v}`
Scroll text of current window downward ARG lines; or a windowful if no ARG.

`kotl-mode:scroll-up {C-v}`
Scroll text of current window upward ARG lines; or a windowful if no ARG.

`kotl-mode:set-cell-attribute {C-c C-i}`
Include ATTRIBUTE VALUE with the current cell or the cell at optional POS. Replace any existing value that ATTRIBUTE has. When called interactively, display the setting in the minibuffer as confirmation.

`kotl-mode:set-fill-prefix {C-x l}`
Set fill prefix to line up to point. With prefix arg TURN-OFF or at begin of line, turn fill prefix off.

`kotl-mode:show-all {C-c C-a}`
Show (expand) all cells in current view. With a prefix arg, also toggle the display of blank lines between cells.

`kotl-mode:show-subtree`
Show subtree, ignoring root, at optional CELL-REF (defaults to cell at point).

`kotl-mode:show-tree {C-c C-s}`
Display fully expanded tree rooted at CELL-REF.

`kotl-mode:split-cell {C-c s}`
Split cell into two cells and move to new cell. Cell contents after point become part of newly created cell. Default is to create new cell as sibling of current cell. With optional universal ARG, `{C-u}`, new cell is added as child of current cell.

`kotl-mode:top-cells {C-c C-t}`
Collapse all level 1 cells in view and hide any deeper sublevels. With a prefix arg, also toggle the display of blank lines between cells.

`kotl-mode:transpose-cells {C-c t}`
Exchange current and previous visible cells, leaving point after both. If no previous cell, exchange current with next cell. With prefix ARG, take current cell and move it past ARG cells. With prefix ARG = 0, interchange the cell that contains point with the cell that contains mark.

`kotl-mode:transpose-chars {C-t}`
Interchange characters around point, moving forward one character. With prefix ARG, take character before point and drag it forward past ARG other characters (backward if ARG negative). If no prefix ARG and at end of line, the previous two characters are exchanged.

`kotl-mode:transpose-lines {C-x C-t}`
Exchange current line and previous line, leaving point after both. If no previous line, exchange current with next line. With prefix ARG, take previous line and move it past ARG lines. With prefix ARG = 0, interchange the line that contains point with the line that contains mark.

`kotl-mode:transpose-words {M-t}`
: Interchange words around point, leaving point after both words. With prefix ARG, take word before or around point and drag it forward past ARG other words (backward if ARG negative). If ARG is zero, the words around or after point and around or after mark are interchanged.

`kotl-mode:up-level {C-c C-u}`
: Move up prefix ARG levels higher in current outline view.

`kotl-mode:yank {C-y}`
: Reinsert the last stretch of killed text. More precisely, reinsert the stretch of killed text most recently killed OR yanked. Put point at end, and set mark at beginning. With just C-u as argument, same but put point at beginning (and mark at end). With argument N, reinsert the Nth most recently killed stretch of killed text. See also the command, `(kotl-mode:yank-pop)`.

`kotl-mode:yank-pop {M-y}`
: Replace just-yanked stretch of killed text with a different stretch. This command is allowed only immediately after a `(yank)` or a `(yank-pop)`. At such a time, the region contains a stretch of reinserted previously-killed text. `(yank-pop)` deletes that text and inserts in its place a different stretch of killed text.

  With no argument, the previous kill is inserted. With argument N, insert the Nth previous kill. If N is negative, this is a more recent kill.

  The sequence of kills wraps around, so that after the oldest one comes the newest one.

`kotl-mode:zap-to-char {M-z}`
: Kill up to and including prefix ARGth occurrence of CHAR. Goes backward if ARG is negative; error if CHAR not found.

`kview:set-label-separator {C-c M-l}`
: Set the LABEL-SEPARATOR (a string) between labels and cell contents for the current kview. With optional prefix arg SET-DEFAULT-P, the default separator value used for new outlines is also set to this new value.

`kview:set-label-type {C-c C-l}`
: Change kview's label display type to NEW-TYPE, updating all displayed labels. See documentation for the `kview:default-label-type` variable, for valid values of NEW-TYPE.

`kvspec:activate {C-c C-v}`
: Activate optional VIEW-SPEC or existing view specification over the current koutline. VIEW-SPEC must be a string. See '`<${hyperb:dir}/kotl/EXAMPLE.kotl#2b17=048>`' for details on valid view specs.

`kvspec:toggle-blank-lines {C-c b}`
: Toggle blank lines between cells on or off.

Appendix E Smart Key Reference

This appendix documents Hyperbole's context-sensitive Smart Key operations. It is quite extensive and is meant for reference rather than sequential reading. See Chapter 3 [Smart Keys], page 12, for a description of the Smart Keys. That section also describes how to get context-sensitive Smart Key help, with which you can explore Smart Key operation bit by bit.

What a Smart Key does depends on the context in which it is used. Smart Key operations are context-sensitive. Contexts are defined by logic conditionals, e.g. when depressed here, if this is true, etc. Each Smart Key context is listed in the order in which it will be checked. The first matching context is always the one applied. Within each context, the actions performed by the Action and Assist Keys are given.

E.1 Smart Mouse Keys

The contexts and actions in this section, like drags and modeline clicks, apply only if you have mouse support within Hyperbole. The Smart Key operations in Section E.2 [Smart Keyboard Keys], page 130, apply to both mouse and keyboard Smart Key usage.

The following section documents what the Smart Mouse Keys do in each context, with the contexts listed in decreasing order of priority, i.e. the first context to match is the one that is used. If no matching mouse key context is found, then the keyboard key contexts are searched in order.

E.1.1 Minibuffer Menu Activation

When clicked within an inactive minibuffer:

ACTION KEY
: The Hyperbole minibuffer menu is displayed for selection, by default.
The variable `action-key-minibuffer-function` controls this behavior.

ASSIST KEY
: The buffer, window and frame jump menu is displayed for selection, by default. You can jump to buffers categorized by major mode, jump to windows by buffer name, or to frames by name. Manage your windows and frames quickly with this menu as well. This is the same menu that a click in a blank area of the modeline displays by default since they are typically so close together. The variable `assist-key-minibuffer-function` controls this behavior.

E.1.2 Thing Selection

In a programming or markup language buffer, when pressed/clicked at the start or end of a delimited thing (including lists, comments, strings, arrays/vectors, sets, functions and markup pair tags in a markup language), and not at the end of a line:

ACTION KEY
: Marks the thing for editing.

ASSIST KEY
: Marks and kills the thing for yanking elsewhere.

Note that the press must be on the first character of the delimiter of the thing.

There are also *drag* actions that work on delimited things. Delimited things include parenthesized lists, single and double quoted strings, bracketed arrays/vectors, sets with braces, programming language functions and markup pair tags (e.g.   in HTML).

If no region is selected when the Action Mouse Key is dragged from a thing delimiter to another location, it copies the delimited thing to the release point of the drag. The release location may be in the same or a different buffer but if in the same buffer it must be outside of the delimited thing itself. Similarly, the Assist Mouse Key kills (cuts) the delimited thing at its original location and yanks (pastes) it at the new location.

The start of the drag must be on the first character of the starting or ending delimiter. For strings and comments, the drag must start on the first line of the thing.

Experiment with these drag actions and you will quickly find them easy to use and indispensable.

E.1.3 Side-by-Side Window Resizing

If dragged from a side-by-side window edge or from the immediate left of a vertical scroll bar:

ACTION KEY or ASSIST KEY

Resizes adjacent window sides to the point of the drag release.

E.1.4 Modeline Clicks and Drags

If depressed within a window modeline:
ACTION MOUSE KEY

(1) clicked on the first blank character of a window's modeline, the window's buffer is buried (placed at the bottom of the buffer list);

(2) clicked on the right edge of a window's modeline, the Info buffer is displayed, or if it is already displayed and the modeline clicked upon belongs to a window displaying Info, the Info buffer is hidden;

(3) clicked on the buffer id of a window's modeline, dired is run on the current directory, replacing the window's buffer; successive clicks walk up the directory tree

(4) clicked anywhere within the middle of a window's modeline, the function given by `action-key-modeline-function` is called;

(5) dragged vertically from a modeline to within a window, the modeline is moved to the point of the drag release, thereby resizing its window and potentially its vertically neighboring windows;

(6) dragged other than straight vertically from a modeline to another window, duplicate the modeline's window buffer to the window of release;

(7) dragged from a bottommost modeline when the frame has a non-nil `drag-with-mode-line` property, then move the frame until release of the Action Mouse Key;

(8) otherwise, dragged from a another modeline to outside of Emacs (MacOS only), create a new frame sized to match the selected window with the same buffer.

ASSIST MOUSE KEY
(1) clicked on the first blank character of a window's modeline, the bottom buffer in the buffer list is unburied and placed in the window;
(2) clicked on the right edge of a window's modeline, the summary of Smart Key behavior is displayed, or if it is already displayed and the modeline clicked upon belongs to a window displaying the summary, the summary buffer is hidden;
(3) clicked on the buffer id of a window's modeline, the next buffer in sequence is displayed in the window;
(4) clicked anywhere within the middle of a window's modeline, the function given by `assist-key-modeline-function` is called;
(5) dragged vertically from a modeline to within a window, the modeline is moved to the point of the drag release, thereby resizing its window and potentially its vertically neighboring windows;
(6) dragged other than straight vertically from a modeline to another window, swap buffers in the two windows;
(7) dragged from a bottommost modeline when the frame has a non-nil `drag-with-mode-line` property, then move the frame until release of the Action Mouse Key;
(8) dragged from a modeline to outside of Emacs (MacOS only), create a new frame sized to match the selected window with the same buffer. If there is only one window in the source frame or if `hycontrol-keep-window-flag` is non-nil, leave the original window and just clone it into the new frame; otherwise, delete the original window.

If dragged from a window and released within a window modeline:
ACTION KEY
(1) If depress was on a buffer name in Buffer-menu/ibuffer mode or on a file/directory in dired mode, splits the release window and displays the item in the original release window.
(2) Otherwise, splits the release window and displays the depress window's buffer in the original release window.
ASSIST KEY
Swaps buffers in the two windows.

E.1.5 Smart Mouse Drags between Windows

If an active (highlighted) region exists within the editor:
ACTION KEY
Copies and yanks (pastes) the region to the release point in a different window.
ASSIST KEY
Kills (cuts) and yanks (pastes) the region to the release point in a different window.

Otherwise, if dragged from inside one window to another:
ACTION AND ASSIST KEYS
(1) If depress was on a buffer name in Buffer-menu/ibuffer mode or on a file/directory in dired mode, displays the item in window of release. If the drag start position is within a button, displays the button referent in window of release.
See `hmouse-drag-item-mode-forms` for how to allow for draggable items in other modes.
(2) Otherwise, creates a new link button at the drag start location, linked to the drag end location. Action Key creates an implicit button; Assist Key creates an explicit button.

In Hyperbole versions prior to 9, Assist Key drags between windows would swap buffers. In version 9 and above, start or end the drag between windows on a modeline to get this same behavior.

E.1.6 Smart Mouse Drags within a Window

If a region is active and a drag occurs within a single buffer/window:
ACTION KEY
Restores region to before Action Key drag and signals an error.
ASSIST KEY
Restores region to before Action Key drag and signals an error.

(Note that `hmouse-x-drag-sensitivity` sets the minimal horizontal movement which registers a drag). If dragged horizontally within a single window from anywhere but a thing delimiter:
ACTION KEY
Splits the current window, adding a window below.
ASSIST KEY
Deletes the current window if it is not the sole window in the current frame.

(Note that `hmouse-y-drag-sensitivity` sets the minimal vertical movement which registers a drag). If dragged vertically within a single window from anywhere but a thing delimiter:
ACTION KEY
Splits the current window, adding a window to the right.
ASSIST KEY
Deletes the current window if it is not the sole window in the current frame.

If dragged diagonally within a single window while depressed
('hmouse-x-diagonal-sensitivity' and 'hmouse-y-diagonal-sensitivity' set
the minimal diagonal movements which register a drag):
ACTION KEY
Saves the window configuration for the selected frame onto a ring
of window configurations.
ASSIST KEY
Restores the prior window configuration from the ring. A prefix
argument N specifies the Nth prior configuration from the ring.

E.1.7 Smart Mouse Drags outside a Window

If dragged from an Emacs window to outside of Emacs:
ACTION KEY
(1) If depress was on a buffer name in Buffer-menu/ibuffer mode or on
a file/directory in dired mode, display the item in a new frame.
See `hmouse-drag-item-mode-forms` for how to allow for draggable
items in other modes.
(2) If depress was anywhere else, create a new frame sized to match the
selected window with the same buffer.
ASSIST KEY
Create a new frame sized to match the selected window with the same buffer.
If there is only one window in the source frame or if `hycontrol-keep-window-flag`
is non-nil, leave the original window and just clone it into the new frame;
otherwise, delete the original window.

E.2 Smart Keyboard Keys

E.2.1 Smart Key - Company Mode

Company mode is an extensive in-buffer completion framework, often used to complete programming identifiers.

When company-mode is active:
ACTION KEY
Displays selected item's definition.
ASSIST KEY
Displays the documentation, if any, for the selected item.

E.2.2 Smart Key - Org Mode

When in an Org mode context and `hsys-org-enable-smart-keys` is non-nil:
ACTION KEY

(1) If on an Org todo keyword, cycle through the keywords in that set or if final done keyword, remove it.

(2) If on an Org agenda view item, jump to the item for editing.

(3) Within a radio or internal target or a link to it, jump between the target and the first link to it, allowing two-way navigation.

(4) Follow other internal links and ID references in Org mode files.

(5) Follow Org mode external links.

(6) When on a Hyperbole button, activate the button.

(7) With point on the :dir path of a code block definition, display the directory given by the path.

(8) With point on any #+BEGIN_SRC, #+END_SRC, #+RESULTS, #+begin_example or #+end_example header, execute the code block via the Org mode standard binding of `{C-c C-c}`, `org-ctrl-c-ctrl-c`.

(9) When point is on an Org mode heading, cycle the view of the subtree at point.

(10) In any other context besides the end of a line, invoke the Org mode standard binding of `{M- RET}`, `org-meta-return`.

When the ASSIST KEY is pressed, it behaves just like the Action Key except in these contexts:

(1) If on an Org todo keyword, move to the first todo keyword in the next set, if any.

(2) If on an Org mode link, ID reference or agenda view item, display Hyperbole context-sensitive help.

(3) On a Hyperbole button, perform the Assist Key function, generally showing help for the button.

(4) With point on the :dir value of a code block definition, display a help summary of this implicit directory button.

(5) With point on any #+BEGIN_SRC, #+END_SRC, #+RESULTS, #+begin_example or #+end_example header, remove source block results.

(6) Not on a Hyperbole button but on an Org mode heading, cycle through views of the whole buffer outline.

Org links may be used outside of Org mode buffers. Such links are handled by the separate implicit button type, `org-link-outside-org-mode`. Org Roam and Org IDs may be activated as hyperbuttons outside of Org mode buffers. They are handled by the separate implicit button type, `org-id`.

E.2.3 Smart Key - Ivy

When an Ivy completion list is active, a press of either Smart Key on a completion candidate selects that one and exits the minibuffer.

E.2.4 Smart Key - Treemacs

Treemacs is an add-on Emacs package that offers a fixed, per-frame, graphical window for hierarchically browsing and operating upon directories, files and programming tags within files. Use the Emacs package manager to install it and then invoke it with `{M-x treemacs RET}` and quit with `{q}`.

Treemacs items may be dragged with the Action Key to other windows for display. See Section 3.7.5.4 [Displaying Items], page 21.

When in a Treemacs file browser buffer:
ACTION KEY or ASSIST KEY
(1) on an entry icon, the treemacs TAB command is run to expand and collapse the entry;
(2) elsewhere within an entry line, the item is displayed for editing, normally in another window;
(3) at the end of an entry line: if an Action Key press, invokes `action-key-eol-function`, typically to scroll up proportionally; if an Assist Key press, invokes `assist-key-eol-function`, typically to scroll down proportionally;
(4) on the first line of the buffer (other than the end of line), dired is run on the current directory of this Treemacs;
(5) at the end of the first or last line of the buffer, this Treemacs invocation is quit.

E.2.5 Smart Key - Dired Sidebar Mode

Dired-sidebar is an add-on Emacs package that puts dired in a sidebar and optionally integrates with various other packages. Use the Emacs package manager to install it and then invoke it with `{M-x dired-sidebar-toggle-sidebar RET}` and quit with `{q}`.

When in a dired-sidebar buffer:
ACTION KEY or ASSIST KEY
(1) within an entry line, the item is displayed for editing, normally in another window, or if it is a directory and 'dired-sidebar-cycle-subtree-on-click' is t it will expand and collapse the entry
(2) at the end of an entry line: invoke 'action-key-eol-function', typically to scroll up proportionally, if an Action Key press; invoke 'assist-key-eol-function', typically to scroll down proportionally, if an Assist Key press;
(3) on the first line of the buffer (other than the end of line), dired is run on the current directory of this dired-sidebar;
(4) at the end of the first or last line of the buffer, this dired-sidebar invocation is hidden.

E.2.6 Smart Key - ERT Results Mode

When in an Emacs Regression Test (ERT) results buffer:
ACTION KEY
Filters `ert-results-mode` test results entries to those matching the result status of the entry at point. Does nothing if there is no entry at point.

With point on any of the statistics lines in the top section of the results buffer, does the following:
Selector: - toggles showing/hiding all test results
Passed: - shows passed tests only
Failed: - shows failed tests only
Skipped: - shows skipped tests only
Total: - shows all tests

ASSIST KEY
Displays help documentation for the `ert-results-mode` test at point, if any. Triggers an error if there is no test result at or before point."

E.2.7 Smart Key - Emacs Pushbuttons

When over an Emacs pushbutton:
ACTION KEY
Performs the button action
ASSIST KEY
Displays the help text for the button, if any.

E.2.8 Smart Key - Argument Completion

When prompting for a Hyperbole argument, a press in the minibuffer:
ACTION KEY
Accepts the current minibuffer argument.
ASSIST KEY
Offers completions for the current minibuffer argument.

When reading a Hyperbole menu item or an argument with completion:
ACTION KEY
Returns the value selected at point if any, else nil. If the value is the same as the contents of the minibuffer, this value is accepted as the argument for which the minibuffer is presently prompting; otherwise, the minibuffer is erased and the value is inserted there, for inspection by the user.
ASSIST KEY
Displays Hyperbole menu item help when an item is selected.

E.2.9 Smart Key - ID Edit Mode

If in ID Edit mode (a package within InfoDock, not included in Hyperbole, that supports rapid marking, killing, copying, yanking and display-management):

ACTION KEY or ASSIST KEY
: Yanks (pastes) last selected region at point.

E.2.10 Smart Key - Emacs Cross-references (Xrefs)

When over an Emacs cross-reference:

ACTION KEY
: Follows the cross-reference to its source definition in another window.

ASSIST KEY
: Displays the cross-reference definition in another window but stays in the current window.

E.2.11 Smart Key - Smart Scrolling

When pressed at the end of a line but not the end of a buffer:

ACTION KEY
: Calls the function given by `action-key-eol-function` whose default value is `smart-scroll-up`. This scrolls up according to the value of `smart-scroll-proportional`. If `smart-scroll-proportional` is nil or if point is on the top window line, it scrolls up (forward) a windowful. Otherwise, it tries to bring the current line to the top of the window, leaving point at the end of the line and returning t if scrolled, nil if not. To disable this behavior entirely, evaluate this line:
`(customize-set-variable 'action-key-eol-function #'ignore)`

ASSIST KEY
: Calls the function given by `assist-key-eol-function` whose default value is `smart-scroll-down`. This scrolls down according to the value of `smart-scroll-proportional`. If `smart-scroll-proportional` is nil or if point is on the bottom window line, it scrolls down (backward) a windowful. Otherwise, it tries to bring the current line to the bottom of the window, leaving point at the end of the line and returning t if scrolled, nil if not. To disable this behavior entirely, evaluate this line:
`(customize-set-variable 'assist-key-eol-function #'ignore)`

E.2.12 Smart Key - Smart Menus

Smart Menus are an older in-buffer menu system that worked on dumb terminals and predated Emacs' own dumb terminal menu support. They are included with InfoDock (which is no longer maintained) and are not available separately. They are not a part of Hyperbole and are not necessary for its use.

When pressed on a Smart Menu item (this is an older in-buffer menu
system that pre-dates Emacs' own menus):
ACTION KEY
Activates the item.
ASSIST KEY
Displays help for the item.

If the Smart Menu package (part of InfoDock) has been loaded and
'hkey-always-display-menu' is non-nil:
ACTION KEY or ASSIST KEY
Pops up a window with a Smart Menu of commands.
The menu displayed is selected by (smart-menu-choose-menu).

E.2.13 Smart Key - Dired Mode

If pressed within a dired-mode (directory editor) buffer:
ACTION KEY
(1) within an entry line, the selected file/directory is displayed
for editing, normally in another window but if an entry has been dragged
for display in another window, then this entry is displayed in the current
window (DisplayHere minor mode is shown in the mode-line; use `{g}` to
disable it)
(2) on a dired header line (other than the end of line):
(a) within the leading whitespace, then if any deletes are to be
performed, they are executed after user verification; otherwise,
nothing is done;
(b) otherwise, dired is run in another window on the ancestor directory
of the current directory path up through the location of point; if
point is on the first character, then the / root directory is used.
(3) on or after the last line in the buffer, this dired invocation is quit.

ASSIST KEY
(1) on a ~ character, all backup files in the directory are marked for deletion;
(2) on a # character, all auto-save files in the directory are marked for
deletion;
(3) anywhere else within an entry line, the current entry is marked for deletion;
(4) on or after the last line in the buffer, all delete marks on all entries are
undone.

E.2.14 Smart Key - Hyperbole Buttons

When pressed on a Hyperbole button:
ACTION KEY
Activates the button.
ASSIST KEY
Displays help for the button, typically a summary of its
attributes.

E.2.15 Smart Key - View Mode

If pressed within a buffer in View major or minor mode:

ACTION KEY

Scrolls the buffer forward a windowful. If at the last line of the buffer, instead quits from view mode.

ASSIST KEY

Scrolls the buffer backward a windowful.

E.2.16 Smart Key - Helm Mode

Because of the way helm is written, you may need a modified version of helm for these Smart Key actions to work. Try them in your own version and if there are any issues, install helm from `github.com/rswgnu/helm`.

If pressed within a buffer in helm major mode:

ACTION KEY

(1) at the end of the buffer, quits from helm and exits the minibuffer;
(2) on a candidate line, performs the candidate's first action and remains in the minibuffer;
(3) on the top, fixed header line, toggles display of the selected candidate's possible actions;
(4) on an action list line, performs the action after exiting the minibuffer;
(5) on a source section header, moves to the next source section or first if on last;
(6) on a candidate separator line, does nothing;
(7) in the minibuffer window, ends the helm session and performs the selected item's action.

ASSIST KEY

(1) at the end of the buffer, quits from helm and exits the minibuffer;
(2) on a candidate line, display's the candidate's first action and remains in the minibuffer;
(3) on the top, fixed header line, toggles display of the selected candidate's possible actions;
(4) on an action list line, performs the action after exiting the minibuffer;
(5) on a source section header, moves to the previous source section or last if on first;
(6) on a candidate separator line, does nothing;
(7) in the minibuffer window, ends the helm session and performs the selected item's action.

E.2.17 Smart Key - Delimited Things

In a programming or markup language buffer, when pressed/clicked at the start or end of a delimited thing (including lists, comments, strings, arrays/vectors, sets, functions and markup pair tags in a markup language), and not at the end of a line:

ACTION KEY
  Marks the thing for editing.

ASSIST KEY
  Marks and kills the thing for yanking elsewhere.

Note that the press must be on the first character of the delimiter of the thing.

There are also drag actions that work on delimited things. If no region is selected, when the Action Mouse Key is dragged from a thing delimiter to another location, it copies the thing and yanks it at the new location. Similarly, the Assist Mouse Key kills the thing at its original location and yanks it at the new location.

E.2.18 Smart Key - The Koutliner

When pressed within a Hyperbole Koutliner buffer (kotl-mode):

ACTION KEY
  (1) at the end of the buffer, uncollapses and unhides all cells in the view;
  (2) within a cell, if its subtree is hidden then shows it, otherwise hides it;
  (3) between cells or within the read-only indentation region to the left of a cell, begins creation of a klink to some other outline cell; press the Action Key twice on another cell to select the link referent cell;
  (4) anywhere else, scrolls up a windowful.

ASSIST KEY
  (1) at the end of the buffer, collapses all cells and hides all non-level-one cells;
  (2) on a header line but not at the beginning or end, displays the properties of each following cell in the koutline, starting with the cell at point;
  (3) between cells or within the read-only indentation region to the left of a cell, prompts to move one tree to a new location in the outline; press the Action Key twice to select the tree to move and where to move it;
  (4) anywhere else, scrolls down a windowful.

E.2.19 Smart Key - RDB Mode

If pressed within an rdb-mode buffer which manipulates in-memory,
relational databases (part of InfoDock):

ACTION KEY

(1) on the name of a relation, the relation's full table is shown;
(2) on an attribute name, all attribute columns aside from this one
are removed from the relation display;
(3) to the left of a tuple (row), the tuple is removed from the display;
(4) on an attribute value, all tuples (rows) which do not contain
the selected attribute value are removed from the current table display;
(5) on or after the last line in the buffer, the current database is redisplayed;
(6) anywhere else (except the end of a line), the last command is undone."

ASSIST KEY

(1) on the name of a relation, the relation is removed from the display;
(2) on an attribute name, the attribute column is removed from the relation
display;
(3) to the left of a tuple (row), the tuple is removed from the display;
(4) on an attribute value, all tuples with the same attribute value are
removed from the display."

E.2.20 Smart Key - Help Buffers

When pressed at the end of a Help buffer:

ACTION KEY or ASSIST KEY

Restores the window configuration prior to the help display.

E.2.21 Smart Key - Custom Mode

When pressed within Custom-mode for editing customizations: ACTION KEY (1) on the last line of the buffer, exit Custom mode, potentially prompting to save any changes; (2) at the end of any other line, scroll the window down down a windowful; (3) if a mouse event on a widget, activate the widget or display a menu; (4) anywhere else, execute the command bound to `RET`. ASSIST KEY (1) on the last line of the buffer, exit Custom mode, potentially prompting to save any changes; (2) at the end of any other line, scroll the window down down a windowful; (3) if a mouse event on a widget, activate the widget or display a menu; (4) anywhere else, execute the command bound to `RET`.

E.2.22 Smart Key - Bookmark Mode

Bookmark-bmenu-mode lists existing per-user Emacs bookmarks, which each link to a particular file location.

When pressed on a bookmark-bmenu-mode entry line:

ACTION KEY

Jumps to the file point linked to by the bookmark.

ASSIST KEY

Shows what the Action Key does in this context.

E.2.23 Smart Key - Pages Directory Mode

Pages-directory-mode is used in special buffers that contain title lines extracted from files consisting of titled, page-delimited contents, e.g. Info files.

When pressed on a pages-directory-mode entry line:

ACTION KEY

Jumps to the associated line in the pages file that contains the entry.

ASSIST KEY

Jumps to the associated line in the pages file that contains the entry.

E.2.24 Smart Key - Python Source Code

When the Jedi identifier server or the OO-Browser has been loaded and the press is within a Python buffer:

ACTION KEY or ASSIST KEY

Jumps to the definition of the selected Python construct:
(1) on an 'import' line, the referent is displayed;
(2) within a method declaration, its definition is displayed;
(3) on a class name, the class definition is shown;
(4) on a unique identifier reference, its definition is shown (when possible).

When pressed within a Python source code file (without the OO-Browser):

ACTION KEY

Jumps to the definition of the selected Python identifier, assuming the identifier is found within an "etags" generated tags file within the current directory or any of its ancestor directories.

ASSIST KEY

Jumps to the next tag matching an identifier at point.

E.2.25 Smart Key - C Source Code

When pressed within a C source code file:
ACTION KEY
Jumps to the definition of a selected C construct:
(1) on a #include statement, the include file is displayed; this looks for include files using the directory lists 'smart-c-cpp-include-path' and 'smart-c-include-path';
(2) on a C identifier, the identifier definition is displayed, assuming the identifier is found within an "etags" generated tags file within the current directory or any of its ancestor directories;
(3) if 'smart-c-use-lib-man' is non-nil (see its documentation), the C identifier is recognized as a library symbol, and a man page is found for the identifier, then the man page is displayed.
ASSIST KEY
Jumps to the next tag matching an identifier at point.

E.2.26 Smart Key - C++ Source Code

When the OO-Browser has been loaded and the press is within a C++ buffer:
ACTION KEY or ASSIST KEY
Jumps to the definition of the selected C++ construct via OO-Browser support.
(1) on a #include statement, the include file is displayed; this looks for include files using the directory lists 'smart-c-cpp-include-path' and 'smart-c-include-path';
(2) within a method definition before the opening brace, its declaration is displayed;
(3) within a method declaration, its definition is displayed;
(4) on a class name, the class definition is shown;
(5) on a member reference (past any :: scoping operator), the member definition or a listing of possible definitions or a matching declaration (if no definitions exist within the Environment) is shown;
(6) on a global variable or function identifier, its definition is shown.

When pressed within a C++ source code file (without the OO-Browser):
ACTION KEY
Jumps to the definition of the selected C++ construct:
(1) on a #include statement, the include file is displayed;
this looks for include files using the directory lists
'smart-c-cpp-include-path' and
'smart-c-include-path';
(2) on a C++ identifier, the identifier definition is displayed,
assuming the identifier is found within an "etags" generated
tags file in the current directory or any of its ancestor
directories;
(3) if 'smart-c-use-lib-man' is non-nil (see its documentation),
the C++ identifier is recognized as a library symbol, and a man
page is found for the identifier, then the man page is
displayed.
ASSIST KEY
Jumps to the next tag matching an identifier at point.

E.2.27 Smart Key - Assembly Source Code

When pressed within an assembly source code file:
ACTION KEY
Jumps to the definition of the selected assembly construct:
(1) on an include statement, the include file is displayed;
this looks for include files using the directory list
'smart-asm-include-path';
(2) on an identifier, the identifier definition is displayed,
assuming the identifier is found within an "etags" generated
tags file within the current directory or any of its ancestor
directories.
ASSIST KEY
Jumps to the next tag matching an identifier at point.

E.2.28 Smart Key - Lisp Source Code

When pressed on a Lisp symbol within any of these types of buffers
(Lisp code, debugger, compilation, *Warnings*, *Flymake log* and *Flymake
diagnostics, help or change-log-mode buffers) on an Emacs Lisp bound
identifier:
ACTION KEY
Jumps to the definition of any selected Lisp construct. This includes
Hyperbole implicit button type and action type references. If on an
Emacs Lisp require, load, or autoload clause and the (find-library)
function is defined, jumps to the library source, if possible.
ASSIST KEY
Jumps to the next tag matching an identifier at point or if
the identifier is an Emacs Lisp symbol, then this displays the
documentation for the symbol.

E.2.29 Smart Key - Java Source Code

When the OO-Browser has been loaded and the press is within a Java buffer:

ACTION KEY or ASSIST KEY

Jumps to the definition of the selected Java construct:
(1) within a commented @see cross-reference, the referent is displayed;
(2) on a package or import statement, the referent is displayed; this looks for referent files using the directory list 'smart-java-package-path';
(3) within a method declaration, its definition is displayed;
(4) on a class name, the class definition is shown;
(5) on a unique identifier reference, its definition is shown (when possible).

When pressed within a Java source code file (without the OO-Browser):

ACTION KEY

Jumps to the definition of the selected Java construct:
(1) within a commented @see cross-reference, the referent is displayed;
(2) on a package or import statement, the referent is displayed; this looks for referent files using the directory list 'smart-java-package-path';
(3) on a Java identifier, the identifier definition is displayed, assuming the identifier is found within an "etags" generated tags file within the current directory or any of its ancestor directories.

ASSIST KEY

Jumps to the next tag matching an identifier at point.

E.2.30 Smart Key - JavaScript Source Code

When pressed within a JavaScript source code file:

ACTION KEY

Jumps to the definition of the selected JavaScript identifier, assuming the identifier is found within an "etags" generated tags file within the current directory or any of its ancestor directories.

ASSIST KEY

Jumps to the next tag matching an identifier at point.

E.2.31 Smart Key - Objective-C Source Code

When the OO-Browser has been loaded and the press is within a Objective-C buffer:

ACTION KEY or ASSIST KEY

Jumps to the definition of the selected Objective-C construct via OO-Browser support.

(1) on a #import or #include statement, the include file is displayed; this looks for include files using the directory lists 'objc-cpp-include-path' and 'objc-include-path';
(2) within a method declaration, its definition is displayed;
(3) on a class name, the class definition is shown;
(4) on a member reference (past any :: scoping operator), the member definition or a listing of possible definitions is shown;
(5) on a global variable or function identifier, its definition is shown.

When pressed within an Objective-C source code file (without the OO-Browser):

ACTION KEY

Jumps to the definition of the selected Objective-C construct:

(1) on a #import or #include statement, the include file is displayed; this looks for include files using the directory lists 'objc-cpp-include-path' and 'objc-include-path';
(2) on an Objective-C identifier, the identifier definition is displayed, assuming the identifier is found within an "etags" generated tags file in the current directory or any of its ancestor directories;
(3) if 'smart-c-use-lib-man' is non-nil (see its documentation), the Objective-C identifier is recognized as a library symbol, and a man page is found for the identifier, then the man page is displayed.

ASSIST KEY

Jumps to the next tag matching an identifier at point.

E.2.32 Smart Key - Fortran Source Code

When pressed within a Fortran source code file:

ACTION KEY or ASSIST KEY

If on an identifier, the identifier definition (or a definition in which the identifier appears) is displayed, assuming the identifier is found within an "etags" generated tags file in the current directory or any of its ancestor directories.

E.2.33 Smart Key - Identifier Menu Mode

This works only for identifiers defined within the same source file in which they are referenced. It requires either Emacs' imenu library and it requires that an index of identifiers has been built for the current buffer. Other handlers handle identifier references and definitions across multiple files.

When pressed on an identifier name after an identifier index has been generated:

ACTION KEY

Jumps to the source definition within the current buffer of the identifier at point.

ASSIST KEY

Prompts with completion for an identifier defined within the buffer and then jumps to the its source definition.

E.2.34 Smart Key - Occurrence Matches

When pressed within an occur-mode, moccur-mode or amoccur-mode buffer:

ACTION KEY or ASSIST KEY

Jumps to the source buffer and line of the current occurrence.

E.2.35 Smart Key - Calendar Mode

When pressed within a calendar-mode buffer:

ACTION KEY

(1) at the end of the buffer, the calendar is scrolled forward 3 months;
(2) to the left of any dates on a calendar line, the calendar is scrolled backward 3 months;
(3) on a date, the diary entries for the date, if any, are displayed.

ASSIST KEY

(1) at the end of the buffer, the calendar is scrolled backward 3 months;
(2) to the left of any dates on a calendar line, the calendar is scrolled forward 3 months;
(3) anywhere else, all dates with marking diary entries are marked in the calendar window.

E.2.36 Smart Key - Man Page Apropos

When pressed within a man page apropos buffer or listing:

ACTION KEY

(1) on a UNIX man apropos entry, the man page for that entry is displayed in another window;

(2) on or after the last line, the buffer in the other window is scrolled up a windowful.

ASSIST KEY

(1) on a UNIX man apropos entry, the man page for that entry is displayed in another window;

(2) on or after the last line, the buffer in the other window is scrolled down a windowful.

E.2.37 Smart Key - Emacs Outline Mode

If pressed within an outline-mode buffer or when no other context is matched and outline-minor-mode is enabled:

ACTION KEY

Collapses, expands, and moves outline entries.

(1) after an outline heading has been cut via the Action Key, pastes the cut heading at point;

(2) at the end of the buffer, shows all buffer text;

(3) at the beginning of a heading line, cuts the headings subtree from the buffer;

(4) on a header line but not at the beginning or end of the line, if the headings subtree is hidden, shows it, otherwise hides it;

(5) at the end of a line, invokes `action-key-eol-function`, typically to scroll up a windowful.

ASSIST KEY

(1) after an outline heading has been cut via the Action Key, allows multiple pastes throughout the buffer (the last paste should be done with the Action Key, not the Assist Key);

(2) at the end of the buffer, hides all bodies in the buffer;

(3) at the beginning of a heading line, cuts the current heading (sans subtree) from the buffer;

(4) on a header line but not at the beginning or end, if the heading body is hidden, shows it, otherwise hides it;

(5) at the end of a line, invokes `assist-key-eol-function`, typically to scroll down a windowful.

E.2.38 Smart Key - Info Manuals

If pressed within an Info manual node:
ACTION KEY
(1) on the first line of an Info Menu Entry or Cross Reference, the referenced node is displayed;
(2) on the Up, Next, or Previous entries of a Node Header (first line), the referenced node is displayed;
(3) on the File entry of a Node Header (first line), the Top node within that file is displayed;
(4) at the end of the current node, the next node is displayed (this descends subtrees if the function (Info-global-next) is bound);
(5) anywhere else (e.g. at the end of a line), the current node is scrolled up a windowful.

ASSIST KEY
(1) on the first line of an Info Menu Entry or Cross Reference, the referenced node is displayed;
(2) on the Up, Next, or Previous entries of a Node Header (first line), the last node in the history list is found;
(3) on the File entry of a Node Header (first line), the DIR root-level node is found;
(4) at the end of the current node, the previous node is displayed (this returns from subtrees if the function (Info-global-prev) is bound);
(5) anywhere else (e.g. at the end of a line), the current node is scrolled down a windowful.

Use `{s}` within an Info manual to search for any concept that interests you.

E.2.39 Smart Key - Email Readers

If pressed within a Hyperbole-supported mail reader (defined by 'hmail:reader') or a mail summary (defined by 'hmail:lister') buffer:
ACTION KEY
(1) in a msg buffer within the first line of a message or at the end of a message, the next undeleted message is displayed;
(2) in a msg buffer within the first line of an Info cross reference, the referent is displayed;
(3) anywhere else within a msg buffer, the window is scrolled up one windowful;
(4) in a msg summary buffer on a header entry, the message corresponding to the header is displayed in the msg window;
(5) in a msg summary buffer, on or after the last line, the messages marked for deletion are expunged.

ASSIST KEY
(1) in a msg buffer within the first line or at the end of a message, the previous undeleted message is displayed;
(2) in a msg buffer within the first line of an Info cross reference, the referent is displayed;
(3) anywhere else within a msg buffer, the window is scrolled down one windowful;
(4) in a msg summary buffer on a header entry, the message corresponding to the header is marked for deletion;
(5) in a msg summary buffer on or after the last line, all messages are marked undeleted.

E.2.40 Smart Key - GNUS Newsreader

If pressed within the Gnus newsgroups listing buffer:
ACTION KEY
(1) on a GNUS-GROUP line, that newsgroup is read;
(2) if 'gnus-topic-mode' is active, and on a topic line, the topic is expanded or collapsed as needed;
(3) to the left of any GNUS-GROUP line, within any of the whitespace, the current group is unsubscribed or resubscribed;
(4) at the end of the GNUS-GROUP buffer after all lines, the number of waiting messages per group is updated.

ASSIST KEY
(1) on a GNUS-GROUP line, that newsgroup is read;
(2) if 'gnus-topic-mode' is active, and on a topic line, the topic is expanded or collapsed as needed;
(3) to the left of any GNUS-GROUP line, within any of the whitespace, the user is prompted for a group name to subscribe or unsubscribe to;
(4) at the end of the GNUS-GROUP buffer after all lines, the newsreader is quit.

If pressed within a Gnus newsreader subject listing buffer:
ACTION KEY
(1) on a GNUS-SUBJECT line, that article is read, marked deleted, and scrolled forward;
(2) at the end of the GNUS-SUBJECT buffer, the next undeleted article is read or the next group is entered.

ASSIST KEY
(1) on a GNUS-SUBJECT line, that article is read and scrolled backward;
(2) at the end of the GNUS-SUBJECT buffer, the group is exited and the user is returned to the group listing buffer.

If pressed within a Gnus newsreader article buffer:
ACTION KEY
(1) on the first line or at the end of an article, the next unread message is displayed;
(2) on the first line of an Info cross reference, the referent is displayed;
(3) anywhere else, the window is scrolled up a windowful.

ASSIST KEY
(1) on the first line or end of an article, the previous message is displayed;
(2) on the first line of an Info cross reference, the referent is displayed;
(3) anywhere else, the window is scrolled down a windowful.

E.2.41 Smart Key - Buffer Menus

If pressed within a listing of buffers (Buffer-menu-mode):
ACTION KEY
(1) on the first column of an entry, the selected buffer is marked for display;
(2) on the second column of an entry, the selected buffer is marked for saving;
(3) anywhere else within an entry line, all saves and deletes are done, and selected buffers are displayed, including the one just clicked on (if in the OO-Browser, only the selected buffer is displayed);
(4) on or after the last line in the buffer, all saves and deletes are done.

ASSIST KEY
(1) on the first or second column of an entry, the selected buffer is unmarked for display and for saving or deletion;
(2) anywhere else within an entry line, the selected buffer is marked for deletion;
(3) on or after the last line in the buffer, all display, save, and delete marks on all entries are undone.

If pressed within an interactive buffer menu (ibuffer-mode):
ACTION KEY
(1) on the first or second column of an entry, the selected buffer is marked for display;
(2) anywhere else within an entry line, all saves and deletes are done, and selected buffers are displayed, including the one just clicked on (if within the OO-Browser user interface, only the selected buffer is displayed);
(3) on the first or last line in the buffer, all deletes are done.

ASSIST KEY
(1) on the first or second column of an entry, the selected buffer is unmarked for display or deletion;
(2) anywhere else within an entry line, the selected buffer is marked for deletion;
(3) on the first or last line in the buffer, all display, save, and delete marks on all entries are undone.

E.2.42 Smart Key - Tar File Mode

If pressed within a tar-mode buffer:
ACTION KEY
(1) on an entry line, the selected file/directory is displayed for editing in the other window;
(2) on or after the last line in the buffer, if any deletes are to be performed, they are executed after user verification; otherwise, this tar file browser is quit.

ASSIST KEY
(1) on an entry line, the current entry is marked for deletion;
(2) on or after the last line in the buffer, all delete marks on all entries are undone.

E.2.43 Smart Key - Man Pages

If pressed on a cross reference within a man page entry section labeled NAME, SEE ALSO, or PACKAGES USED, or within a man page C routine specification (see 'smart-man-c-routine-ref') and the man page buffer has either an attached file or else a man-path local variable containing its pathname:
ACTION KEY or ASSIST KEY
Displays the man page or source code for the cross reference.

E.2.44 Smart Key - WWW URLs

If pressed on a World-Wide Web universal resource locator (URL):
ACTION KEY
Displays the referent for the URL at point using the web browser given by the variable, `browse-url-browser-function`. Adjust this setting with the Cust/URL-Display `{C-h h c u}` menu.
ASSIST KEY
Displays help for the ACTION KEY.

E.2.45 Smart Key - HyRolo Match Buffers

If pressed within an entry in the HyRolo search results buffer:
ACTION KEY or ASSIST KEY
The entry is edited in the other window.

E.2.46 Smart Key - Image Thumbnails

If pressed within a Dired Image Thumbnail buffer:
ACTION KEY
Selects the chosen thumbnail and scales its image for display in another Emacs window.
ASSIST KEY
Selects thumbnail and uses the external viewer named by `image-dired-external-viewer`
to display it.

E.2.47 Smart Key - Gomoku Game

If pressed within a Gomoku game buffer:
ACTION KEY
Makes a move to the selected space.
ASSIST KEY
Takes back a prior move made at the selected space.

E.2.48 Smart Key - Magit Mode

If pressed within a Magit buffer and not on a button:
ACTION KEY
(1) on the last line, quit from the magit mode (`{q}` key binding);
(2) at the end of a line, scroll up a windowful;
(3) on an initial read-only header line, cycle visibility of diff sections;
(4) anywhere else, hide/show the thing at point (`{ TAB}` key binding)
unless that does nothing in the mode, then jump to the thing at point
(`{ RET}` key binding) but display based on the value of
`hpath:display-where`.
ASSIST KEY
(1) on the last line, quit from the magit mode (`{q}` key binding);
(2) at the end of a line, scroll down a windowful;
(3) on an initial read-only header line, cycle visibility of all sections;
(4) anywhere else, jump to the thing at point (`{ RET}` key binding)
but display based on the value of `hpath:display-where`."

E.2.49 Smart Key - The OO-Browser

If pressed within an OO-Browser implementors, elements or OOBR-FTR tags
buffer after an OO-Browser Environment has been loaded:
ACTION KEY
Jumps to the definition of the item at point.
ASSIST KEY
Displays help for the Action Key context at point.

When pressed within an OO-Browser listing window:
ACTION KEY
(1) in a blank buffer or at the end of a buffer, browser help information is displayed in the viewer window;
(2) on a default class name, the statically defined instances of the default class are listed;
(3) at the beginning of a (non-single char) class name, the class' ancestors are listed;
(4) at the end of an entry line, the listing is scrolled up;
(5) on the '...', following a class name, point is moved to the class descendency expansion;
(6) before an element entry, the element's implementors are listed;
(7) anywhere else on an entry line, the source is displayed for editing.

ASSIST KEY
(1) in a blank buffer, a selection list of buffer files is displayed;
(2) on a default class name, the statically defined instances of the default class are listed;
(3) at the beginning of a (non-single char) entry, the class' descendants are listed;
(4) at the end of an entry line, the listing is scrolled down;
(5) on the '...', following a class name, point is moved to the class expansion;
(6) anywhere else on a class entry line, the class' elements are listed;
(7) anywhere else on an element line, the element's implementors are listed;
(8) on a blank line following all entries, the current listing buffer is exited.

When pressed within the OO-Browser Command Help Menu Buffer:
ACTION KEY
Executes an OO-Browser command whose key binding is at point.
ASSIST KEY
Displays help for an OO-Browser command whose key binding is at point.

When pressed on an identifier within an OO-Browser source file:
ACTION KEY
Tries to display the identifier definition.
ASSIST KEY
Does nothing.

E.2.50 Smart Key - Todotext Mode

todotxt-mode is an add-on package for editing todo.txt files using the todotxt-format. For the file format see http://todotxt.org/.

If pressed within a Todotext mode buffer:
ACTION KEY
(1) at the end of buffer, bury the buffer.
(2) on a todo item, toggle the completion status of the todo item
ASSIST KEY
(1) at the end of buffer, archive all completed todo items
(2) on a todo item, edit the item

E.2.51 Smart Key - Default Context

Finally, if pressed within an unrecognized context:
ACTION KEY
Runs the function stored in `action-key-default-function`. By default, it just displays an error message. Set it to `hyperbole` if you want it to display the Hyperbole minibuffer menu or `hyperbole-popup-menu` to popup the Hyperbole menubar menu.
ASSIST KEY
Runs the function stored in `assist-key-default-function`. By default, it just displays an error message. Set it to `hkey-summarize` if you want it to display a summary of Smart Key behavior.

Appendix F Suggestion or Bug Reporting

If you find any errors in Hyperbole's operation or documentation, feel free to report them to <bug-hyperbole@gnu.org>. Be sure to use the `{C-h h m r}` Msg/Report-Hypb-Bug minibuffer menu item whenever you send a message to this address since that command will insert important system version information for you.

If you use Hyperbole mail or news support (see Section 4.7.6 [Buttons in Mail], page 45), a press of your Action Key on the Hyperbole mail list address will insert a description of your Hyperbole configuration information into your outgoing message, so that you do not have to type it. Otherwise, be sure to include the version numbers of your editor, Hyperbole and your window system. Your Hyperbole version number can be found in the top-level Hyperbole menu.

Below are some tips on how best to structure requests and discussion messages. If you share information about your use of Hyperbole with others, it will promote broader use and development of Hyperbole.

- Always use your Subject lines to state the position that your message takes on the topic that it addresses.

  For example, write: "Subject: Typo in top-level Hyperbole minibuffer menu."

  rather than: "Subject: Hyperbole bug"
- Statements end with periods, questions with question marks (typically), and high energy, high impact declarations with exclamation points. These simple rules make all e-mail communication much easier for recipients to handle appropriately.
- Question messages should normally include your Hyperbole and Emacs version numbers and should clearly explain your problem and surrounding issues. Otherwise, it is difficult for anyone to answer your question. (Your top-level Hyperbole menu shows its version number and `{M-x emacs-version RET}` gives the other.)
- If you ask questions, you should consider adding to the discussion by telling people the kinds of work you are doing or contemplating doing with Hyperbole. In this way, the list is not overrun by messages that ask for, but provide no information.

If you have suggestions on how to improve Hyperbole, send them to <hyperbole-users@gnu.com> (`{C-h h m c}` minibuffer menu item Msg/Compose-Hypb-Mail). Here are some issues you might address:

- What did you like and dislike about the system?
- What kinds of tasks, if any, does it seem to help you with?
- What did you think of the Emacs-based user interface?
- How was the Hyperbole Manual and other documentation?
- Was the setup trivial, average or hard?
- What areas of Hyperbole would you like to see expanded/added?
- How does it compare to other hypertext tools you have used?
- Was it easy or difficult to create your own types? Why?
- Did you get any use out of the external system encapsulations?

Appendix G Questions and Answers

1. As I discover the Zen of Hyperbole, will I become so enamored of its power that I lose all control of my physical faculties?

   This other-worldly reaction is of course an individual matter. Some people have canceled meditation trips to the Far East after discovering that pressing the Action Key in random contexts serves a similar purpose much more cheaply. We have not seen anyone's mind turn to jelly but with the cognition Hyperbole saves you, you might just grow a second one. Eventually, you will be at peace and will understand that there is no adequate description of Hyperbole. Just let it flow through you.

   Ok, joking aside, now that we have your attention, here are some serious questions and answers.

2. Isn't Org-mode the same as Hyperbole?

   No, they offer very different capabilities when you compare them a bit more deeply. In fact, it makes sense to use them together and they are highly compatible. The only overlap we see is that Org-mode has a more limited kind of hyperlinks and offers some BBDB integration as Hyperbole does. For a list of some differences, see: `https://www.emacswiki.org/emacs/Hyperbole`.

   Org-mode offers traditional Emacs outlining, todo list management, agenda and diary management, so it is very complementary to Hyperbole. It did not exist when Hyperbole was first developed.

   Smart Key support for Org-mode is already in Hyperbole. Use the `hsys-org-enable-smart-keys` customization variable to control the Smart Keys and `{M-RET}` when in Org-mode with `hyperbole-mode` active. `t` enables Smart Key support everywhere. The symbol, `buttons`, is the default; it means the Smart Keys are active only when point is within a Hyperbole button. A `nil` value means no Smart Key support; Hyperbole gives Org complete control over `{M-RET}` so that it behaves just as it does normally in Org mode.

3. How can I change the Smart Mouse Key bindings?

   Since the Smart Mouse Keys are set up for use under many different Emacs configurations, there is no easy way to provide user level customization. Any mouse key binding changes require editing the `(hmouse-setup)` and `(hmouse-get-bindings)` functions in the `hmouse-sh.el` file.

   To make the Smart Keys do new things in particular contexts, define new types of implicit buttons, see Section 4.3 [Implicit Buttons], page 26.

   The `hkey-alist` and `hmouse-alist` variables in `hui-mouse.el` and `hui-window.el` must be altered if you want to change what the Smart Keys do in standard contexts. You should then update the Smart Key summary documentation in the file, `man/hkey-help.txt`, and then regenerate the readable forms of this manual which includes that file.

4. What if I get mail with a Hyperbole button type I don't have?

   Or what if someone sends a mail message with a button whose link referent I can't access?

   You receive an error that an action type is not defined or a link referent is not accessible/readable if you try to use the button. This is hardly different than trying to get

through a locked door without a key; you try the doorknob, find that it is locked, and then realize that you need to take a different approach or else give up.

Like all communication, people need to coordinate, which usually requires an iterative process. If you get a mail message with a button for which you don't have the action type, you mail the sender and request it.

5. How can I modify a number of global buttons in succession?

   Rather than typing the name for each, it is quicker to jump to the global button file and edit the buttons there as you would any explicit or implicit buttons. By default, the ButFile/PersonalFile menu item takes you to the file where global buttons are saved. Global buttons are saved near the end of this file.

6. Why are button attributes scattered across directories?

   When you think of a hyperspace that you depend on every day, you don't want to have a single point of failure that can make you incapable of doing work. With Hyperbole, if some directories become unavailable for a particular time (e.g. the filesystems on which they reside are dismounted) you can still work elsewhere with minimal effect. We believe this to be a compelling factor to leave the design with distributed button attribute storage.

   This design also permits the potential addition of buttons to read-only media.

7. Why are action types defined apart from implicit button types?

   Any category of button can make use of any action type. Some action types are useful as behavior definitions for a variety of button categories, so all action types are defined separately to give them independence from those types which apply them.

   For implicit button types that require a lot of code, it is useful to add a module that includes the implicit button type definition, its action type definition and supporting code. Then simply load that module into your Emacs session.

Appendix H Future Work

This appendix is included for a number of reasons:

- to better allow you to assess whether to work with Hyperbole by providing sketches of possible additions;
- to direct further development effort towards known needs;
- and to acknowledge known weaknesses in the current system.

Without any serious interest from users, progress on these fronts will be slow. Here are some new features we have in mind, however.

Button Copying, Killing, and Yanking
: There is as yet no means of transferring explicit buttons among buffers. We realize this is an important need. Users should be able to manipulate text with embedded buttons in ordinary ways. With this feature, Hyperbole would store the button attributes as text properties within the buffers so that if a button is copied, its attributes follow. When a buffer is saved, the attributes also will be saved.

Koutliner View Mode
: This will complement the Koutliner editing mode by using simple one character keys that normally insert characters to instead modify the view of a Koutline and to move around in it, for ease of study. Switching between view and edit modes will also be simple.

Direct Manipulation
: Hyperbole is designed to let you rapidly navigate and manipulate large, distributed information spaces. Being able to directly manipulate entities in these spaces will accelerate understanding and production of new information. Already Hyperbole lets you drag buffers, windows, files, and directories and place them where you like. But there is much more that can be done to allow for higher-level browsing and information organization.

Trails
: Trails are an extension to the basic history mechanism presently offered by Hyperbole. Trails will allow a user to capture, edit and store a specific sequence and set of views of information for later replay by other users. Conditional branching may also be supported.

Storage of button data within button source files
: The current design choice of storing buttons external to the source file was made under the assumption that people should be able to look at files that contain Hyperbole buttons with any standard editor or tool and not be bothered by the ugly button data (since they won't be able to utilize the buttons anyway, they don't need to see or have access to them).

  In many contexts, embedding the button data within the source files may be a better choice, so a provision which would allow selection of either configuration may be added. Here are some of the PROs and CONs of both design choices:

	POSITIVE	NEGATIVE
Button data in source file		
	Documents can stand alone. Normal file operations apply.	All edit operators have to account for file structure and hide internal components.
	Simplifies creation and facility expansion for structured and multimedia files.	
Button data external to source file		
	Files can be displayed and printed exactly as they look. No special display formatting is necessary.	Currently, attributes for a whole directory are locked when any button entry is locked.
	Button-based searches and database-type lookup operations need only search one file per directory.	

Forms-based Interfaces

This will allow one to create buttons more flexibly. For example, button attributes could be given in any order. Entry of long code sequences, quick note taking and cross-referencing would also be made easier.

Collaboration Support

From the early stages of Hyperbole design, collaborative work environments have been considered. A simple facility has demonstrated broadcast of button activations to a number of workstations on a local area network, so that one user can lead others around an information space, as during an online design review. (This facility was never adapted to the current Hyperbole release, however). Nowadays you could just use a screen sharing program.

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