

Keyboard Dialog Design

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Relevant GitHub Issues:

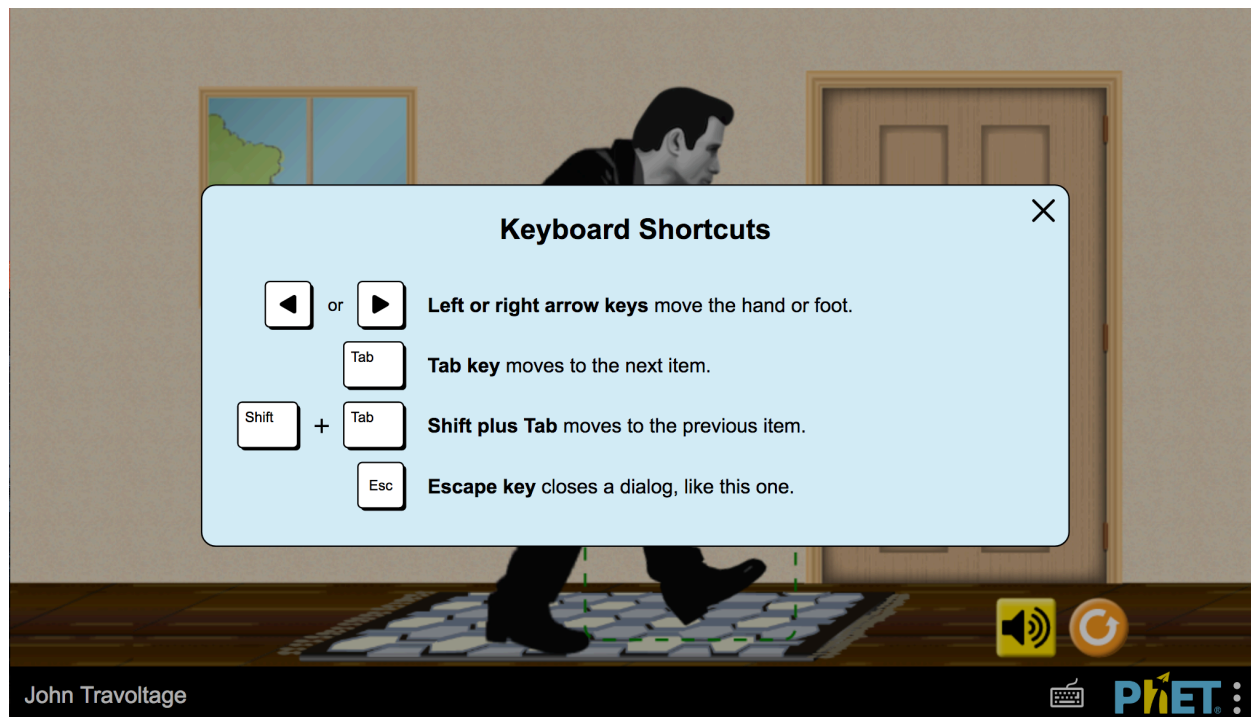
- <https://github.com/phetsims/ohms-law/issues/61>
- <https://github.com/phetsims/john-travoltage/issues/127>
- <https://github.com/phetsims/balloons-and-static-electricity/issues/263>

Design Questions

1. What Information to provide and what order?
 - a. Essential key patterns, essential for use of the sim (native interaction, or not)?
 - b. Custom key patterns helpful to sim use, but not essential?
 - c. General navigation key patterns, like tabbing forward and helpful ?
2. Visual Design Issues/Questions?
 - a. What works best for scannability?
 - b. Layouts (compact or not)?
 - c. What to highlight visually (the keys or the action)
 - d. How best to use iconography or imagery for the keyboard combinations?
3. How should the visual and non-visual content align in terms of wording?
 - a. What are the impact on collaboration if the content visual dialog is different from the non-visual representation, i.e. not describing the key icons, but rather just providing the instructions for the key presses.

Visual Design Examples

John Travoltage Simulation



- Key presses highlighted rather than the actual action
- Essential slider patterns provided with no native “extras” explained in dialog, but the native “extras” do work
- General navigation provided
- All interactions are native in this sim

Issue: Escape key not working

Balloons and Static Electricity Simulation

Keyboard Shortcuts

Grab or Release Balloon

Space or Enter Space or Enter keys **grab** or **release** balloon.

Jump Grabbed Balloon

J + S J plus S **J**umps close to **S**weater.

J + W J plus W **J**umps to **W**all.

J + N J plus N **J**umps **N**ear wall.

J + C J plus C **J**umps to **C**enter.

Move Grabbed Balloon

Arrow keys **move** grabbed balloon.

W, A, S, or D keys **move** grabbed balloon up, left, down, or right.

Hold down Shift and press a move key to **move in smaller steps**.

General Navigation

Tab Tab key moves to the **next** item.

Shift + Tab Shift plus Tab moves to **previous** item.

Esc Escape key **exits a dialog**, like this one.

PhET

Show no charges
Show charge differences
Reset Balloon
Remove Wall

Balloons and Static Electricity

PhET

- Mixed order in terms of essential key patterns
 - Essential grab action first (duplicated in the sim itself)
 - Non-essential, but very helpful custom jump keys (before arrow keys)
 - Arrow keys and WASD keys (WASD keys explained in actual sim as well)
 - General navigation
- Highlight action rather than key presses

Ohm's Law Simulation

The screenshot shows a light blue dialog box titled "Keyboard Shortcuts" with a close button (X) in the top right corner. It is divided into two sections: "Slider Controls" and "General Navigation".

Slider Controls

- Up, Down, Left, and Right arrow keys: Adjust the sliders.
- Shift + Arrow keys: Hold down Shift and press an arrow key to move in smaller steps.
- Page Up or Page Down: Page Up or Page Down moves in larger steps.
- Home or End: Home or End moves to the end.

General Navigation

- Tab: Tab key moves to the next item.
- Shift + Tab: Shift plus Tab moves to previous item.
- Esc: Escape key exits a dialog, like this one.

At the bottom of the dialog box, there is a small orange arrow pointing up and to the right. The background of the simulation is partially visible, showing a circuit diagram with a battery, a resistor, and a wire.

Ohm's Law 

- Full example (above)
- Extra stepping options explained (native interactions, custom steps) that are quite relevant to efficiently using the sliders.
- Highlight action, rather than key press.
- Compact example (below)

The screenshot shows the main interface of the Ohm's Law simulation. A large blue equation $V = IR$ is displayed at the top. Below it, a circuit diagram shows a 1.5 V battery connected to a resistor. The current is shown as 9.0 mA. A slider for resistance is set to 500 Ω . The "Keyboard Shortcuts" dialog box is open, showing the same shortcuts as in the first screenshot.

Keyboard Shortcuts

Slider Controls

- Adjust the sliders:
- Move in smaller steps:
- Move in larger steps:
- Move to the end:

General Navigation

- Move to next item:
- Move to previous item:
- Exit a dialog:

Ohm's Law 

Adjust or move - be consistent in the action described.

Do we need to repeat slider?

Adjust voltage and resistance instead of “slider”.

Consistency in interaction across sims - type of the control - “Adjust values” - the visual design may not be consistent (e.g. John Travoltage hand and foot)

“Modifier”

Generic term for PhET Sims: “control widget”

Familiarity with controls -

Link to more information - users may or may not be interested in general approaches.

Or like in JT, not essential, but can do native interactions that could be useful to the user.

Communicating differences in keyboards - here or in a general document?

The keyboard shortcuts dialog icon - is it still available without a keyboard. A single key? Limitation of icon communication.



Infusion key icon:

Keyboard issues - with custom modifiers - may not support

Test with sticky keys - the jump commands

maybe a larger linespacing? (In compact version)

yes perhaps. in either case, that layout seems to “solve” the emphasis question

People seemed to really like the compact version best, and describing all keys in the non-visual version (up, left, down, right) and not just say “arrow keys” may be important. The icons show all directions.

Note from Caren: Agree, compact version is clear and not overwhelming. BUT if it is necessary to show the “customized” interaction separate from the conventional interaction perhaps something like this very quick iteration might be worth exploring (language and icons notwithstanding):

KEYBOARD SHORTCUTS

Grab or Release Balloon

or **Space or Enter** grabs or releases the balloon.

General Navigation

Tab key moves to the next item.

+ **Shift plus Tab** moves to the previous item.

Escape key closes a dialog, like this one.

Jump Grabbed Balloon

+ J plus S **jumps** close to **sweater**.

+ J plus W **jumps** to **wall**.

+ J plus N **jumps** **near** wall.

+ J plus C **jumps** to **center** of play area.

Move Grabbed Balloon

Arrow keys move grabbed balloon.

W, A, S, or D keys move grabbed balloon up, left, down, or right.

W, A, S, or D keys move grabbed balloon up, left, down, or right.

Hold down **Shift** and press a drag key to move in smaller steps.

Examples from other platforms

Slack's Keyboard Shortcuts

The image shows a screenshot of the Slack interface with a modal window titled "Keyboard Shortcuts" (Ctrl /) overlaid. The modal is divided into three columns: "Channels & DMs", "Messaging", and "Extras". Each column lists various keyboard shortcuts for navigating and interacting within Slack. At the bottom of the modal, there is a note: "Begin a message with / for a list of all the commands at your disposal." The background shows a Slack channel with messages from Sam Reid and Jonathan Olson.

Keyboard Shortcuts (Ctrl /)

Channels & DMs	Messaging	Extras
Previous in list: Alt ↑	Autocomplete	Open Preferences: Ctrl ,
Next in list: Alt ↓	Names: [a-z] Tab or @ Tab	Open All Threads: Ctrl Shift t
Previous unread: Alt Shift ↑	Channels: # Tab	Toggle Right Sidebar: Ctrl .
Next unread: Alt Shift ↓	Emoji: : Tab	Channel Info: Ctrl Shift i
Back in history: Alt ←	New line: Shift Enter	Activity: Ctrl Shift m
Forward in history: Alt →	Edit last message: ↑ in input	Team: Ctrl Shift e
Mark as read: Esc	React to last message: Ctrl Shift \	Stars: Ctrl Shift s
Mark all as read: Shift Esc		Search: Ctrl f
Quick switcher: Ctrl k or t		Upload a File: Ctrl u
Browse DMs: Ctrl Shift k		Dismiss Dialogs: Esc
		Zoom In: Ctrl +
		Zoom Out: Ctrl -

Begin a message with / for a list of all the commands at your disposal.

- Extensive number of commands
- One-liners
- Explanation prefixed
- Easier to scan?

A section from Voice Over's list

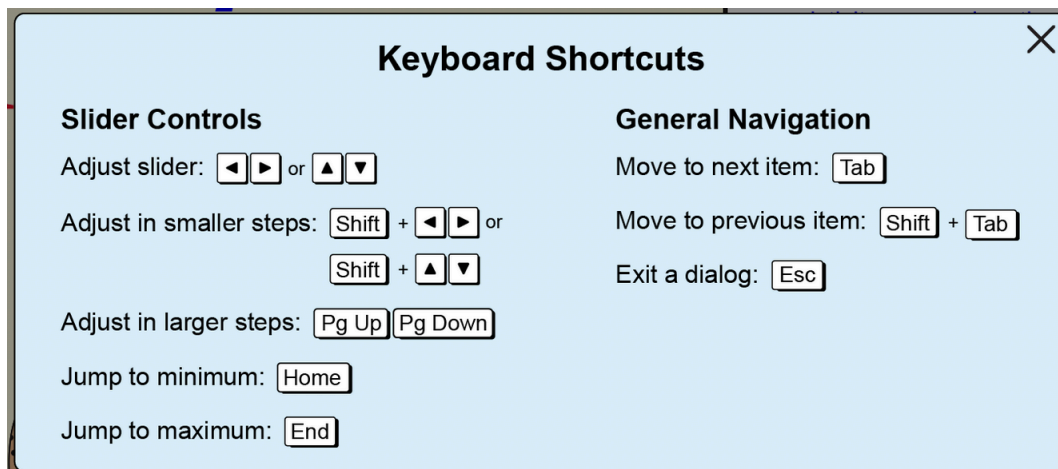
- **tab** : Next link or form control
- **VO** + **command** + **L** : Next link
- **VO** + **command** + **H** : Next heading
- **VO** + **command** + **J** : Next form control
- **VO** + **command** + **T** : Next table
- **VO** + **command** + **X** : Next list
- **VO** + **command** + **G** : Next graphic
- **VO** + **space** : Activate a link or form control

- Also one-liners
- Explanatory text at end
- Not sure how content of the images of keys are provided to non-visual users.

Examples of PhET Sim Dialogs (Post Design Crit)

Sims with sliders

For example, *Ohm's Law* and *Resistance in a Wire*.



Sims with a draggable object

For example, *Friction* and *Faraday's Law*.