



# Characteristics of Computer Access Technology

# Learning Outcomes

- To identify technologies for adapting standard input and output devices
- Identify alternatives to using standard input and output devices
- Identify performance enhancers for computer access

# Learning Objectives, cont.

- To identify alternatives technologies to using a standard mouse
- To identify performance enhancers for computer access
- To identify alternative output options

# Computer Components

- Processor (CPU)
- Memory
- Memory storage devices
- Input devices
- Output devices



# Operating Systems

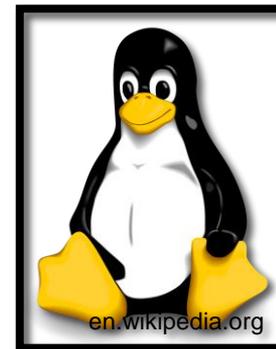
- Microsoft Windows
- Mac OS X
- Linux
- Unix
- Android
- iOS
- Windows Phone



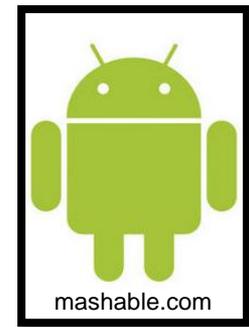
[microsoft.com](http://microsoft.com)



[quora.com](http://quora.com)



[en.wikipedia.org](http://en.wikipedia.org)



[mashable.com](http://mashable.com)

# Applications

- Word-processing
- Databases
- Spreadsheets
  - Personal finance managers
- Graphics



adobe.com

# Applications, cont.

- Communications
  - Internet
  - E-mail
  - Social Networking
- Games
- Instructional



facebook.com



Google.com/chrome

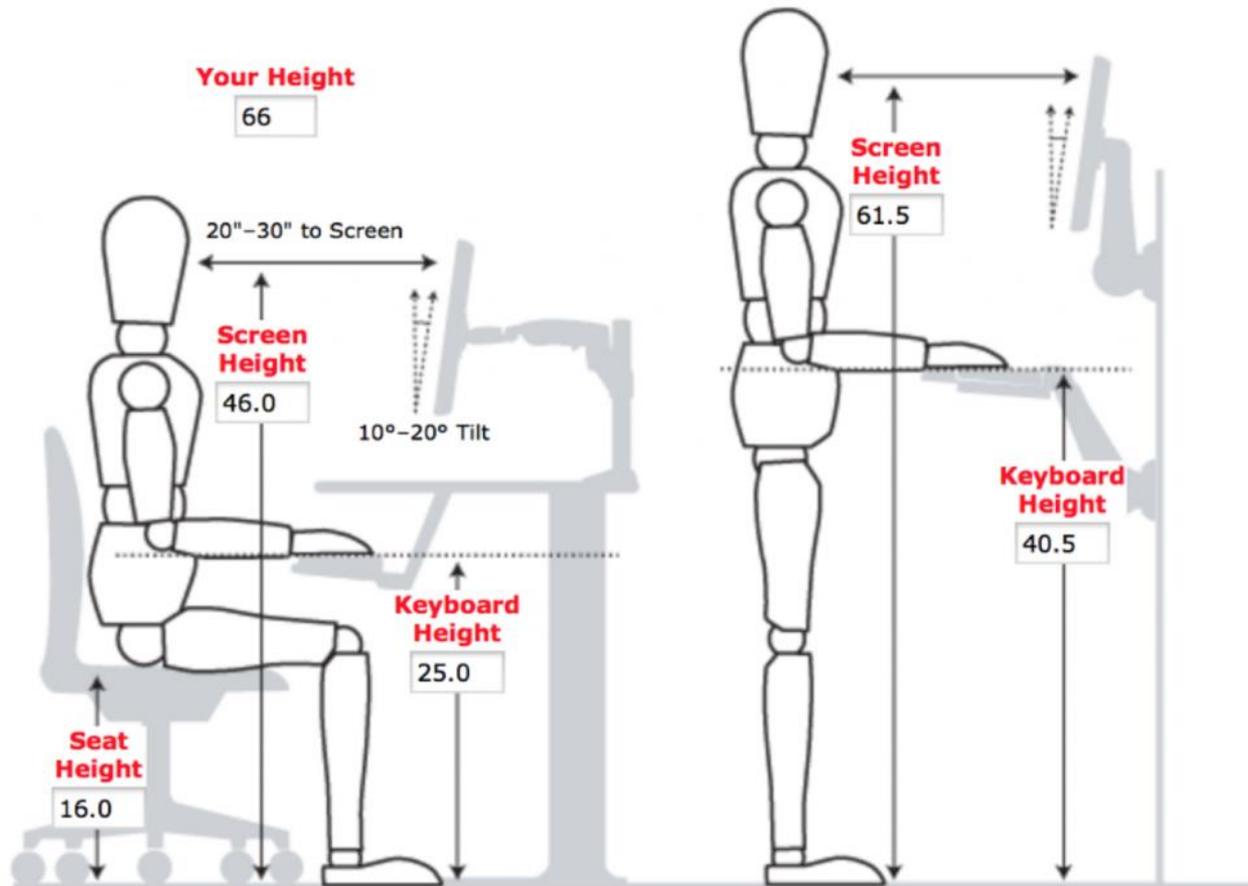


angrybirds.com

# Computer Access Strategies

- Workstation positioning/ergonomics
- Adaptations and alternatives to the standard keyboard
- Adaptations and alternatives to the standard mouse
- Adaptations to the standard monitor
- Alternative computer outputs
- Performance enhancements

# Workstation positioning/ergonomics

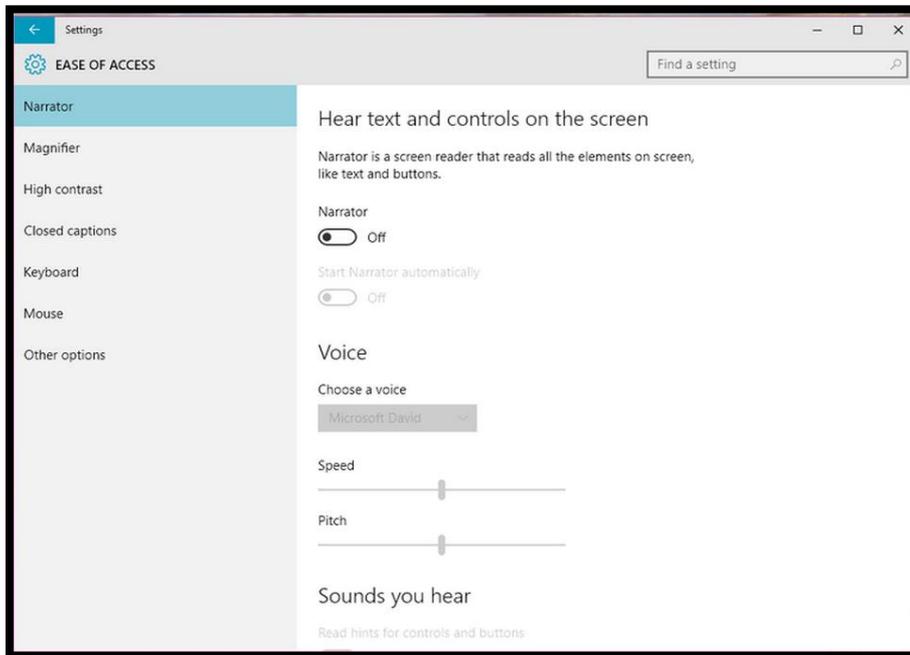


ayresdeets.com

# Adaptations to the Standard Keyboard

## Operating System Adjustments

### [Accessibility in Windows 10](#)



cnet.com

### [Apple OS X Accessibility](#)



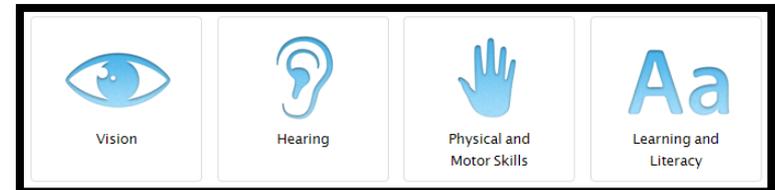
apple.com

# Operating System Adjustments/Software

- StickyKeys - latch modifier keys
- FilterKeys - ignore brief & repeated presses
- ToggleKeys - hear tones with locking keys
- Keyboard speed - adjust repeat rate & delay
- Alternative keyboard layouts



[wiki.gnome.org/Accessibility](http://wiki.gnome.org/Accessibility)



[apple.com/accessibility/osx](http://apple.com/accessibility/osx)

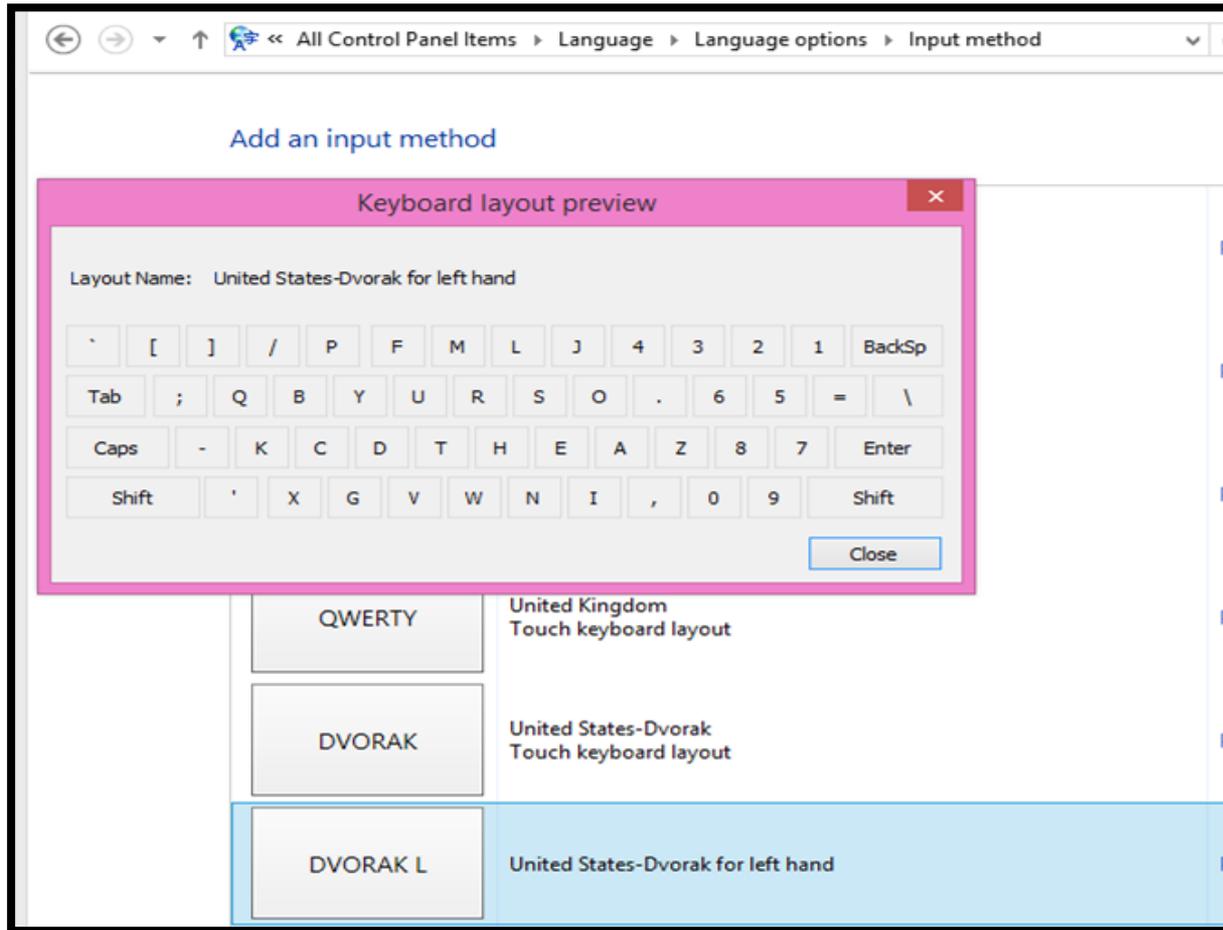


[Microsoft.com/enable](http://Microsoft.com/enable)

# Change Keyboard Layout

- Standard layout is QWERTY
- Dvorak
- Right handed Dvorak
- Left handed Dvorak
- Chubon

# Change Keyboard Layout



# Alternative Keyboard Arrangements

## Dvorak

1 2 3 4 5 6 7 8 9 0 [ ]  
' , . p y f g c r l / = \  
a o e u i d h t n s - ;  
q j k x b m w v z

## Left Hand Dvorak

= - / p f m l j 4 3 2 1  
; q b y u r s o . 6 5  
k c d t h e a z 8 7  
' x g v w n i , 0 9

## Right Hand Dvorak

1 2 3 4 j l m f p / - =  
5 6 q . o r s u y b ;  
7 8 z a e h t d c k  
9 0 x , i n w v g '

## Chubon for one pointer

' [ ] 3 2 1 v u p 6 7 8 = \  
- 4 q m i t s c k z 9 :  
5 j g n r e h b y x 0  
' / ' f o a d l w , .

# Adaptations to the Standard Keyboard: Control Stabilizers

## Keyguards

- Provides stability to the hand
- Facilitates finger isolation



# Adaptations to the Standard Keyboard: Control Stabilizers

## Wrist rests

- Provide stability
- Increases endurance



alimed.com



# Adaptations to the Standard Keyboard: Control Extenders

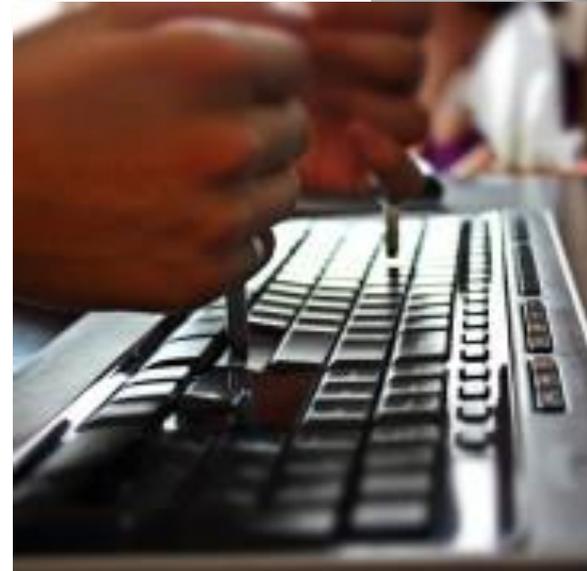
- Hand pointers, dowels, pencils
- Headpointer, headwand
- Mouthstick



handizip.com



griffintechology.com



# Alternatives to the Standard Keyboard

- Alternative keyboards
- Speech recognition
- Onscreen keyboard
- Scanning
- Coded access (i.e., Morse Code)



# Alternative Keyboards

- Split and Tent keyboard
- Mini keyboard
- Chorded keyboard



infogrip



# Characteristics of Speech Recognition

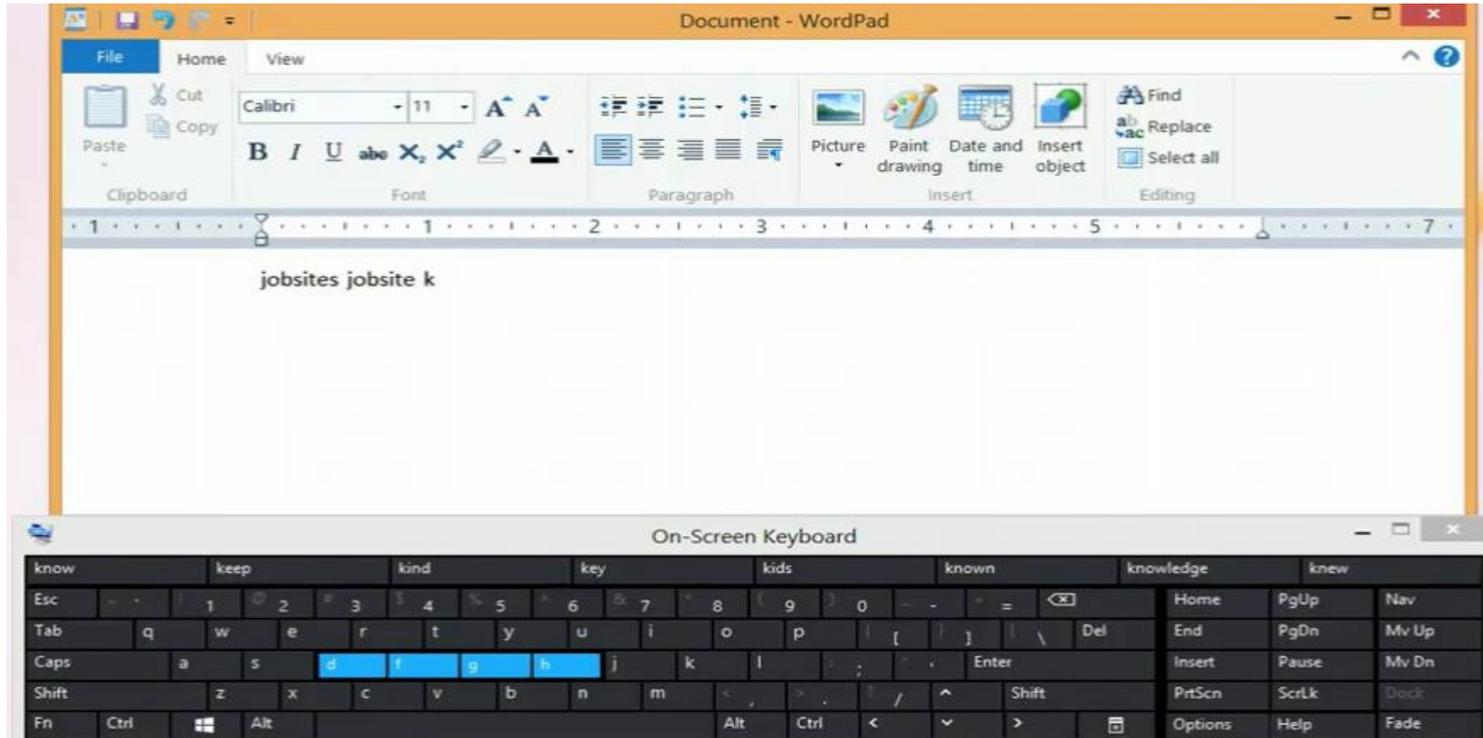
- Direct selection
- Requires consistent speech
- Requires visual monitoring
- Not for all environments
- Cognitively demanding
- Requires training

nuance.com



# Keyboard Alternatives: Onscreen keyboard

Onscreen keyboards can be accessed via a mouse or through switch scanning



# Scanning

## Scanning onscreen keyboard for switch access



apple.com

A screenshot of the SwitchXS application window. The window title is "SwitchXS® 1.0 for Mac OS X". Below the title bar, there is a list of features:

- First single switch access solution for Mac OS X
- Full mouse and keyboard emulation
- Works seamlessly with all standard application

Below the list is a grid of icons representing various mouse and keyboard functions. The grid is titled "SwitchXS (trial copy, 14 days to expiry)". The icons include: Click, 2 Clicks, Drag, Right Cl..., Slow m..., Shift click, Opt click, Cmd click, Ctrl click, Up, Down, Left, Right, Reverse, Down-L..., Down-r..., Up-left, Up-right, a standard keyboard layout, and a row of function keys (F1-F12). At the bottom of the grid are buttons for "Bring to front", "Preferences", "Mouse - Keyboard+", and "Call for Help".

assistware.com

# Morse code

a	..-	n	-. .	1	-----	\	-----	.	-----	"	-----
b	---..	o	---	2	-----	/	-----	,	-----	@	-----
c	---..	p	---.	3	-----	[	-----	_	-----	!	-----
d	---.	q	---..	4	-----	]	-----	~	-----	^	-----
e	..	r	-. .	5	-----	<	-----	?	-----	~	-----
f	...-	s	...	6	-----	>	-----	!	-----	#	-----
g	---	t	-	7	-----	(	-----	;	-----	&	-----
h	....	u	..-	8	-----	)	-----	:	-----	+	-----
i	..	v	...-	9	-----	}	-----	-	-----	=	-----
j	....-	w	---	0	-----	{	-----	\$	-----	*	-----
k	---	x	...-					§	-----		
l	....	y	....-								
m	----	z	----.								



westest.com

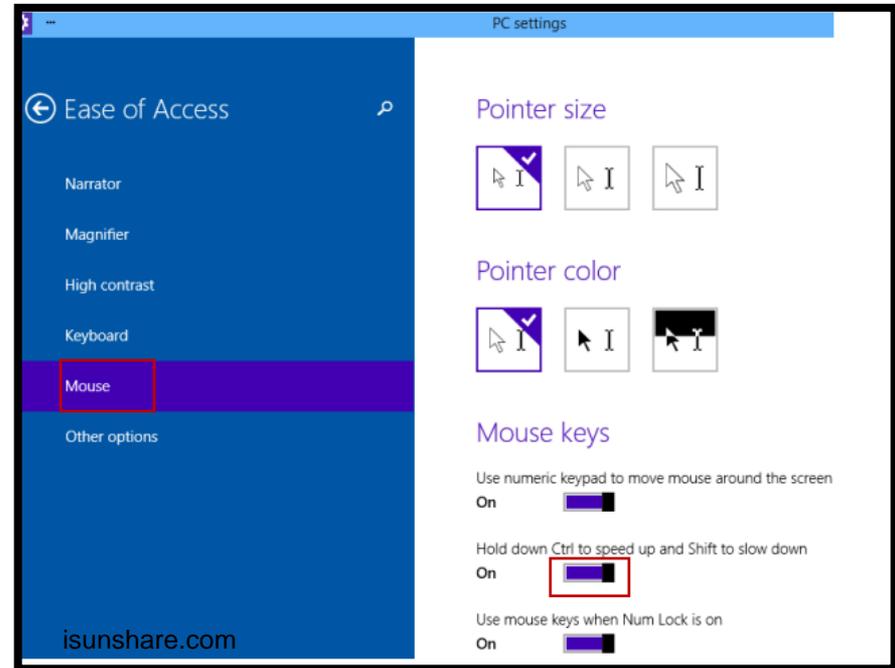
Space	...-	Shft	-----								
Enter	...-	Ctrl	...-	F1	-----	F6	-----				
Backspace	--	Alt	-----	F2	-----	F7	-----	F11	-----		
				F3	-----	F8	-----	F12	-----		
ArwUp	....-	PgUp	.....	F4	-----	F9	-----				
ArwDw	....	PgDn	.....	F5	-----	F10	-----				
ArwLt	....	Home	.....								
ArwRt	....	End	.....	Ctrl-Alt-Del	-----						
Repeat	....	NumLock	-----	Esc	.....	PrtScn	-----				
Hold/Rel	....-	ScrLock	-----	INSert	....	TabFw	-----				
Win Group	....	CapsLock	-----	DElete	....	TabBw	-----				



orin.com

# Adaptations to the Standard Mouse

- Mouse adjustments
  - Tracking Speed
  - Click
- MouseKeys
- Keyboard equivalents



# Alternatives to the Standard Mouse

- Trackball
- Joystick mouse
- Touch pad
- Touch screen, touch window
- Head mouse
- Eye gaze
- Scanning, Morse Code, Voice



[newegg.com](http://newegg.com)



Trackball

[inclusivetlc.com](http://inclusivetlc.com)

# Alternatives to the Standard Mouse

## Head Mice

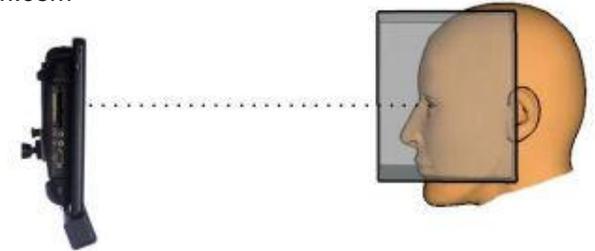
- Translate movement of the head into cursor movement
- Can often be used with speech generating devices



# Characteristics of Eye Gaze

- Direct selection
- Lower cost over the years
- Generally requires stable positioning

prentrom.com



Correct Positioning from the side and as seen straight on.

Eyes are level and gaze is in middle-to-upper part of display screen.



# Alternatives to Standard Clicking

## Switches

- Require switch interface or switch adapted mouse



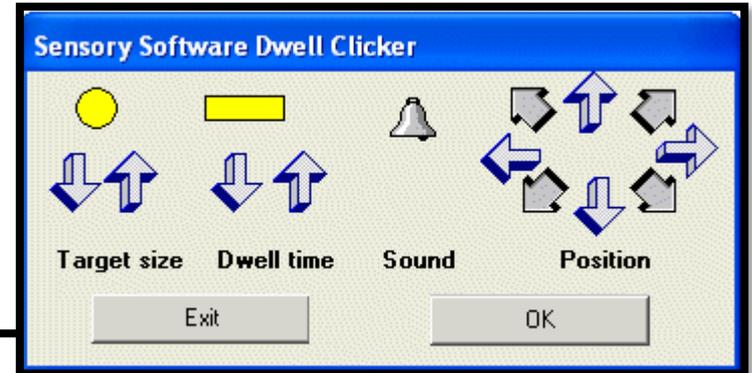
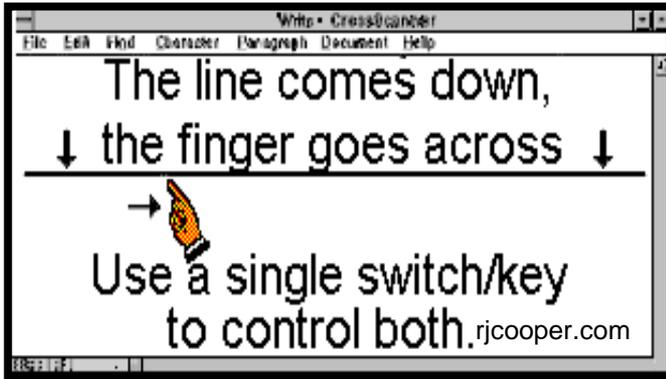
[blenetinc.com/](http://blenetinc.com/)



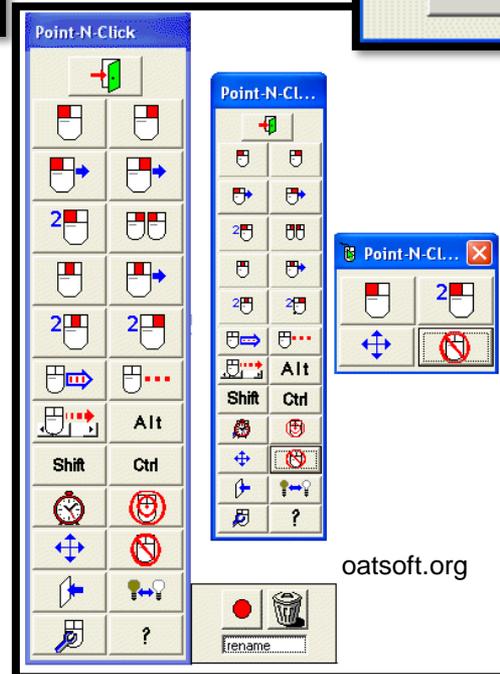
[infogrip.com](http://infogrip.com)

# Scanning

## Mouse Point and Click



oatsoft.org



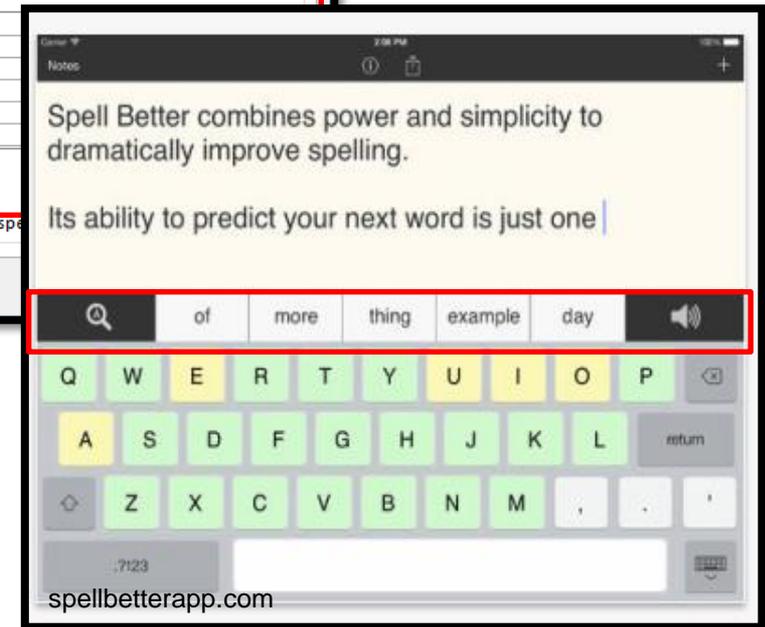
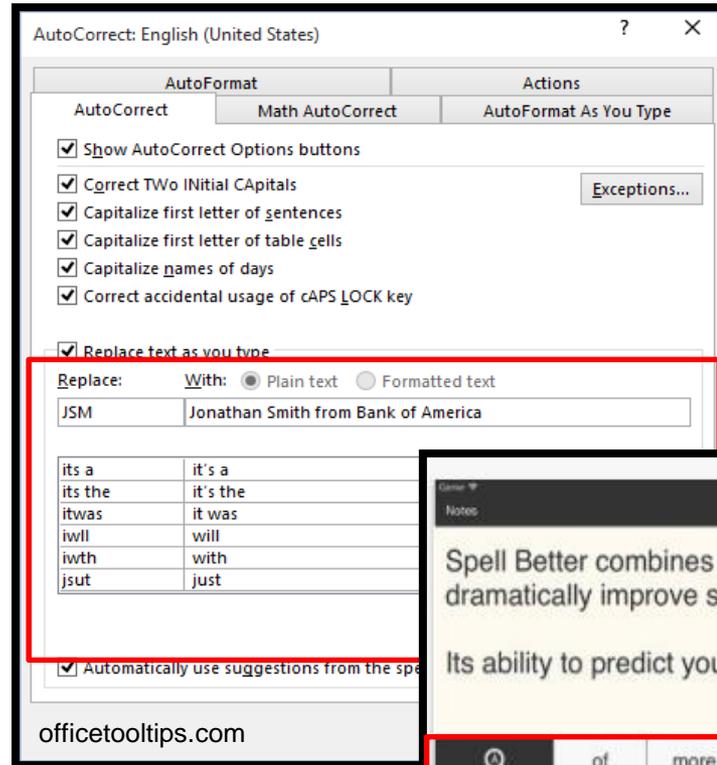
# Typing Injuries



Typing Injury Frequently Asked Questions  
<http://www.tifaq.org/>

# Computer Access Performance Enhancement

- Word prediction/word completion
- Abbreviation expansion
- Macros



# Word Prediction/Completion

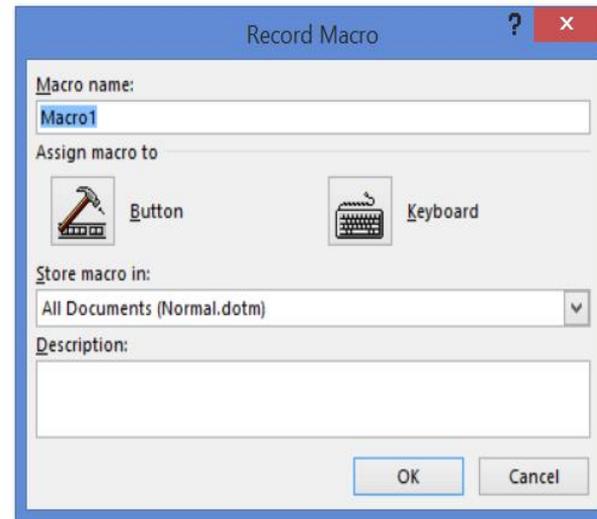
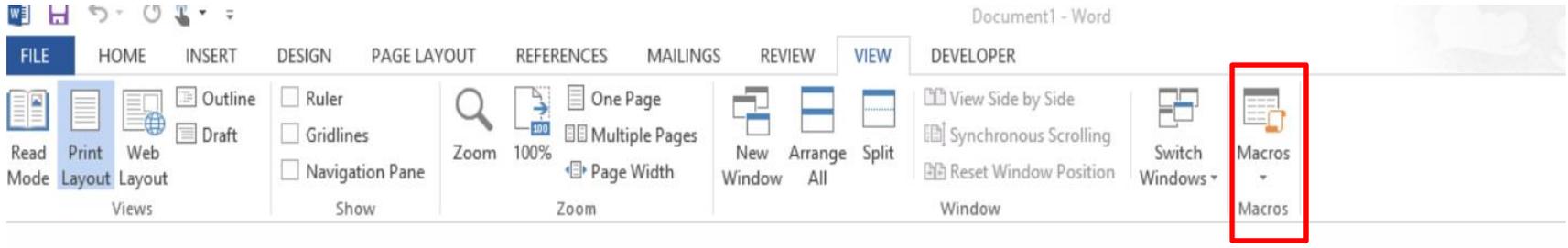
THE RE

- 1 REST
- 2 RESNA
- 3 REAL
- 4 REALLY

# Abbreviation Expansion

asap

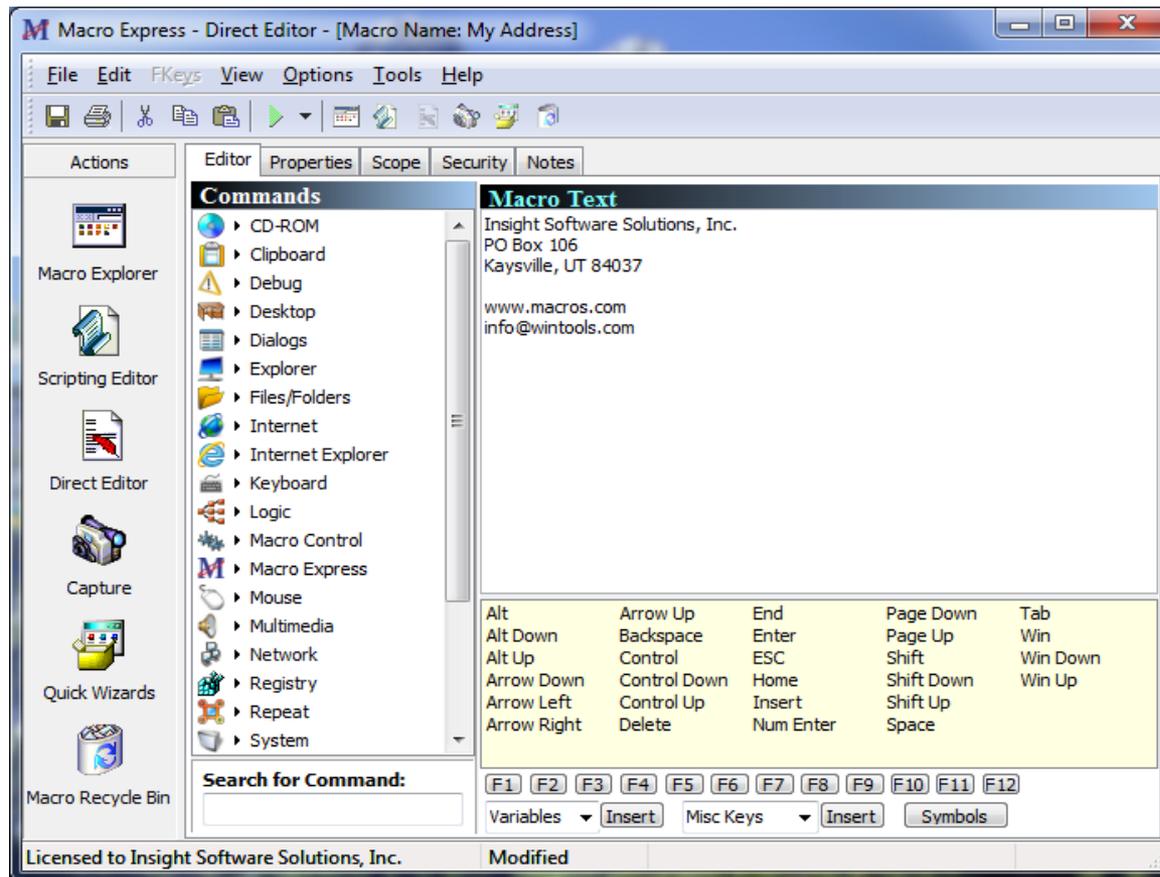
# Macros



Office 2013 Screenshot

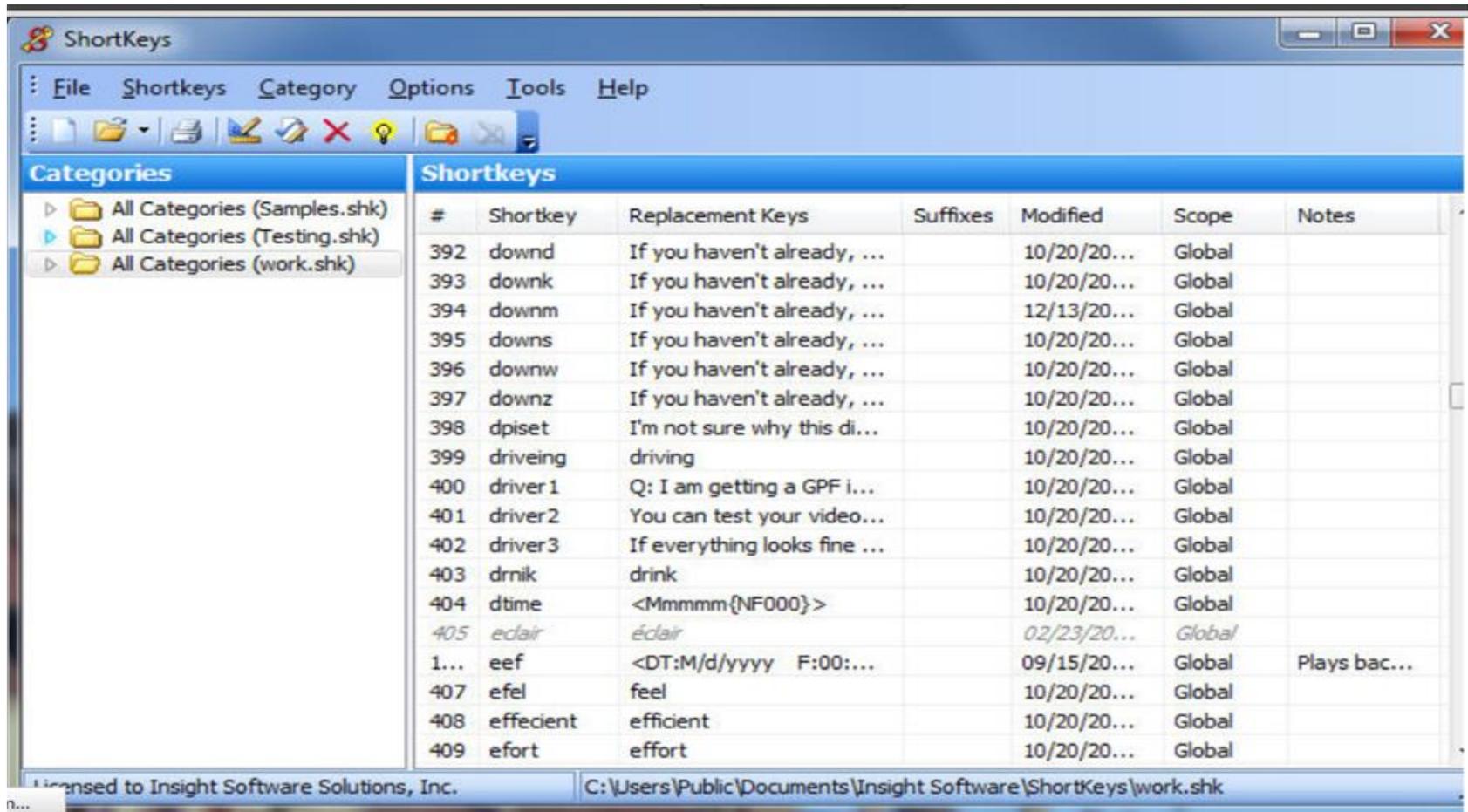
# MacroExpress

[www.macros.com](http://www.macros.com) US\$40



# Abbreviation-Expansion

ShortKeys [www.wintools.com](http://www.wintools.com) US\$25



The screenshot shows the ShortKeys application window. The title bar reads "ShortKeys". The menu bar includes "File", "Shortkeys", "Category", "Options", "Tools", and "Help". The toolbar contains icons for file operations and a lightbulb icon. The main window is divided into two panes: "Categories" on the left and "Shortkeys" on the right. The "Categories" pane shows three folders: "All Categories (Samples.shk)", "All Categories (Testing.shk)", and "All Categories (work.shk)". The "Shortkeys" pane displays a table of shortcuts.

#	Shortcut	Replacement Keys	Suffixes	Modified	Scope	Notes
392	downd	If you haven't already, ...		10/20/20...	Global	
393	downk	If you haven't already, ...		10/20/20...	Global	
394	downm	If you haven't already, ...		12/13/20...	Global	
395	downs	If you haven't already, ...		10/20/20...	Global	
396	downw	If you haven't already, ...		10/20/20...	Global	
397	downz	If you haven't already, ...		10/20/20...	Global	
398	dpiset	I'm not sure why this di...		10/20/20...	Global	
399	driveing	driving		10/20/20...	Global	
400	driver1	Q: I am getting a GPF i...		10/20/20...	Global	
401	driver2	You can test your video...		10/20/20...	Global	
402	driver3	If everything looks fine ...		10/20/20...	Global	
403	drnik	drink		10/20/20...	Global	
404	dtime	<Mmmm{NF000}>		10/20/20...	Global	
405	<i>eclair</i>	<i>éclair</i>		02/23/20...	Global	
1...	eef	<DT:M/d/yyyy F:00:...		09/15/20...	Global	Plays bac...
407	efel	feel		10/20/20...	Global	
408	effecient	efficient		10/20/20...	Global	
409	efort	effort		10/20/20...	Global	

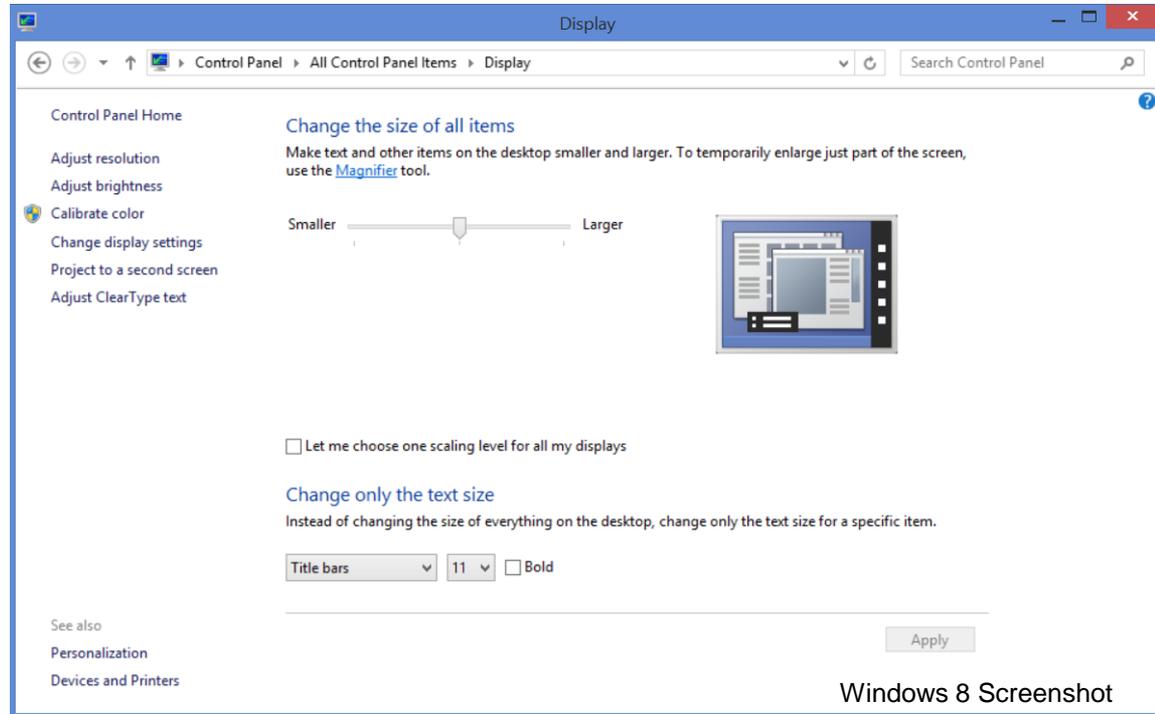
Licensed to Insight Software Solutions, Inc. C:\Users\Public\Documents\Insight Software\ShortKeys\work.shk

# Monitor Adjustments

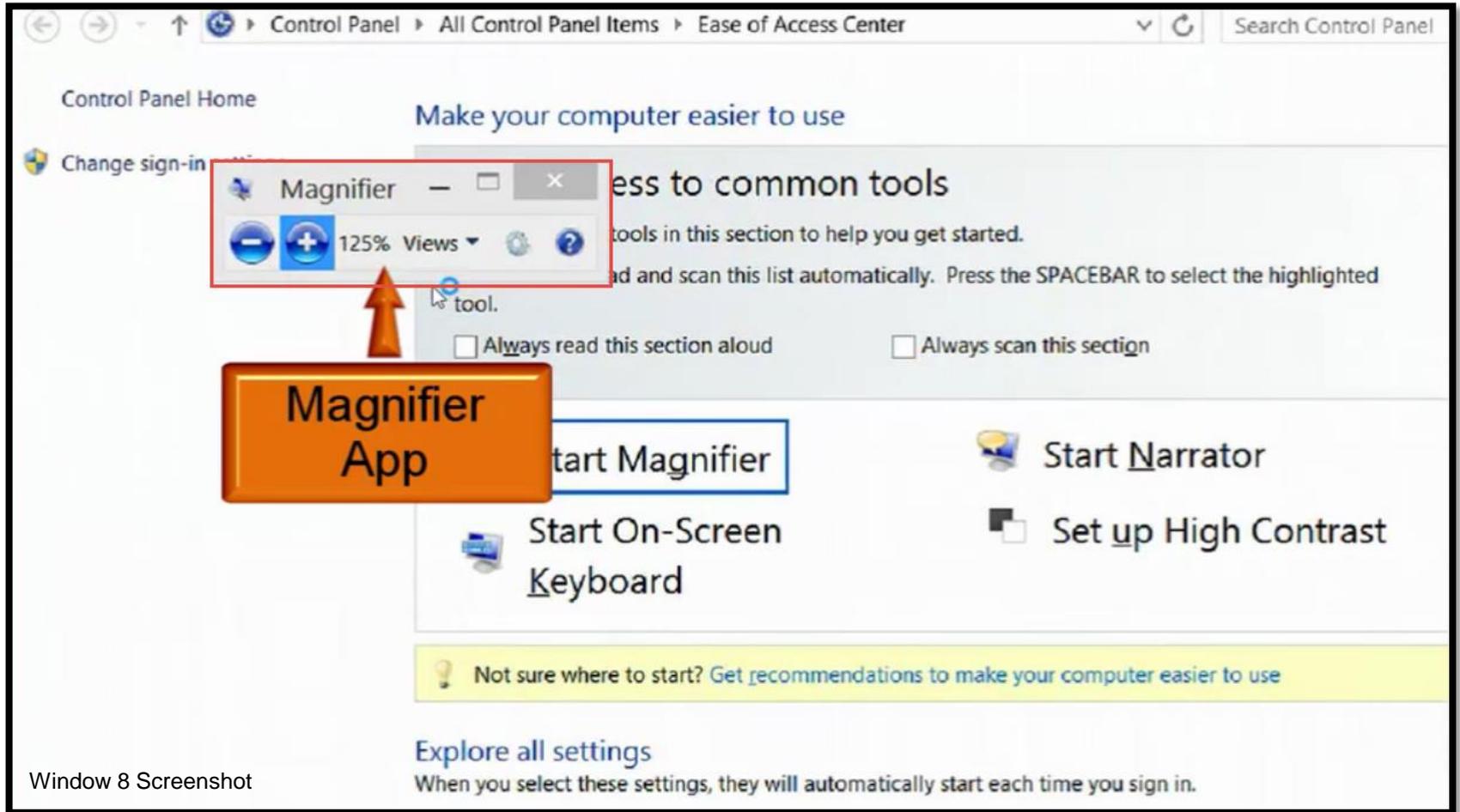
For persons with low vision

- Font size/color
- Background color
- Mouse pointer size
- Screen enlargers
- Contrast adjustment
- Sound sentry / show sounds

## Change the Size of Text and Icons

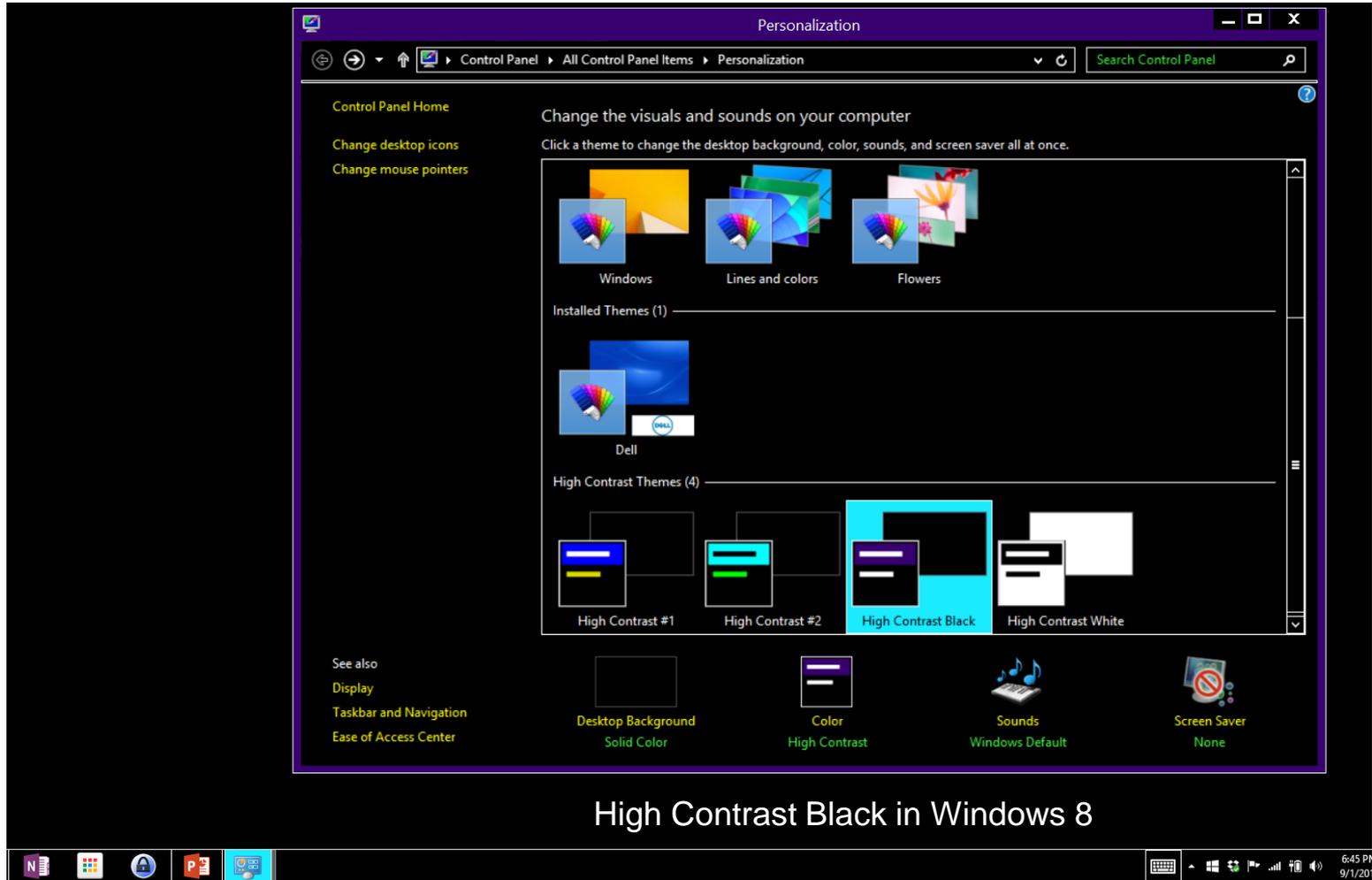


# Windows Magnifier



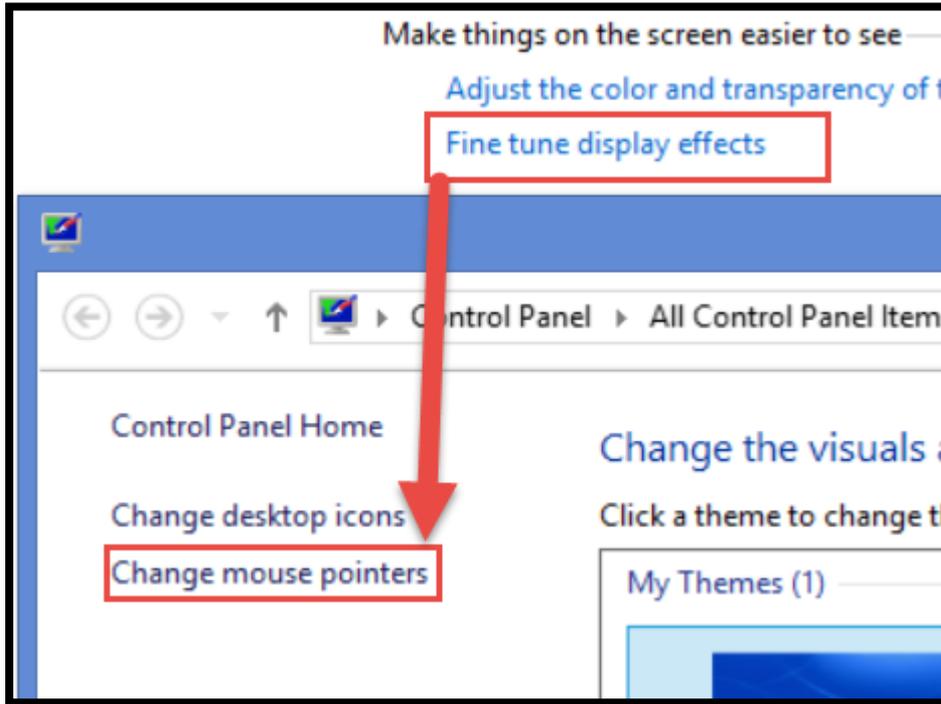
Window 8 Screenshot

# Windows High Contrast

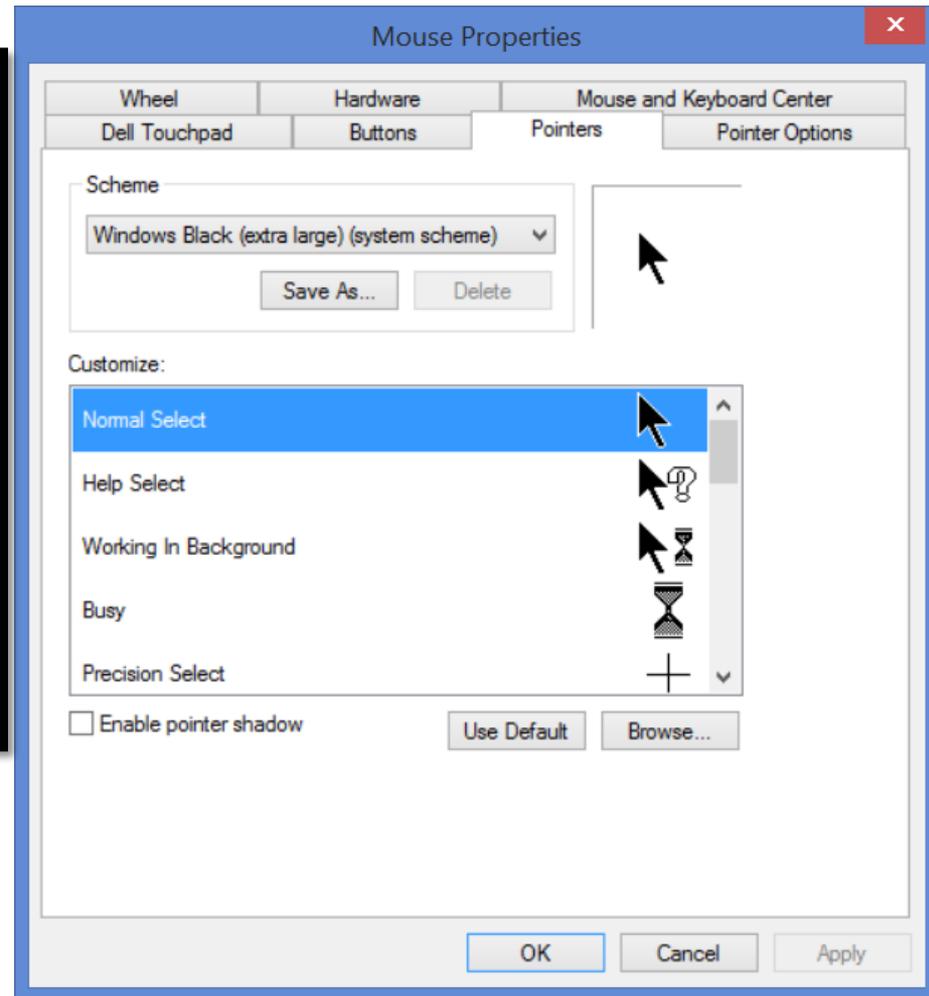


High Contrast Black in Windows 8

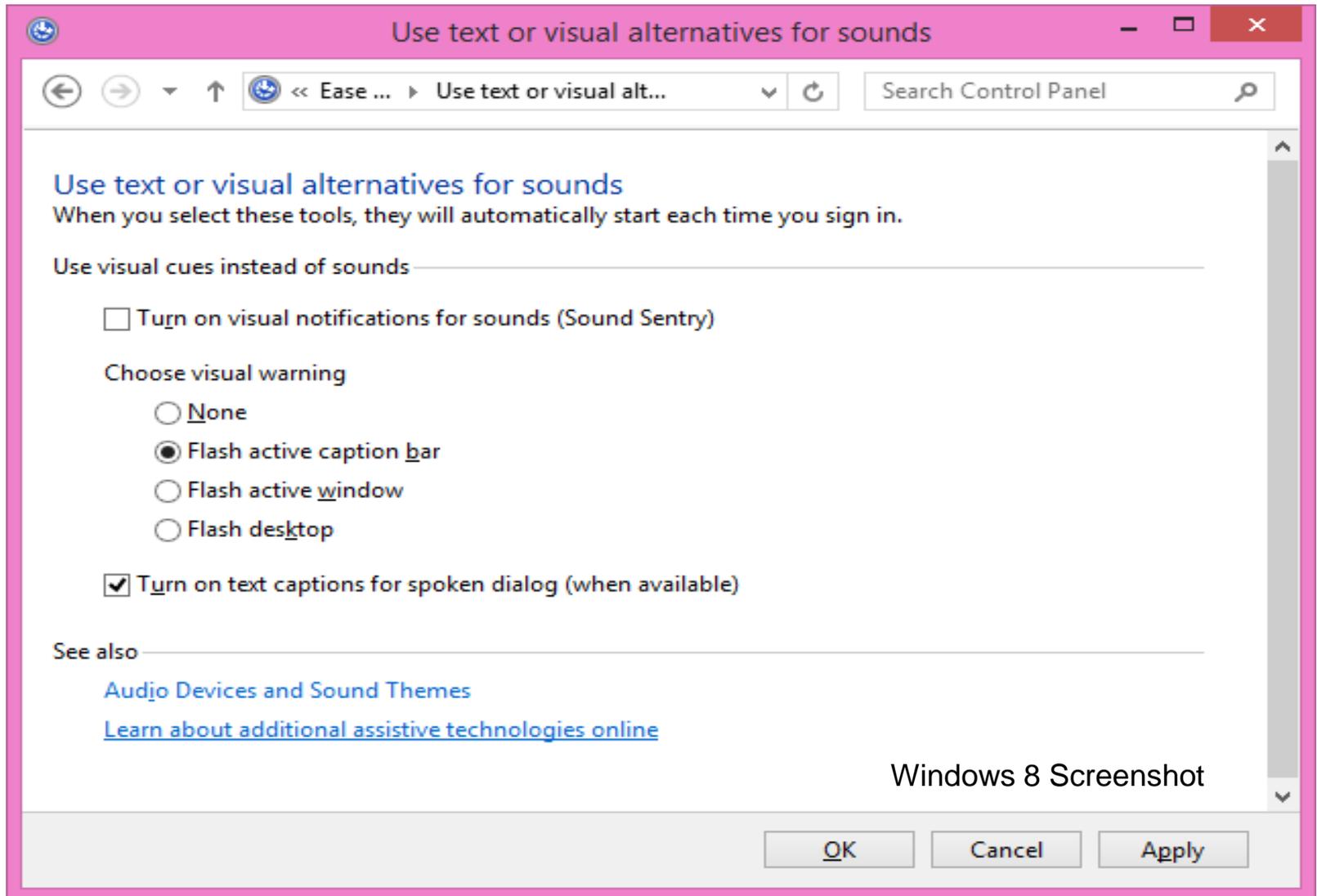
# Change Mouse Pointer Size



Windows 8 Screenshots



# Sound Sentry

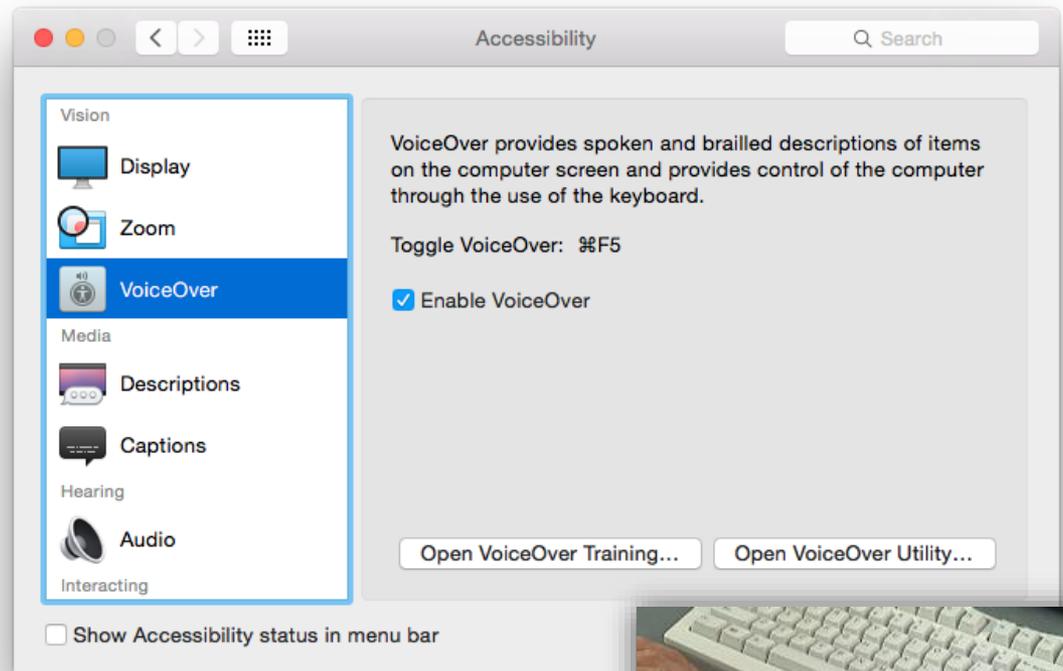


# Output Alternatives

For persons with no vision

- Speech/screen readers
- Keystroke echoing
- Braille

VoiceOver in Yosemite



abilitynet.org



afb.org

# Computer Access

- Many access methods available
- Many things to consider
  - Input method characteristics
  - User needs and abilities

# Review Questions (feel free to discuss with your neighbors)

1. A keyguard is used to:
  - a. Enlarge individual keys for easier visual regard
  - b. Enlarge individual keys for easier access
  - c. Prevent moisture from damaging the keyboard
  - d. Provide stability to the hand and promote finger isolation for key activation
  
2. Which of the following alternative mice translates head movement into cursor movement?
  - a. Head mouse
  - b. Trackball
  - c. Joystick mouse
  - d. Touch screen
  
3. Increasing the size of the font and mouse pointer on the monitor would be helpful for a client with:
  - a. Impaired fine motor skills
  - b. Low vision
  - c. Impaired depth perception
  - d. No vision

# Review Questions (Here are the answers. How did you do?)

1. A keyguard is used to:
  - a. Enlarge individual keys for easier visual regard
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Questions?