

# The Two-handed Desktop Interface

Are we there yet?

# Plan

- Bimanual Control
- The Desktop Interface
- Scrolling
- Microsoft Listens

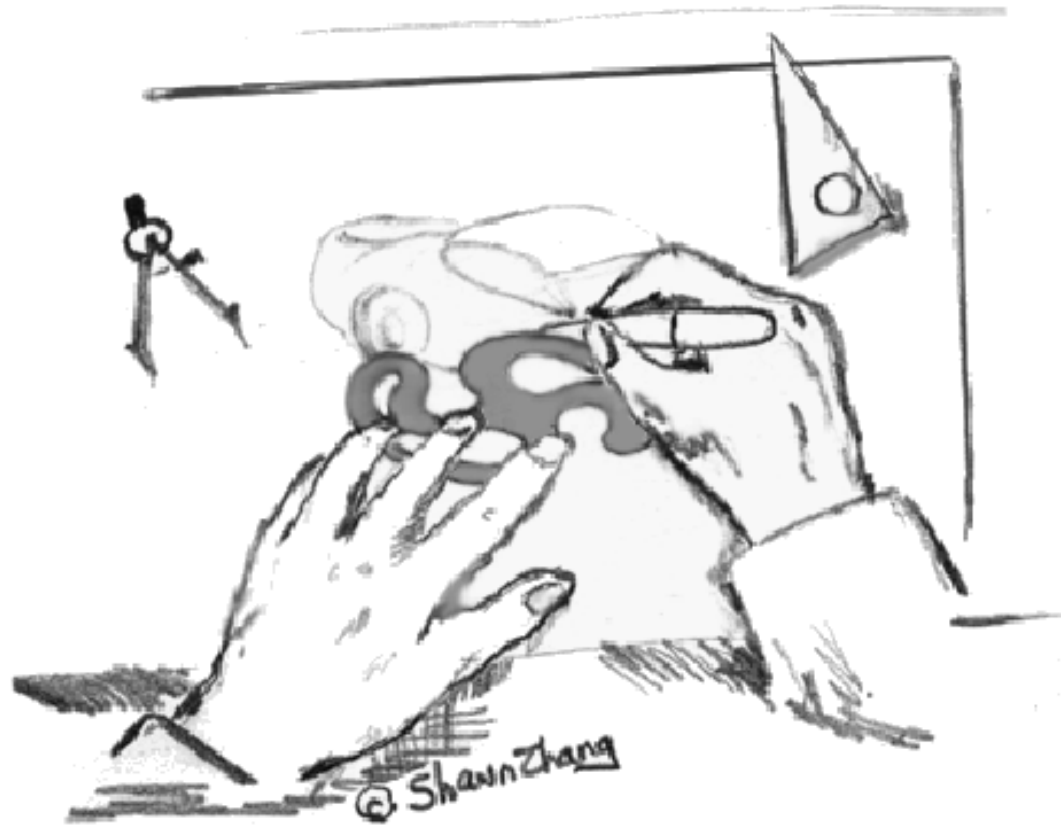
# What is Bimanual Control?

- Aka, two-handed interaction
- Theoretic groundwork: Buxton and Myers (1986), Guiard (1987)
- Considerable recent work in HCI (Zhai, Kabbash, Hinckley, Balakrishnan, etc.)
- The idea:
  - Two-hands work in cooperative, asymmetric manner

# Role of Each Hand

- Non-dominant hand
  - leads (goes first)
  - sets frame of reference
  - works on larger, more coarse tasks
- Dominant hand
  - follows (goes second)
  - works within frame of reference set by nondominant hand
  - works on smaller but finer scale

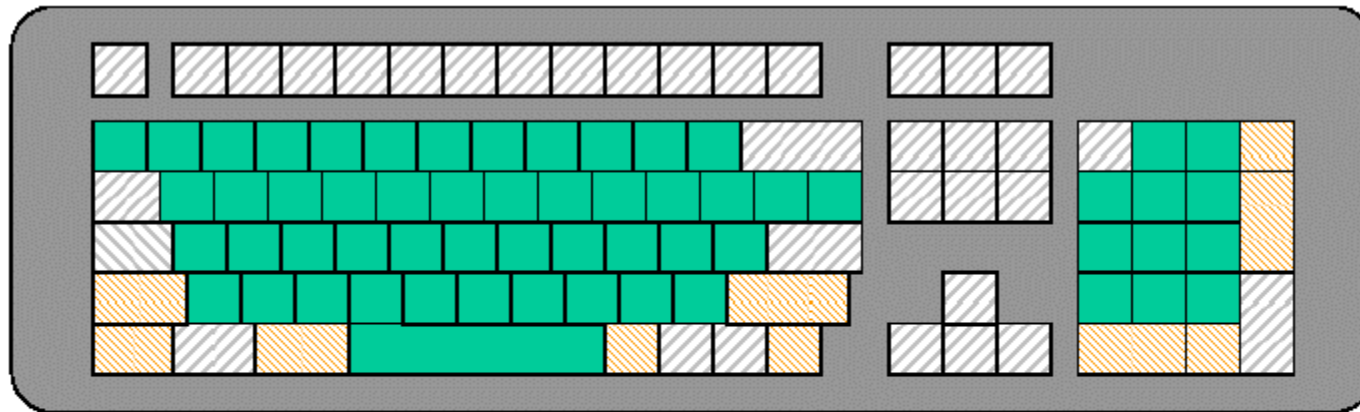
# Two Hands Working Together






# Plan

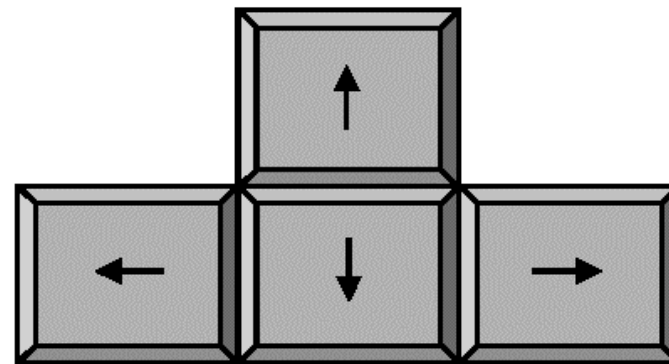
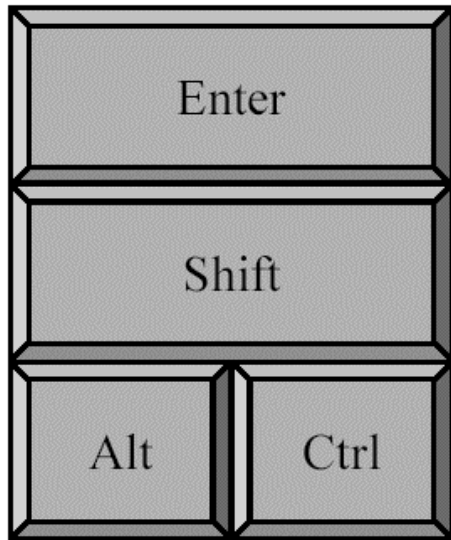
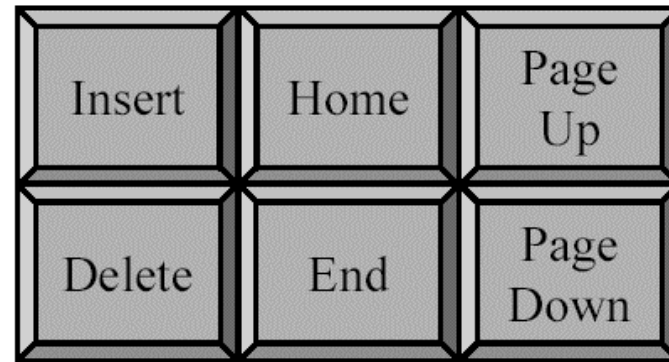
- Bimanual Control
- The Desktop Interface
- Scrolling
- Microsoft Listens

# 101-Style Keyboard

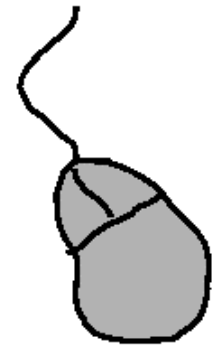


-  Symbol keys
-  Executive keys
-  Modifier keys

# Frequently Used Keys



# Where are they?



# The Left-Handed Desktop

Desktop systems  
are biased for  
left-handed users!



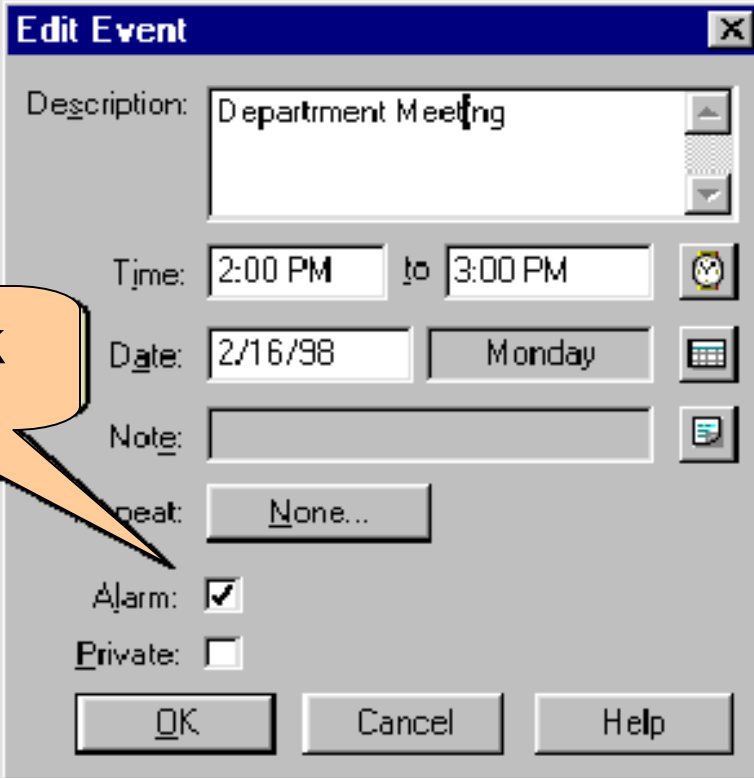
Some examples...

Note: Left-handed users holding the mouse in their left hand.

# Select Option in Window

LH:  
Point-click

RH:  
Enter



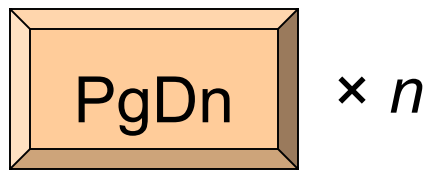
The image shows a screenshot of a Windows-style dialog box titled "Edit Event". The dialog box contains the following fields and controls:

- Description: Department Meeting
- Time: 2:00 PM to 3:00 PM
- Date: 2/16/98 Monday
- Note: (empty text box)
- Repeat: None...
- Alarm:
- Private:
- Buttons: OK, Cancel, Help

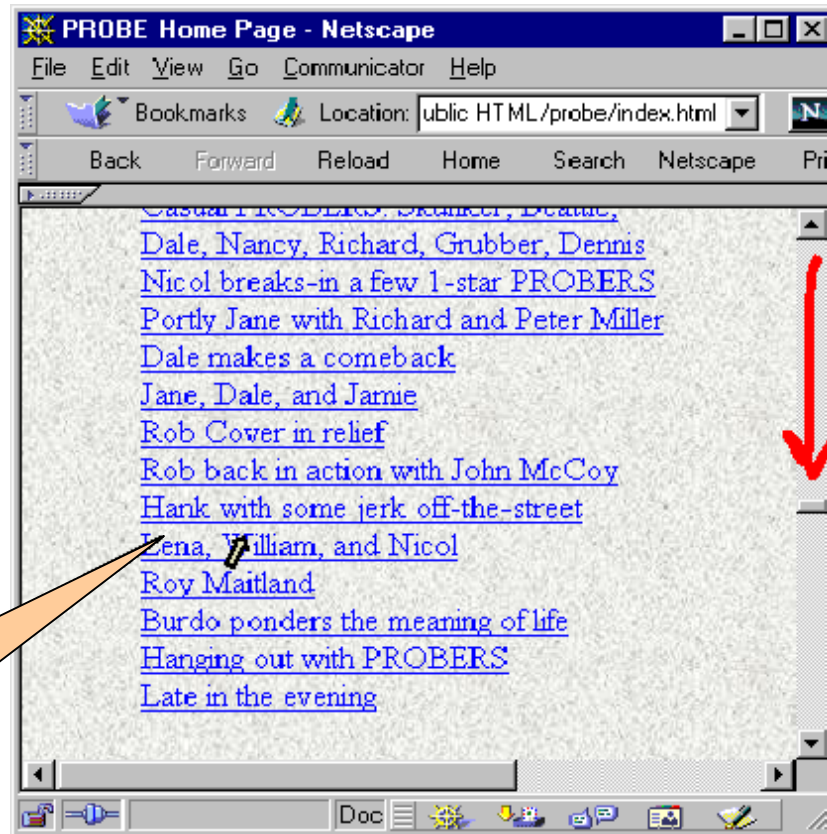
An orange speech bubble labeled "LH: Point-click" points to the "Repeat" button. An orange box labeled "RH: Enter" is positioned below the "Repeat" button.

# Find and Select a Link

RH:



LH:



# Delete a Word

This is some really **utterly** simple text.  
If I want to delete the word “utterly”, I  
double click on it and hit Backspace.

LH:

Point-click-click

RH:

Delete

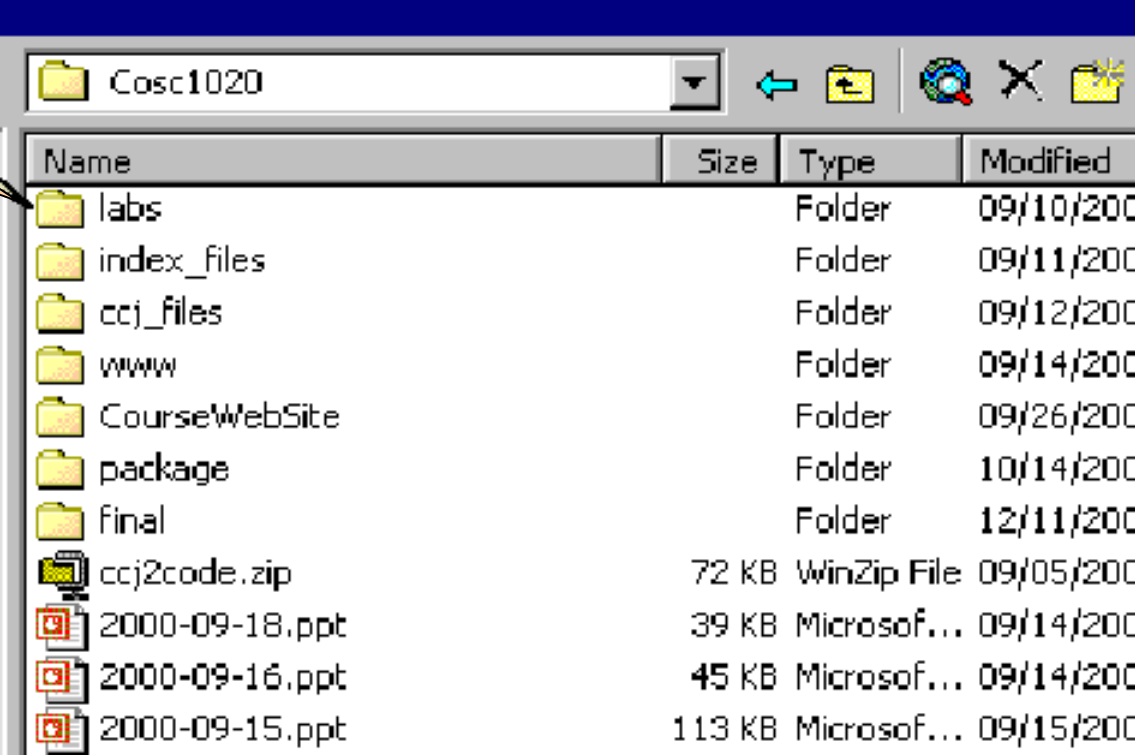
# File System Navigation

LH:

Point-click

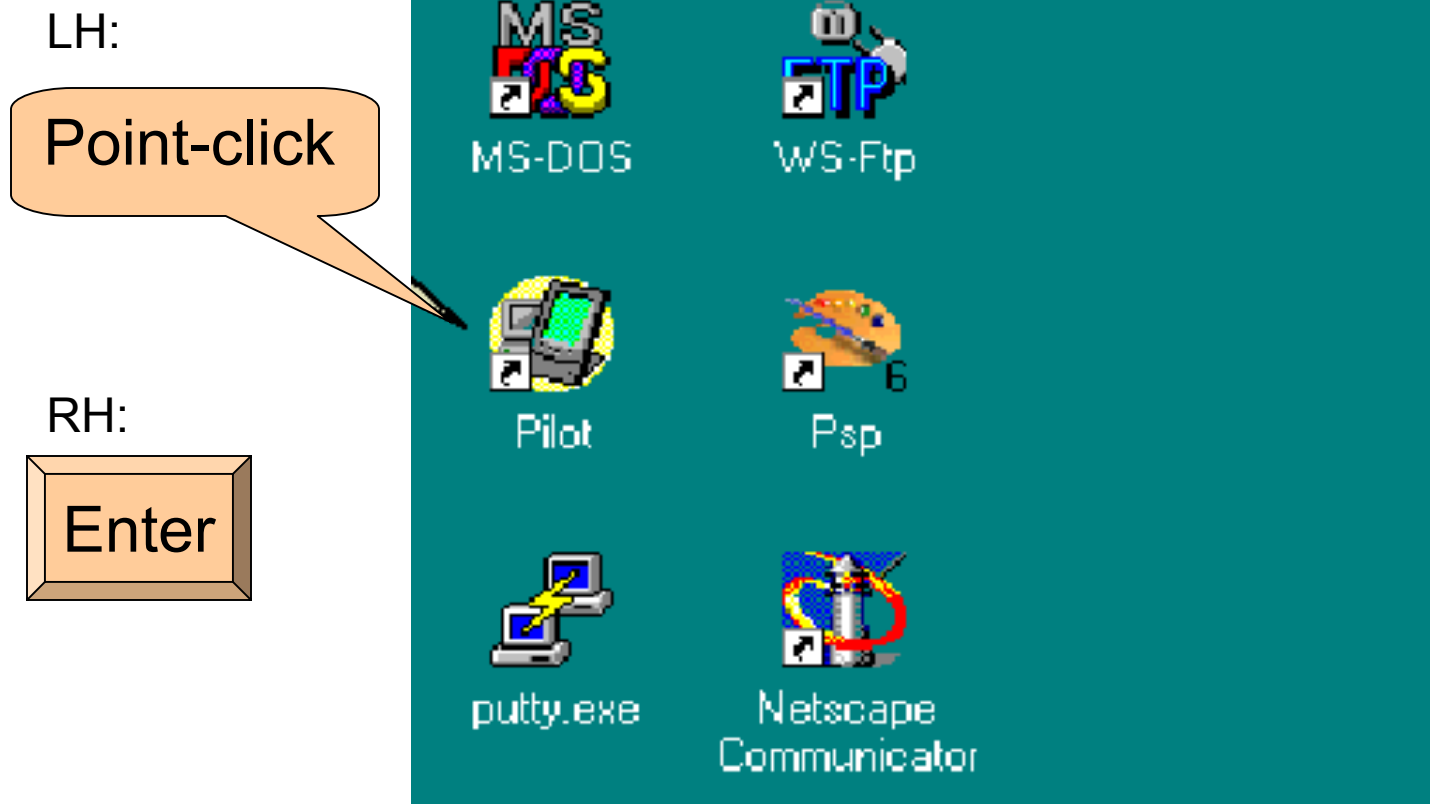
RH:

Enter



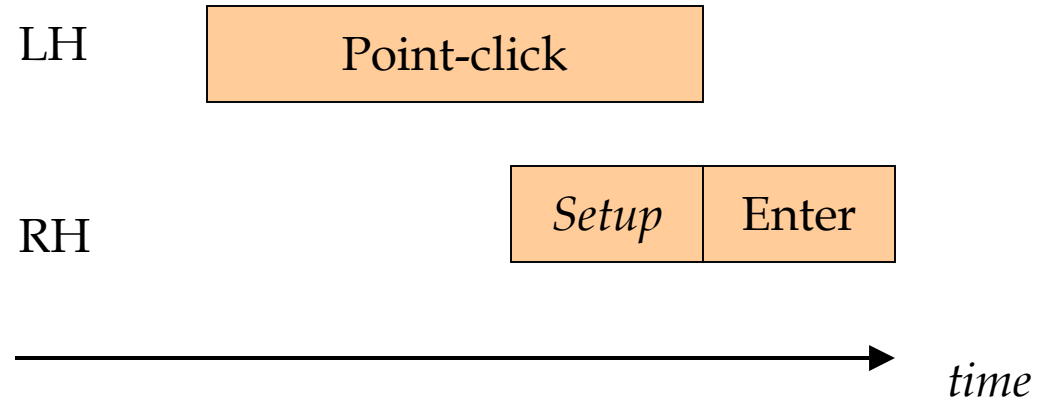
Name	Size	Type	Modified
labs		Folder	09/10/200
index_files		Folder	09/11/200
ccj_files		Folder	09/12/200
www		Folder	09/14/200
CourseWebSite		Folder	09/26/200
package		Folder	10/14/200
final		Folder	12/11/200
ccj2code.zip	72 KB	WinZip File	09/05/200
2000-09-18.ppt	39 KB	Microsof...	09/14/200
2000-09-16.ppt	45 KB	Microsof...	09/14/200
2000-09-15.ppt	113 KB	Microsof...	09/15/200

# Launch an Application



# Temporal Analysis

Left-handed user (mouse on left side of keyboard)



Right-handed user (mouse on right side of keyboard)

?

# Savings

- Small time savings but...
- These tasks are extremely frequent

# Observations (1 of 2)

- Having heard this talk, product designers will redesign the desktop to give right handers the same opportunities as left handers!

No! Keyboard layout is stable and ingrained. Changes are evolutionary, not revolutionary.

# Observations (2 of 2)

- The ideal LH and RH desktop interfaces are mirror images!



No! Left handers are not mirror images of right handers. Left handers are more adept at using their non-dominant hand for trigger actions (e.g., Enter, DEL, Backspace)

# Plan

- Bimanual Control
- The Desktop Interface
- Scrolling
- Microsoft Listens

# Scrolling and Bimanual Control

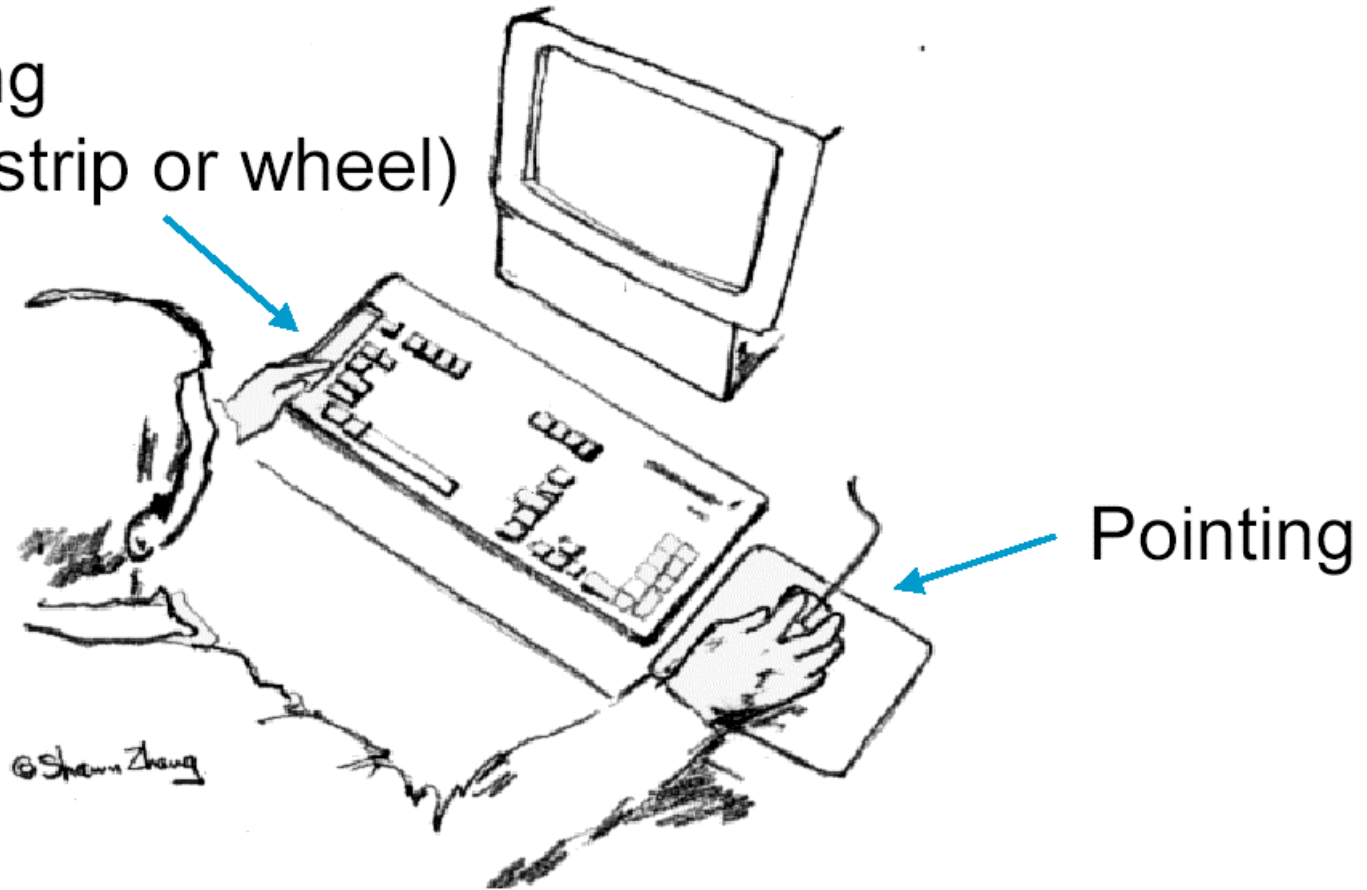
- Scrolling is a classic example of a task well suited to delegation to the non-dominant hand

Task	Characteristics
Non-dominant Hand	<ul style="list-style-type: none"><li>• Precedes/overlaps other tasks</li><li>• Sets frame of reference</li><li>• Minimal precision needed (coarse)</li></ul>
Dominant Hand	<ul style="list-style-type: none"><li>• Follows/overlaps scrolling</li><li>• Works within frame of reference</li><li>• Demands precision (fine)</li></ul>

Does this sound familiar?

# Two-handed Pointing + Scrolling

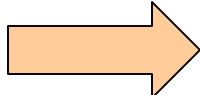
Scrolling  
(touch strip or wheel)

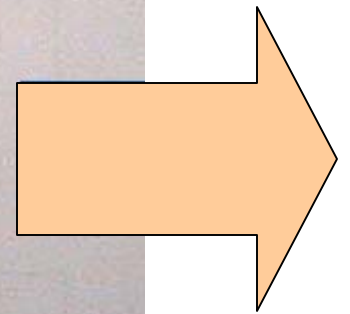


# Plan

- Bimanual Control
- The Desktop Interface
- Scrolling
- Microsoft Listens

# Microsoft Presentation

- I visited Microsoft in Redmond, WA in February 1998 and gave this "speech" to the Hardware Ergonomics Group
- In fact, I gave it twice in the same day
  - Morning audience: "Mouse Group"
  - Afternoon audience: "Keyboard Group"
- My talk included a demo with my reengineered *IntelliMouse* 



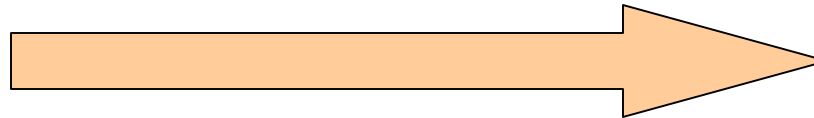
# Re-Engineered *IntelliMouse*

- Wheel removed and placed in separate chassis, positioned on opposite side of keyboard:

Note:  
Right-handed setup



- Two years later



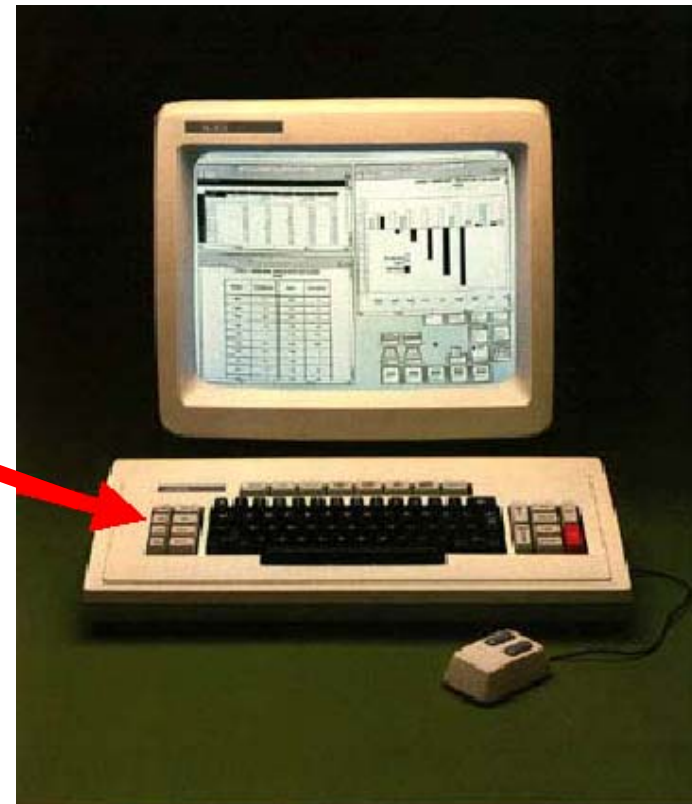
# Microsoft Office Keyboard



# Postscript

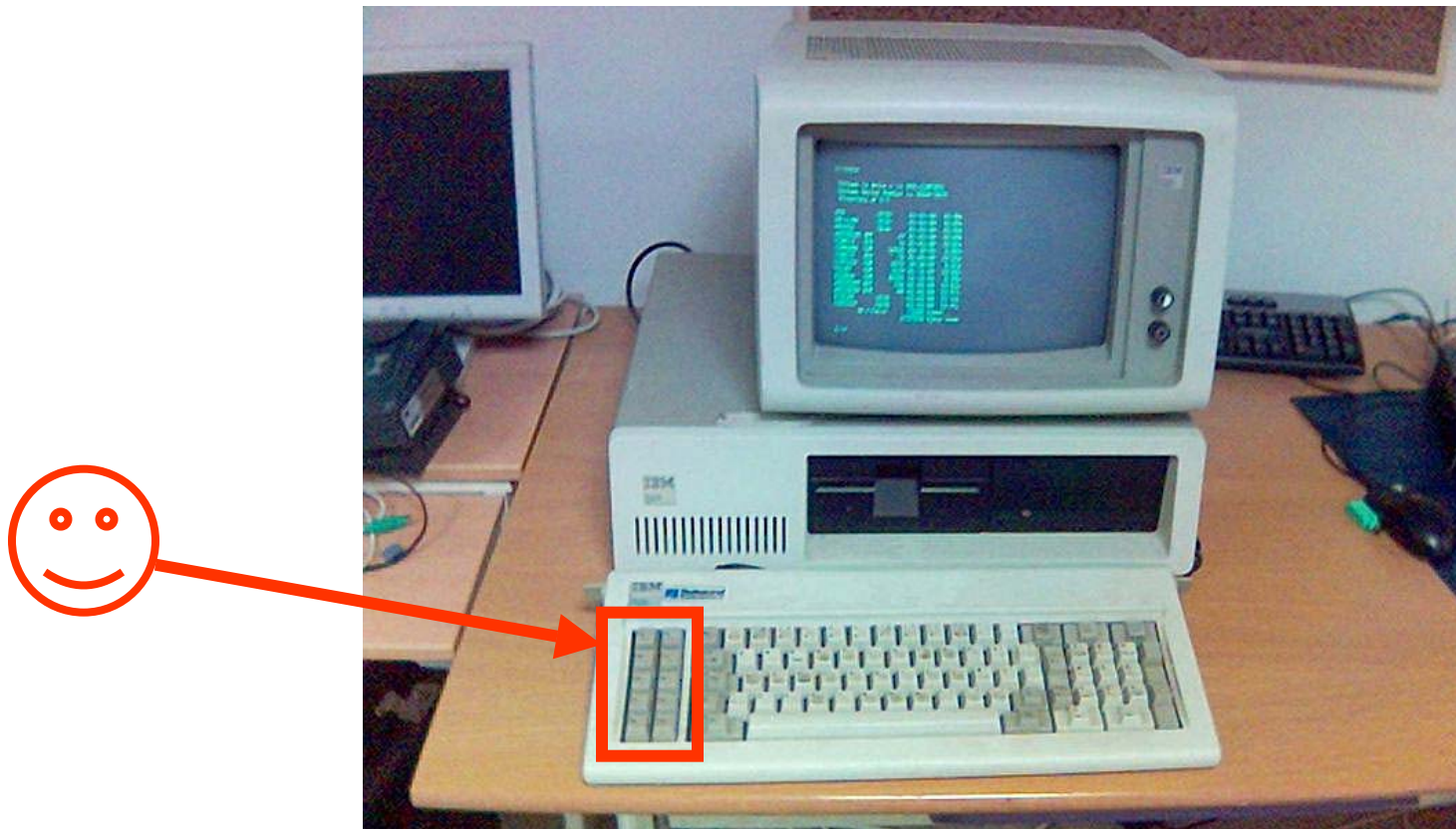
- Xerox Star (1981)

Dedicated cut, copy,  
and paste keys on left  
side of keyboard  
(ideal for RH users)



# Copy Cats Soon Follow

- IBM *PC/XT* (1983)



# Engineers Unleashed

- IBM *PC/AT* “101-style keyboard” (1984)



**Thank you!**