

Questions?

- Project #3
- Homework #4 is due today
- Homework #5 is out today
- Midterm in a week and a half

KLM heuristic rules (Raskin's)

0: Insert M

- *In front of all Ks*
- *In front of all P's selecting a command*

1: Remove M between *fully anticipated* operators

- $PMK \rightarrow PK$

2: if a string of MKs belong to *cognitive unit* delete all M but first

- $4564.23: MKMKMKMKMKMKMK \rightarrow MKKKKKKK$

3: if K is a *redundant terminator* then delete M in front of it

- $\swarrow\swarrow: MKMK \rightarrow MKK$

4a: if K terminate a constant string (command name) delete the M in front of it

- $cd\swarrow: MKKMK \rightarrow MKKK$

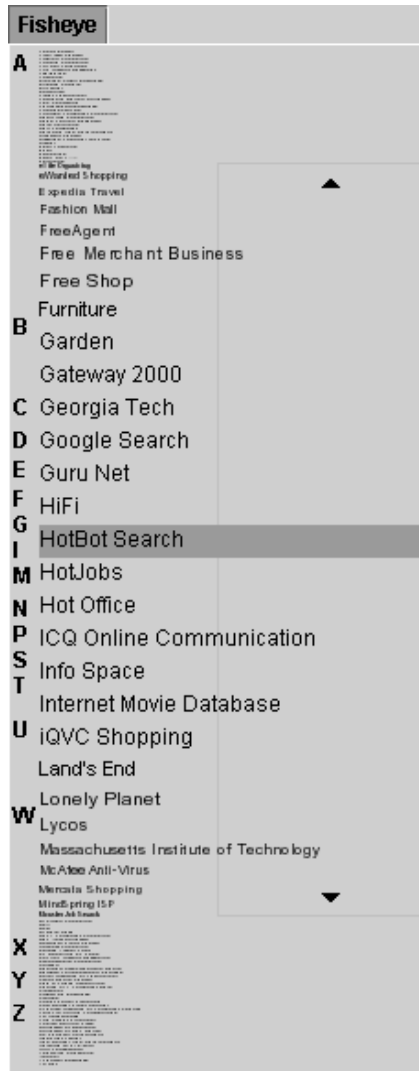
4b: if K terminate a variable string (parameter) keep the M in front of it

- $cd\ class\swarrow: MKKKMKKKKKMK \rightarrow MKKKMKKKKKMK$

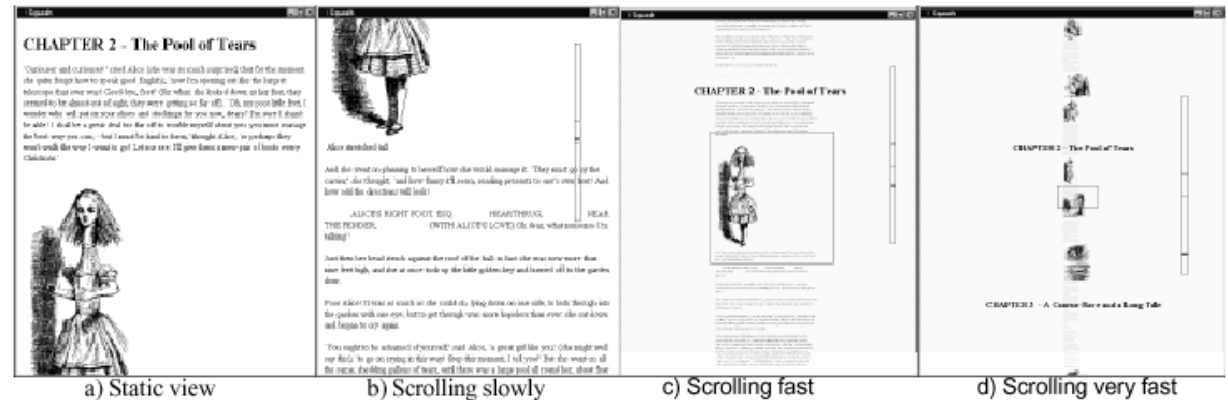
How to select a movie? (I)

- Picking from a list
 - Standard list (Windows for example)
 - Fisheye Menus [Bederson 2000]
 - Speed dependant automatic zooming [Igarachi 2000]
 - Dynamic query system (like the SpotFire)
- Using text entry

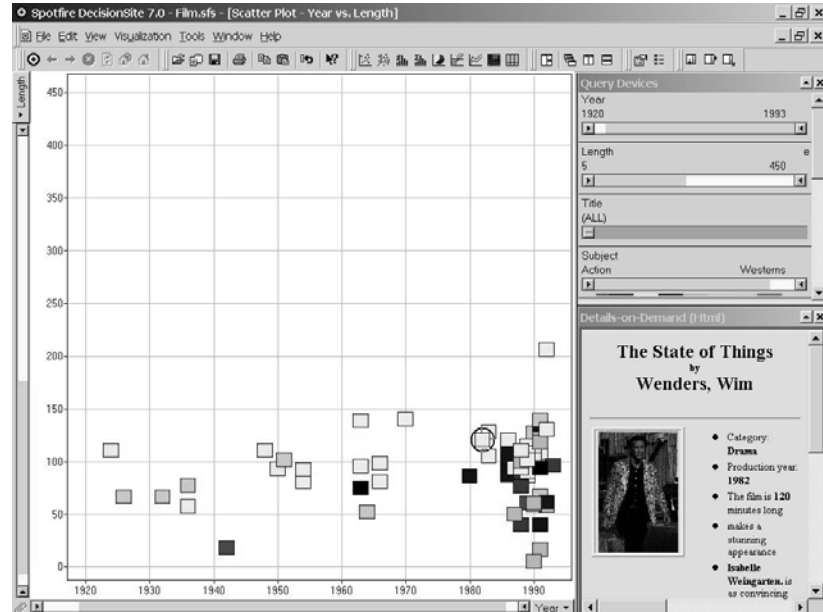
Picking a movie from a list



Fisheye menu [Bederson 2000]



Speed dependant automatic zooming [Igarachi 2000]



SpotFire

How to select a movie? (II)

- Picking from a list
- Text entry
 - Keyboards
 - *Standard*,
 - *Miniatures*
 - Phones, Blackberry
 - *Virtual on screen*
 - Touch based, game like (selecting each letter with a joystick)
 - Gesture based
 - *UniStroke* [Goldberg 93] *and Graffiti*
 - *QuikWrite* [Perlin 98] *and T-Cube* [Venolia 94]
 - *Dasher* [Ward 2000]
 - *Handwriting recognition*
 - Smart completion and advanced search engines
 - *Google...*

Keyboards



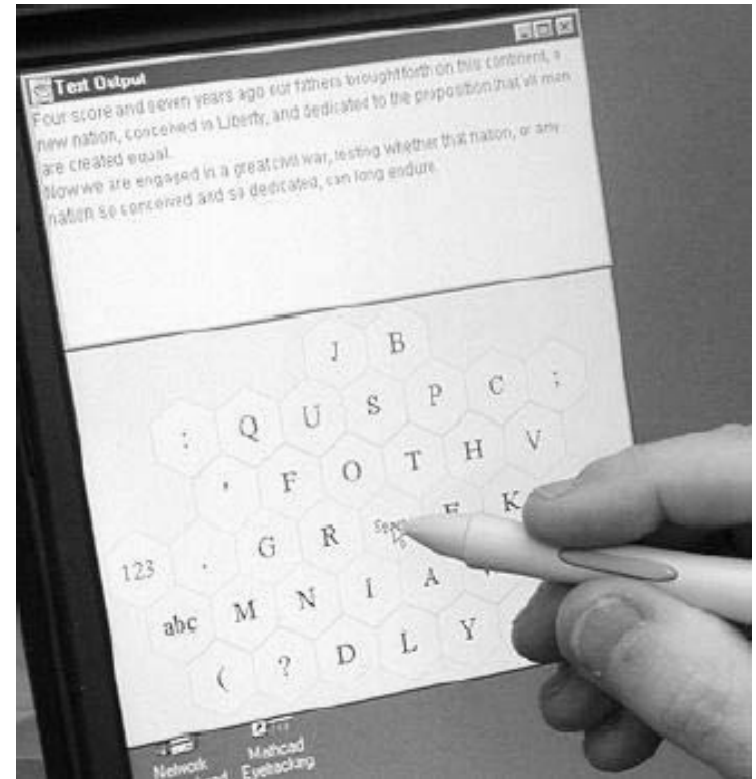
Office keyboard



Cell phone

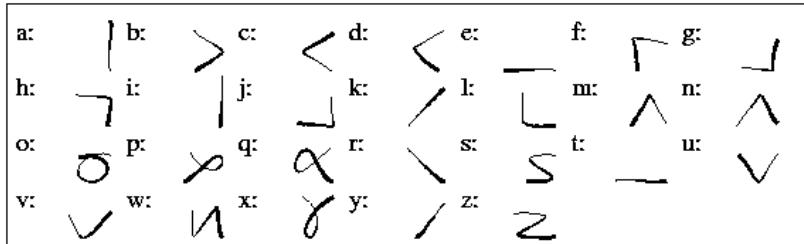


Blackberry

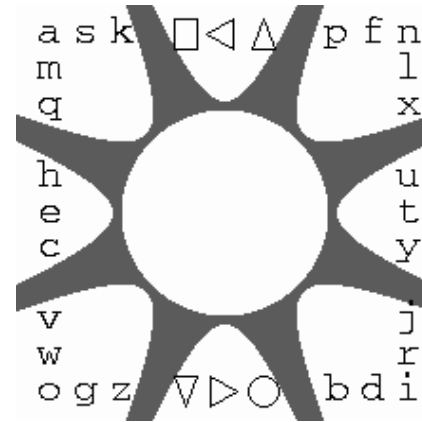


Metropolis keyboard (Zhai, IBM, 2000)

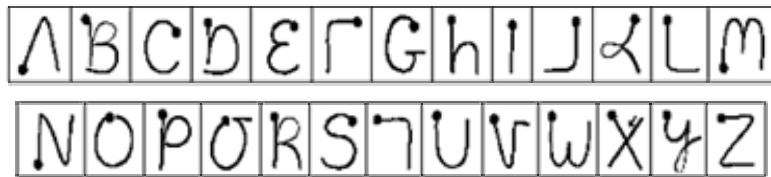
Gestures based



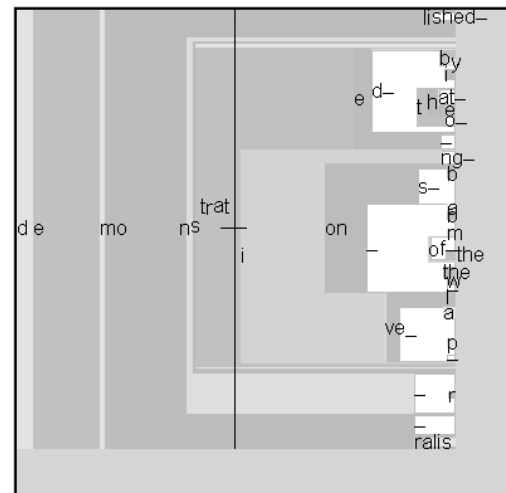
Unistroke alphabet [Goldberg 93]



QuikWriting system [Perlin 98]



Graffiti (Palm OS)



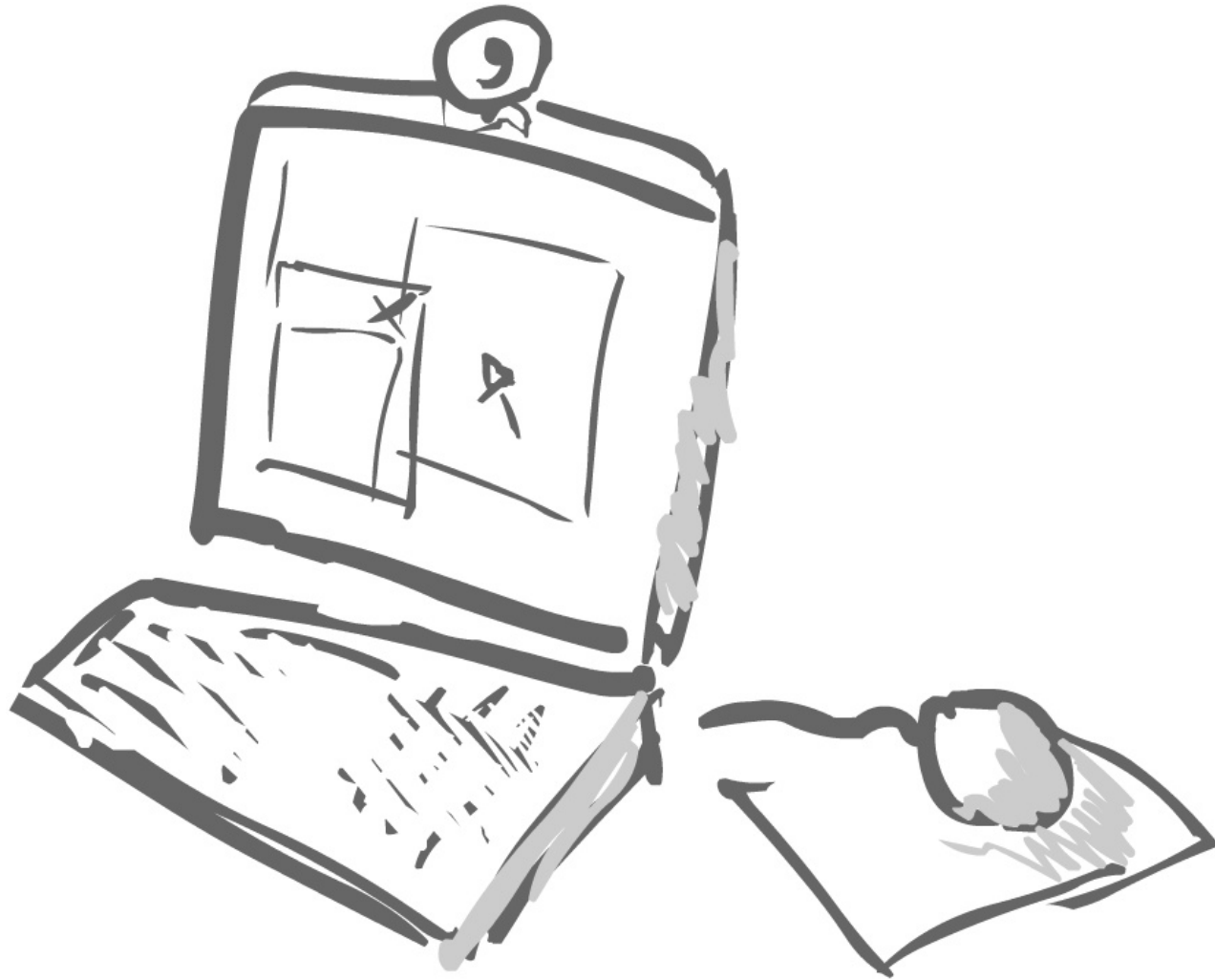
demonstrat

Dasher [Ward 2000]

How to pick a movie? (III)

- Inside a Blockbuster?
- For my on demand video system?

Computer today



Input devices I



Logitech mouse
IBM Trackpoint



Wacom



Wacom tablet



PlayStation 2

Voice



Microsoft keyboard

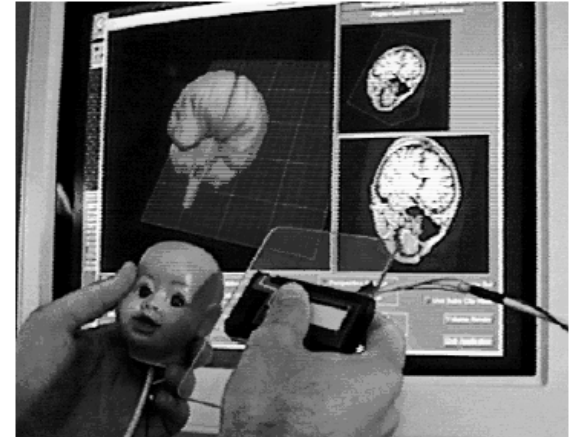
Input devices II



SpaceBall (6DOF)



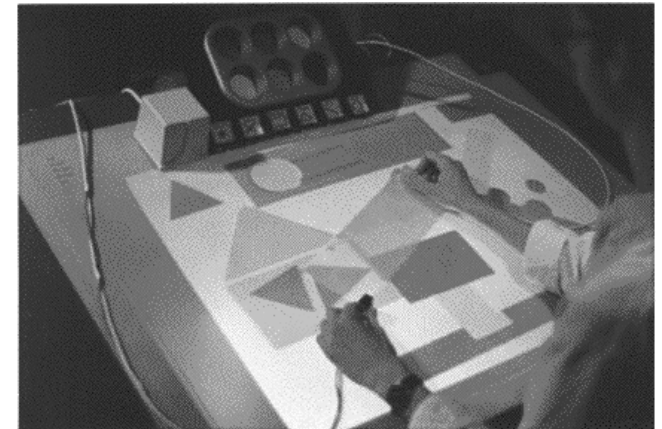
Phantom



Ken Hinckley



Anoto pen

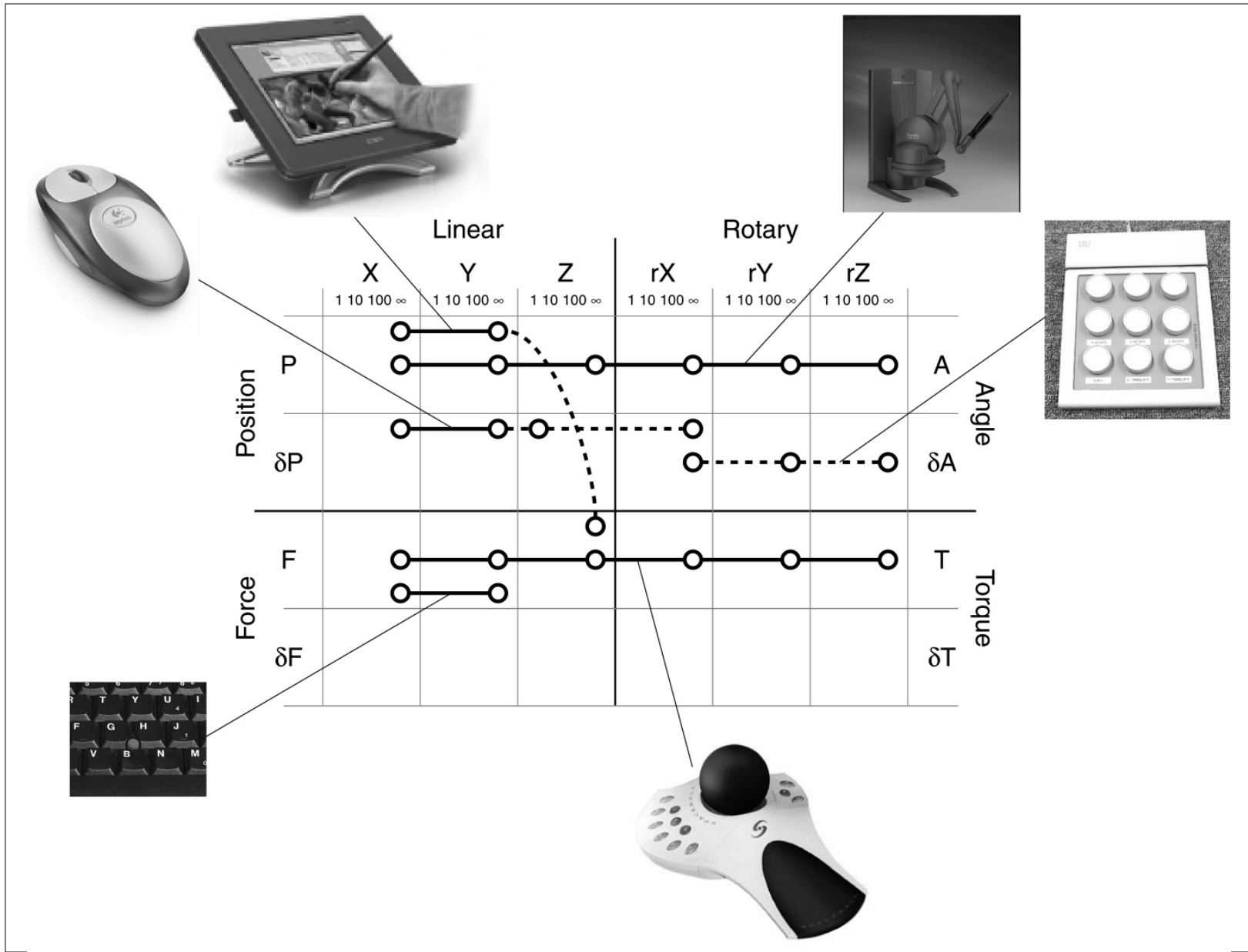


George Fitzmaurice

Input devices characteristics

- Degrees of Freedom
 - Rotary knob: (1 DOF), Mouse (2 DOF)...
 - SpaceBall (6 DOF), 2 Handed Polhemus (12 DOF)
- Isometric or Isotonic
 - TrackPoint versus mouse
- Relative or absolute
 - Mouse versus a pen on the screen
- Direct or indirect
 - Working on your desk versus working on the screen
- Linear or rotary
 - Knob versus a slider

Design space of input devices [Card et al.]



Some Insights

- Isometric or Isotonic
 - Isotonic best for position
 - Isometric best for rate control
 - *Good driver difficult to implement*
- Relative or absolute
 - Relative saves space
 - Absolute faster
- Direct or indirect
 - Direct is faster
 - Indirect maybe more ergonomic

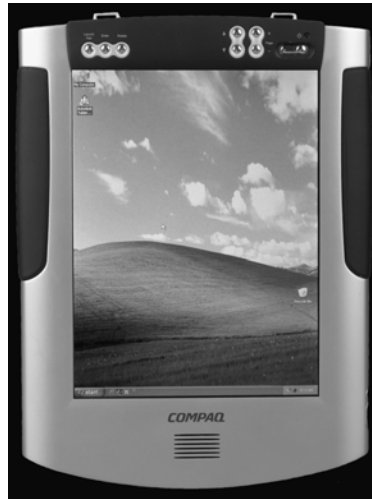
Output devices characteristics

- Modality
 - Sight, hearing, touch, taste and smell
- Dynamic or static
 - Computer display versus printer
- Resolution and size
 - From cell phone display to mural size
- How faithful to our everyday experience
 - From grey scale printed image to full color stereoscopic display

Output devices I



Wacom



Printer



Stanford interactive Mural



IBM (9 Mpixel)

Output devices II



Phantom

VirTouch



Olympus Eye-Trek

Speech

The computer for the 21st Century

(Mark Weiser)

- Unnoticeable
 - Like writing, street signs...
- Disappear into the background
 - Like electric motors
 - Not attention demanding
- 3 scales
 - Taps (100s, inches scale)
 - Pads (10s, feet scale)
 - *Scrap computers*
 - Boards (few, yards scale)



Larger Electric Fans.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Cat. No.	Model	Type	Size, in.	Price
577520	1	Swivel	15	\$10.00
577521	2	Swivel	25	\$12.50
577522	3	Swivel	35	\$15.00
577523	4	Swivel	45	\$17.50
577524	5	Swivel	55	\$20.00
577525	6	Swivel	65	\$22.50
577526	7	Swivel	75	\$25.00
577527	8	Swivel	85	\$27.50
577528	9	Swivel	95	\$30.00
577529	10	Swivel	105	\$32.50

Aids That Every Woman Appreciates

Make Sewing Easy With an Electric Sewing Machine Motor.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Electric Radiator.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Home Motor.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Portable Vibrator.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Beater Attachment.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Household Mixer.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Buffer and Grinder Attachments.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

Fan Attachment.
Quiet running. Ideal for home office. Can be set upright or swivel to wall, etc. like a bracket. We list two styles: straight and swivel. The swivel auto-matically moves from 15 to 115 volts. The straight auto-matically moves from 115 to 115 volts. Shipping wt., about 10 lbs. Price, complete, \$10.00.

New Combination Electric Fan and Lamp.

Electric fan screws into any lamp socket, while lamp bulb can be placed in socket attached to fan; thus will give both breeze and light, or either alone. Fan is of steel, 6 inches in diameter, with lamp socket attached. For usual city current of 105 to 115 volts. Shipping wt., about 10 pounds.

No. 577622 Price, with-out lamp bulb..... \$10.75

Electric Radiator.
Offers the many comforts and advantages which are to be found in other radiators listed on this page and is very similar to our No. 577527, except the difference in general appearance. Nicely nickel plated and polished, and operates on the usual city current of 105 to 115 volts. Shipping wt., about 10 pounds.

No. 577527 Price, complete..... \$8.50

Round Electric Radiator.
Turns about the same amount of electricity as our Nos. 577527 and 577528 radiators. Has general appearance of a small oil stove. More of a tendency to throw the heat upward than the other radiators have and would be very satisfactory as a foot warmer. About 7 inches high and 6 inches wide. Usual city current of 105 to 115 volts. Complete with cord and plug. Shipping weight, about 5 pounds.

No. 577528 Price..... \$5.95

Churn and Mixer Attachment.
Used in connection with the Home Motor, makes a small churn and mixer for which you will find many uses. The attachments include the base, supports, mixer, handle and special cover for jar. Shipping weight, about 15 pounds.

No. 577582 Price..... \$1.30

Vibrator Attachments for Home Motor.
Include the special connection, three applicators and handle. Not necessary to buy a complete vibrator if you have the Home Motor. Shipping weight, about 5 pounds.

No. 5776302 Price..... \$1.35

Household Mixer.
Quickly attached to any lamp socket. You will find many uses for this handy device. Shipping weight, about 35 pounds.

No. 577580 Price, complete as shown..... \$5.95

Buffer and Grinder Attachments.
Will be found very useful in many ways around the house. Used in connection with the Home Motor and include grinding and buffing wheels with bumper compound. Shipping weight, about 5 ounces.

No. 577584 Price..... \$1.35

The invisible computer (Norman)