

Metaphors and Direct Manipulation

Metaphors
 Direct manipulation
 Dynamic queries

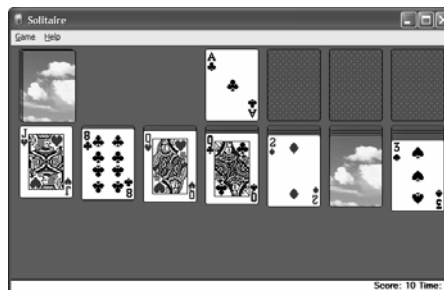
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Metaphors

Pervade excellent interfaces

	A	B	C	D
1	Market value	Land	Improvement	Total assess
2	140.0	65,850.	73,120.	138,970.
3	147.0	77,780.	72,070.	149,850.
4	151.0	74,850.	88,740.	163,590.
5	152.0	80,110.	99,410.	179,520.
6	155.0	79,050.	109,130.	188,180.
7	170.0	94,750.	50,960.	145,710.
8	172.0	82,150.	106,250.	188,400.
9	178.0	78,560.	132,660.	211,220.
10	180.0	92,840.	105,670.	198,510.
11	180.0	80,090.	103,130.	183,220.
12	162.0	76,650.	115,210.	191,860.
13	165.0	75,590.	152,710.	228,300.
14	165.0	85,870.	105,330.	191,200.
15	165.0	80,060.	113,600.	193,660.
16	193.4	80,140.	131,340.	211,480.
17	194.5	73,400.	176,210.	249,610.
18	197.0	84,960.	129,800.	214,760.
19	203.0	91,600.	119,170.	210,770.
20	205.0	79,460.	137,250.	216,710.
21	213.0	87,060.	124,350.	211,410.
22	221.0	97,330.	167,500.	264,830.
23	225.0	87,160.	157,290.	244,450.
24	245.0	79,520.	144,840.	224,360.
25	248.0	89,470.	183,500.	272,970.
26	278.0	82,150.	168,720.	250,870.
27	302.5	118,500.	109,800.	228,300.
28	308.0	83,100.	141,730.	224,830.

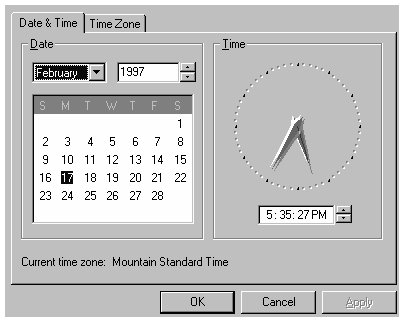
spreadsheet (actuary sheet)



games (literal world)

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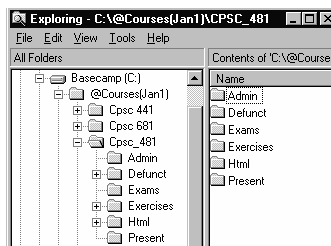
Metaphors



Control Panels with familiar controls

Name: _____
Address: _____
City: _____
Province: _____
Postal Code: _____

Forms



Hierarchical Folders

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Metaphors in interfaces

Definition

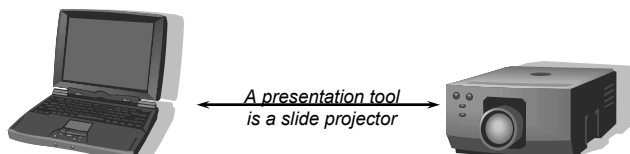
- represents a system object as if it were another type of object
 - disc / network file structure *represented as* file folders

Purpose

- leverages our knowledge of familiar, concrete objects to understand abstract computer and task concepts

Problem

- metaphor portrays inaccurate/naive conceptual model of the system



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Metaphors in interfaces

Things to watch for

- Use metaphors that matches user's conceptual task
 - desktop metaphor for office workers
 - paintbrush metaphor for artists...
- Given a choice, choose the metaphor close to the way the system works
- Ensure emotional tone is appropriate to users
 - eg file deletion metaphors
 - trashcan
 - black hole
 - paper shredder
 - pit bull terrier
 - nuclear disposal unit...

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Metaphors in interfaces

Things to watch for

- will it restrict what people could actually do?
 - strict file/folder hierarchy
 - vs
 - system allows links between directories
- will it set unrealistic expectations?
 - Clipit



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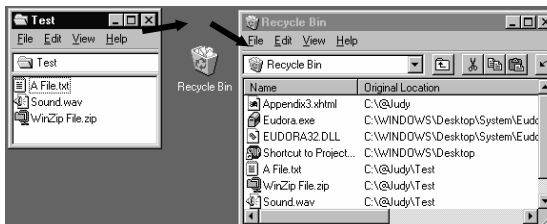
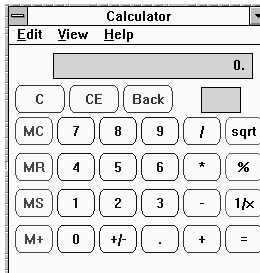
Metaphors in interfaces

Common pitfalls

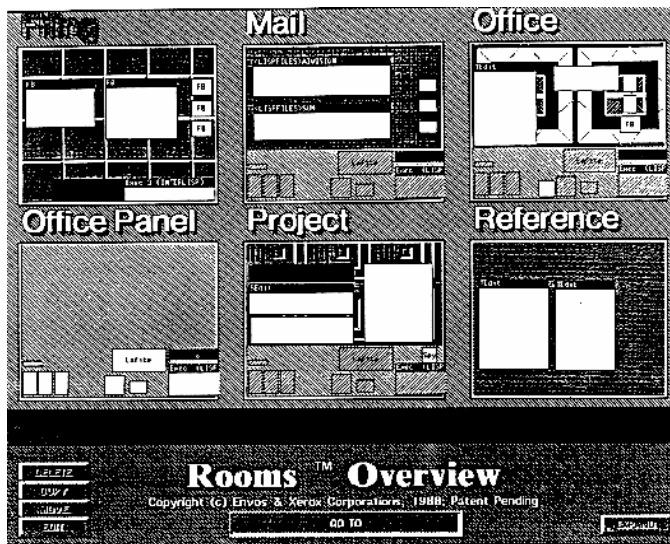
- overly literal
 - unnecessary fidelity
 - excessive interactions
 - unnecessary restrictions

- overly cute
 - novelty quickly wears off

- mismatched
 - does not match user's task and/or thinking



Rooms



Xerox PARC

Saul Greenberg

TeamRooms

The screenshot displays the TeamRooms application interface. On the left, there are two panels: "Rooms on this Server" and "Logged in Users". The "Rooms on this Server" panel lists several rooms, including "TeamRooms feedback ()", "Ideas for Papers (Linda)", "meeting ()", "Dilbert ()", "Mark Roseman's Room (Mark, Saul, gut)", and "gordon's den of inadequacy ()". The "Logged in Users" panel shows three users: "Mark Roseman (Mark Roseman's)", "Saul Greenberg (Mark Roseman's)", and "Carl Gutwin (Mark Roseman's Room)".

The main window is titled "TeamRooms - Mark Roseman's Room". It features a "shared whiteboard" with a "GroupKit" logo and a diagram showing "groupkit evolution" and "teamrooms" connected to "gk classic". There are also "applets" displayed, including a "GOGCHI Site" and a text area with a message: "I think it would be useful if you could notify a user that you wanted their attention, eg. Gordon was writing a message to me in the text chat area, but I was totally unaware of it until he yelled at me from the next cubicle :). The user should be able to specify how they intend to be notified (eg. flashing the screen, playing a sound, popping up a box....). Also, the Web applet seems to generate errors in... Whenever I enter 'Teamrooms Feedback' I get the error, and as a result teamrooms crashes me out when I change to any room. Simon....".

At the bottom, there is a "chat tool" window showing a chat log with messages from Mark Roseman, Saul Greenberg, and Carl Gutwin.

Labels with arrows point to the "shared whiteboard", "applets", and "chat tool".

Roseman and Greenberg, U Calgary

Saul Greenberg

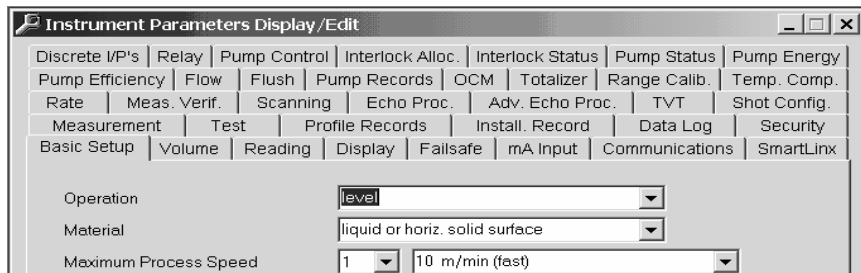
TeamRooms

Room metaphor implies:

- persistent room artifacts
- both synchronous and asynchronous activity
- asynchronous communication by sticky notes attached to artifacts
- "for free" standard tools
- ability to bring in custom tools via (applets)
- same place/different place activity
- knowing who is around
- trivial groupware connectivity
- ...

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Metaphor misuses



Milltronics' Dolphin Plus - a configuration package for industrial level and flow sensors

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Direct Manipulation

Direct manipulation

- interface behaves as though the interaction was with a real-world object rather than with an abstract system
- the feeling of working *directly* on the task

Central ideas

- visibility of the objects of interest
- rapid, reversible, incremental actions
- manipulation by pointing and moving
- immediate and continuous display of results

Almost always based on a metaphor

- mapped onto some facet of the real world task semantics

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Direct Manipulation

objects understood in terms of their visual characteristics

- affordances, constraints

actions understood in terms of their effects on the screen

- causality

intuitively reasonable actions can be performed at any time

- conceptual model

“A subtle thing happens when everything is visible:
the display becomes reality”

Xerox Star inventors

Saul Greenberg

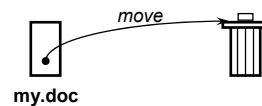
Object-Action vs Action-Object

Select object, *then* do action

- interface emphasizes 'nouns' (visible objects) rather than 'verbs' (actions)

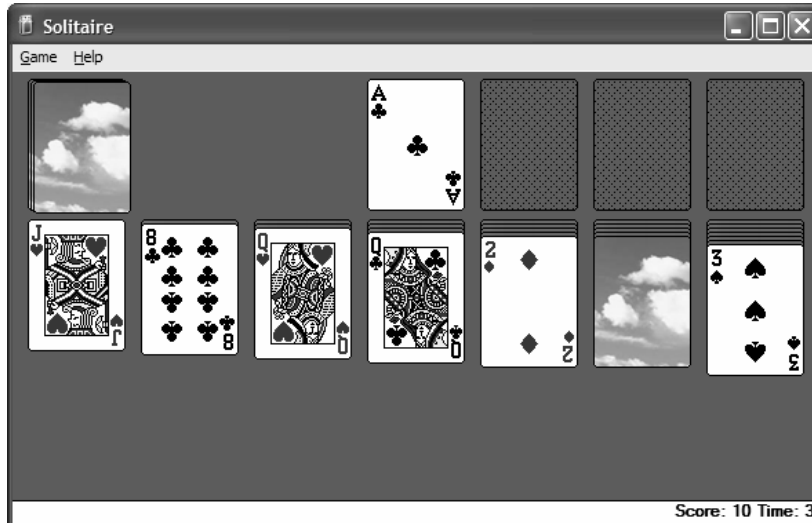
Advantages

- closer to real world
- modeless interaction
- *actions* always within context of object
 - inappropriate ones can be hidden
- *generic commands*
 - the same type of action can be performed on the object
 - eg drag 'n drop:
 - folders
 - files
 - paragraphs
 - text
 - numbers...



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Direct Manipulation

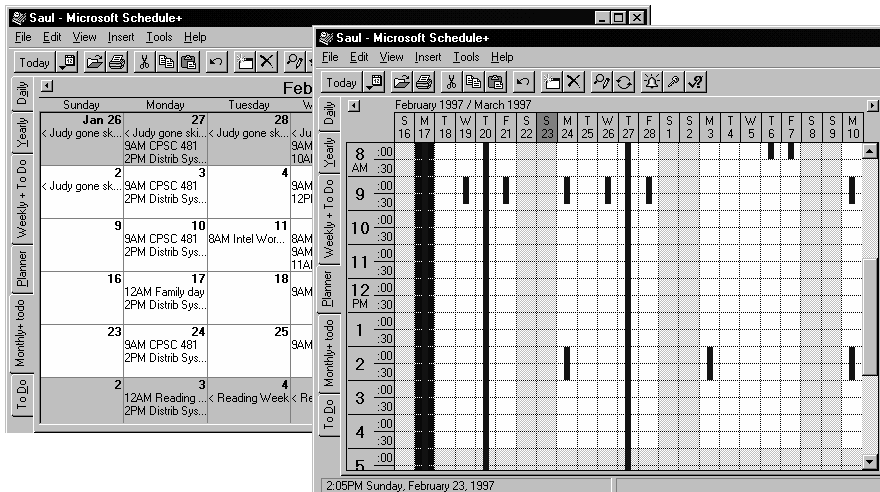


Microsoft Solitaire

Saul Greenberg

Direct manipulation

Representation affects what can be directly manipulated



Microsoft Schedule+

Saul Greenberg

Contact lists

Find "Green"
>S. Greenberg
>Dept Computer Science
>University of Calgary

Command system
no direct manipulation

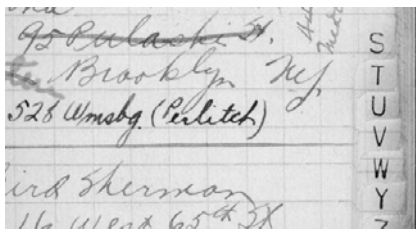


Form metaphor:
syntactic direct
manipulation

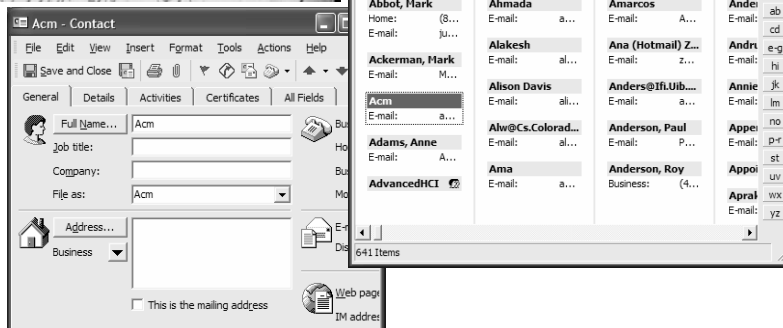
ICQ

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Contact lists



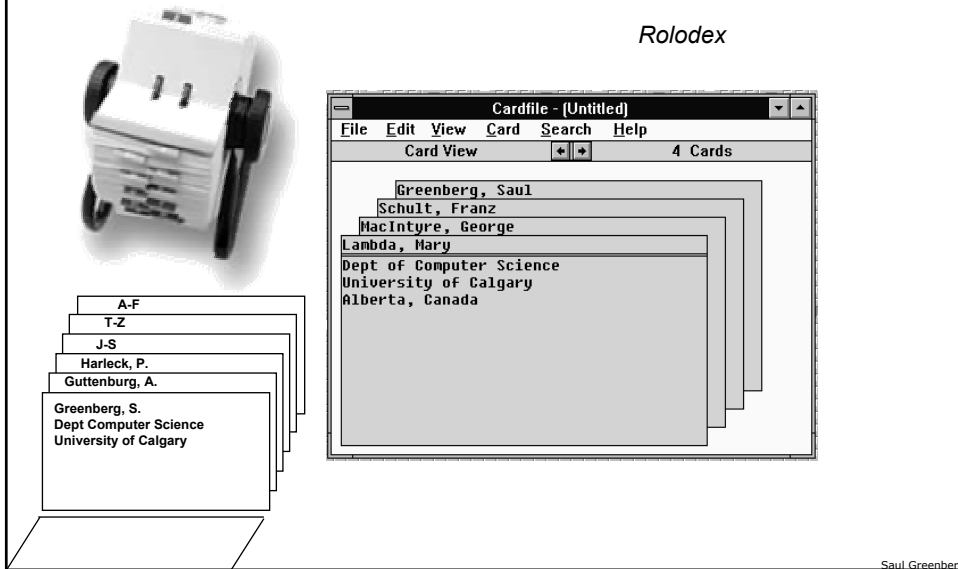
Phone book
a mix...



Microsoft Outlook

Saul Greenberg

Contact lists



Contact lists



Is direct manipulation the way to go?

ill-suited for abstract operations

tedious

- manually search large database vs query

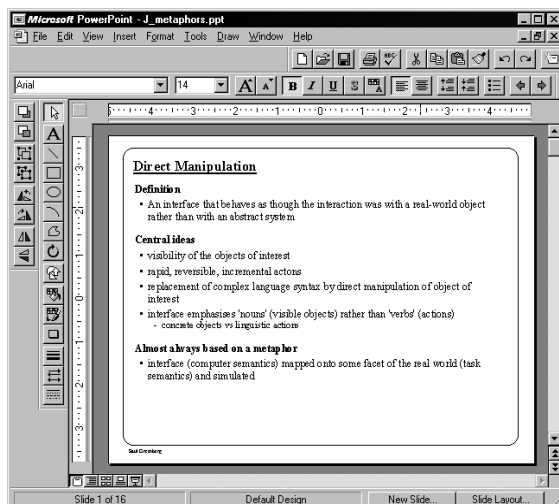
Solution

- Most systems combine direct manipulation and abstractions
 - word processor:
 - WYSIWYG document (direct manipulation)
 - buttons, menus, dialog boxes (abstractions, but direct manipulation "in the small")

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Direct and abstract manipulation

Most good applications mix the two for power



Saul Greenberg

Dynamic queries

Searches and queries by

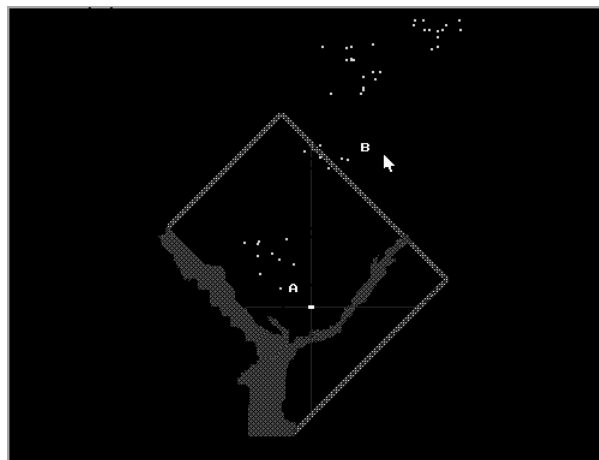
- adjust sliders, buttons, check boxes, and other control widgets
- display immediate updates as the control is adjusted

Why?

- rapid searching with imprecise queries
- people explore data interactions and limits

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Home Finder



The yellow dots above are homes in the DC area for sale. You may get more information on a home by selecting it. You may drag the 'A' and 'B' distance markers to your office or any other location you want to live near. Select distances, bedrooms, and cost ranges by dragging the corresponding slider boxes on the right. Select specific home types and services by pressing the labeled buttons on the right.

Dynamic HomeFinder

Reset Quit

Save Print

Dist to A:

1 19 30

Dist to B:

1 6 30

Bedrooms:

1 2 4 7

Cost:

\$50k \$500k

1.6 38

Look at:

Hse TH Cnd

Features:

Grg Fp1

CAC New

Shneiderman et al University of Maryland <http://www.cs.umd.edu/hcil/spotfire/>

HomeBay

The screenshot shows the HomeBay website interface. On the left, there are three callout boxes with arrows pointing to specific features:

- Dynamic Queries:** Points to the search filters, including Price Range, Square Footage, and Property Type.
- Radar Overview:** Points to the map area showing property locations in Calgary.
- Progressive details on demand:** Points to a property detail popup for a house at 50 Avenue SW, North Covechild, Two-Story, priced at \$199,900.

The main interface includes a search bar, a list of search results with columns for Price, Area, and Property Type, and a map of Calgary with property markers.

481 Student Project (April, 2000) Rob Pearson, Kashama Willms and James Chisan

Starfield Display

The screenshot shows the Starfield Display website. The main feature is a starfield plot where the vertical axis represents 'Popularity' (ranging from 2 to 9) and the horizontal axis represents 'Year of Production' (ranging from 1960 to 1995). The plot contains numerous small rectangular markers representing movies.

Below the plot, there is a detailed view for the movie 'Witches of Eastwick, The':

- Title:** Witches of Eastwick, The
- Director:** Miller, George
- Year:** 1987
- Country:** USA
- Language:** English
- Actors:** Nicholson, Jack; Jenkins, Richard; Joakum, Keith; Struycker, Carel
- Actresses:** Cher; Sarandon, Susan; Pfeiffer, Michelle; Cartwright, Vero
- Length:** 105
- Ratings:** G, PG, PG-13, R
- Films Shown:** 210

At the bottom, there are navigation buttons for genres: ALL, Drama, Mystery, Comedy, Music, Action, War, Sci-Fi, Western, and Horror.

Ahlberg, University of Maryland <http://www.cs.umd.edu/hcil/spotfire/>

What you now know

Metaphors

- leverages our knowledge of the familiar and concrete

Direct manipulation

- visibility of the objects of interest
- rapid, reversible, incremental actions
- manipulation by pointing and moving
- immediate and continuous display of results (dynamic queries)

Saul Greenberg

