Chapter 4 - Basic Rules for UI Design

- Affordances
- Constraints
- Mappings
- Consistency and predictability
- Feedback
- Error tolerance and error avoidance
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- Physics analogy
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Affordance

"A situation *X* affords action *Y* to an animal *Z* on occasion *O* if certain relevant compatibilities between *X* and *Z* obtain"
(Shaw et al. 1982)

Affordance

"A situation *X* affords action *Y* to an animal *Z* on occasion *O* if certain relevant compatibilities between *X* and *Z* obtain"
(Shaw et al. 1982)

Don Norman 1994
https://www.youtube.com/watch?v=NK1Zb_5VxuM&t=6s

I should have used the term "perceived affordance," for in design, we care much more about what the user perceives than what is actually true.
Donald Norman, www.jnd.org

Find the Affordance!








Don Norman: a brief quote on affordances

Signs as Indicators of Bad Design?

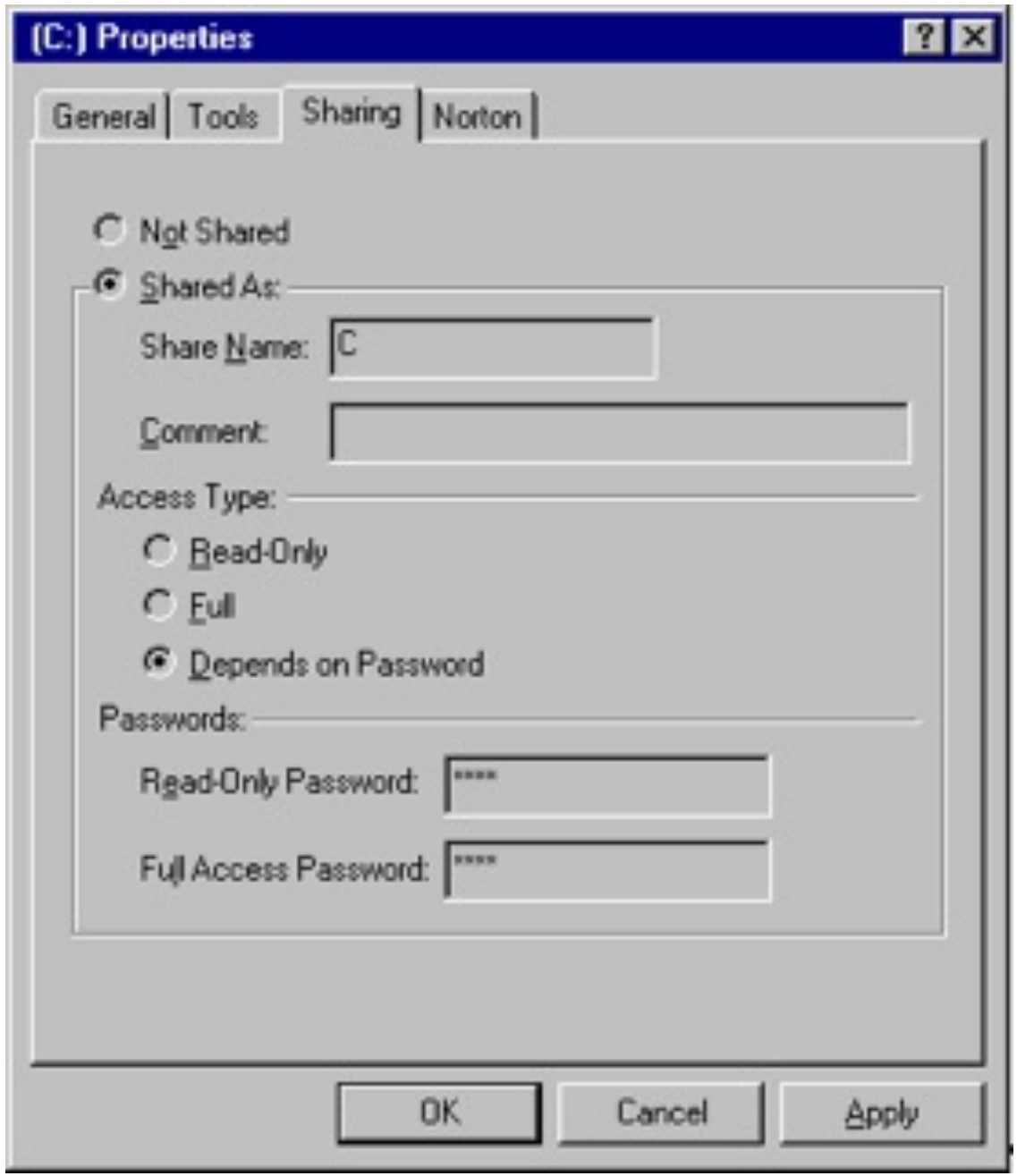
Cafe Luitpold, Munich

- (Group) task: What would be a good way to convey the fact that a motion sensor is used?

What is Wrong?

http://www.teknoblog.com/wp-content/uploads/2013/03/siemens-sx-1-170313.jpg

Affordances in GUIs



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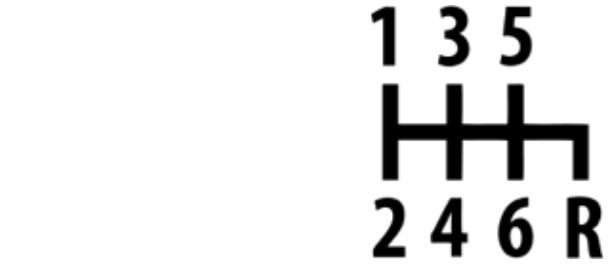
Physical Constraints



Logical Constraints

Cultural Constraints

http://mietenstopp.blogsport.de/images/stop_zwangsraeumungen_ar_2010px.png

http://3.bp.blogspot.com/--rvZLZDzpik/T2C6VgYVq8I/AAAAAAAAAGA/EeT0FKmTHWk/s1600/recycling.jpg

http://www.fotos-aus-china/Bilder/shanghai9.jpg

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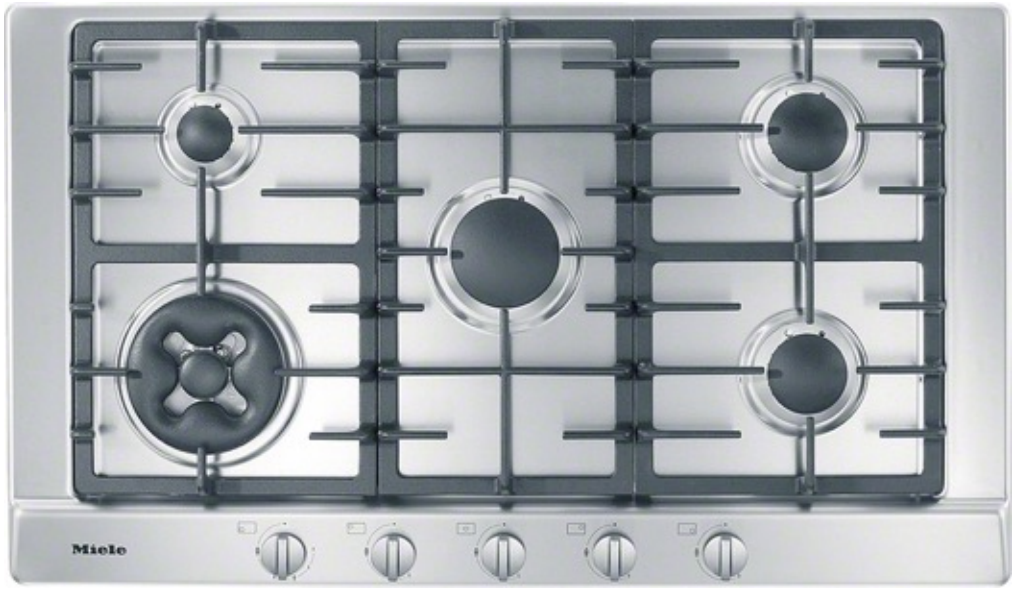
Which Valve Controls Which Flame?



Origins of the Button Arrangement?


900 kg
ODER 12 PERSONEN
4
3
2
1
E
K
NOTBREMSE
ALARM
1971
FABR NR
301545


4
3
0
2
-2
-1
EcoDisc

Mappings & Gulf of Execution

- ISO 2575
  - 4.21 Fog Light
  - 4.22 Rear Fog Light

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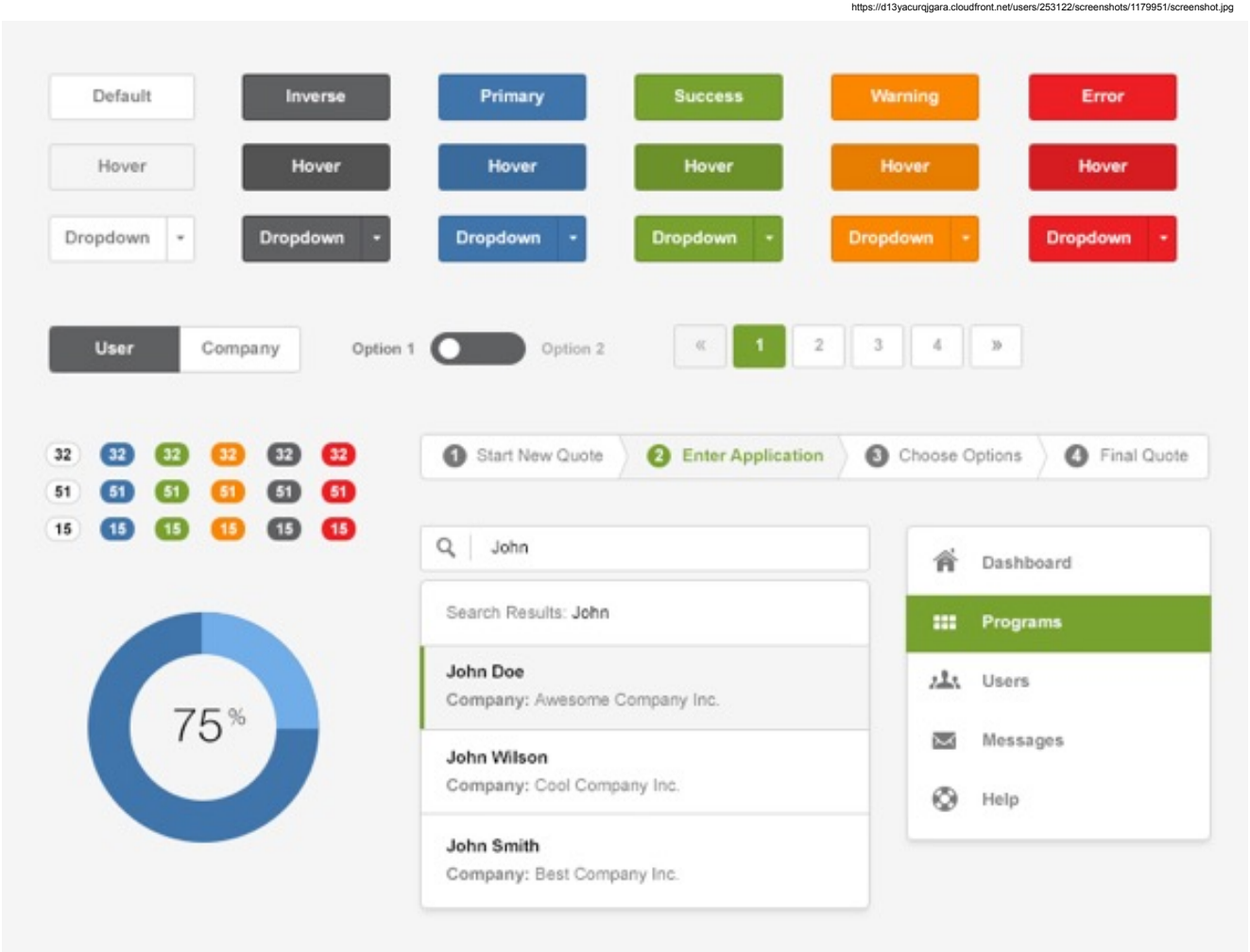
Types of Consistency

- Syntactic consistency
- Semantic consistency
- Lexical/terminological consistency

- Internal consistency
- External consistency

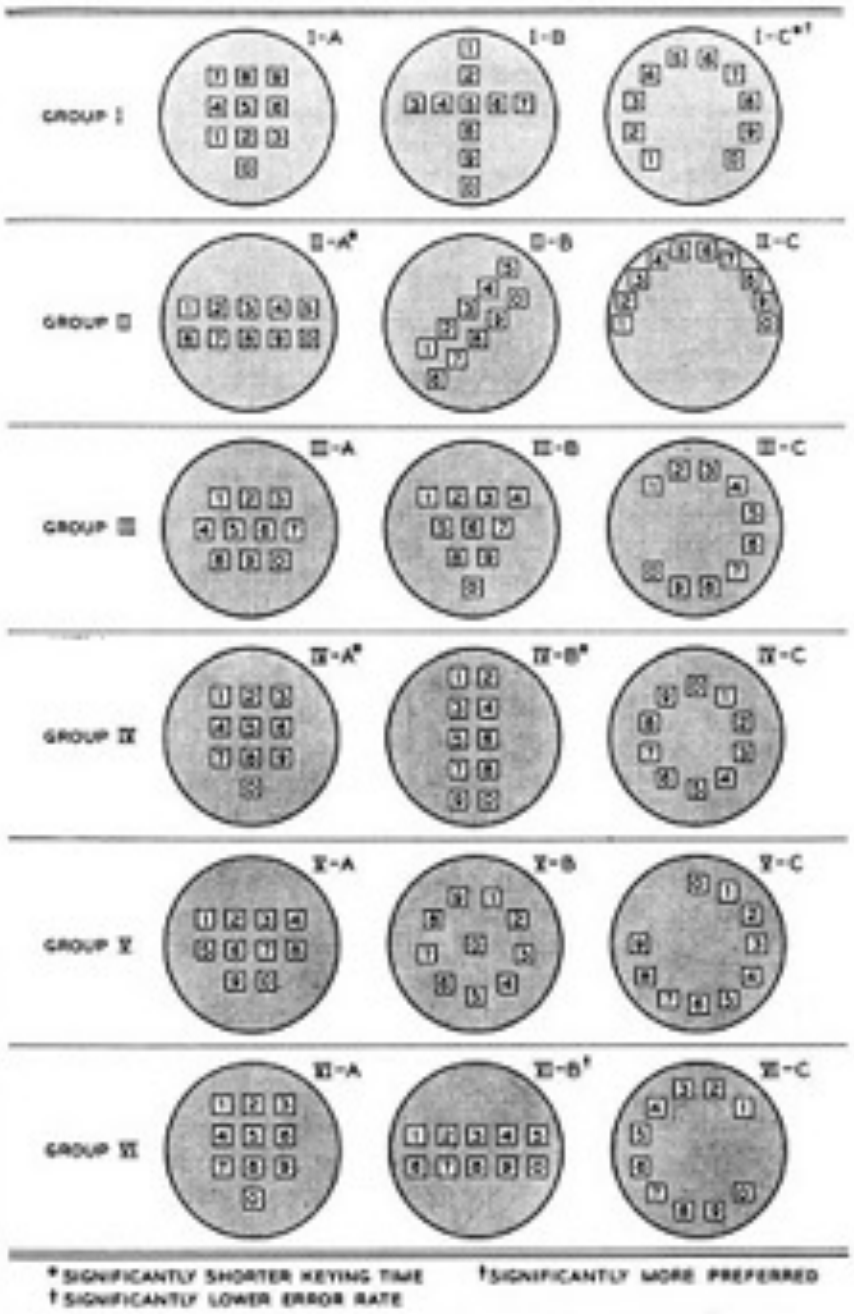


Current Example: Google Material Design

https://www.youtube.com/watch?v=Q8TXgCzxEnw

A Surprising Inconsistency…

Historic Excursion: Phone Keypads



Bell System Technical Journal 1960:
Human Factor Engineering Studies of the Design and Use of Pushbutton Telephone Sets

http://www.vcalc.net/Keyboard.htm

Historic Excursion: Calculator Keypads

David Sundstrand 1914

IBM Keypunch Machine
for card-based computer input
(approx. 1970)

http://www.vcalc.net/Keyboard.htm

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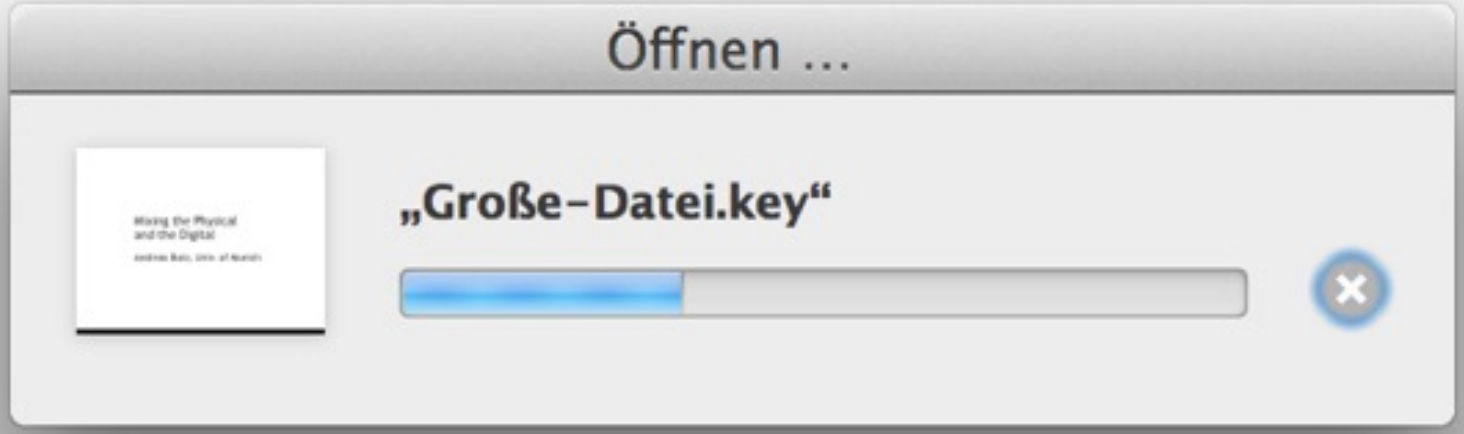
Please Wait!



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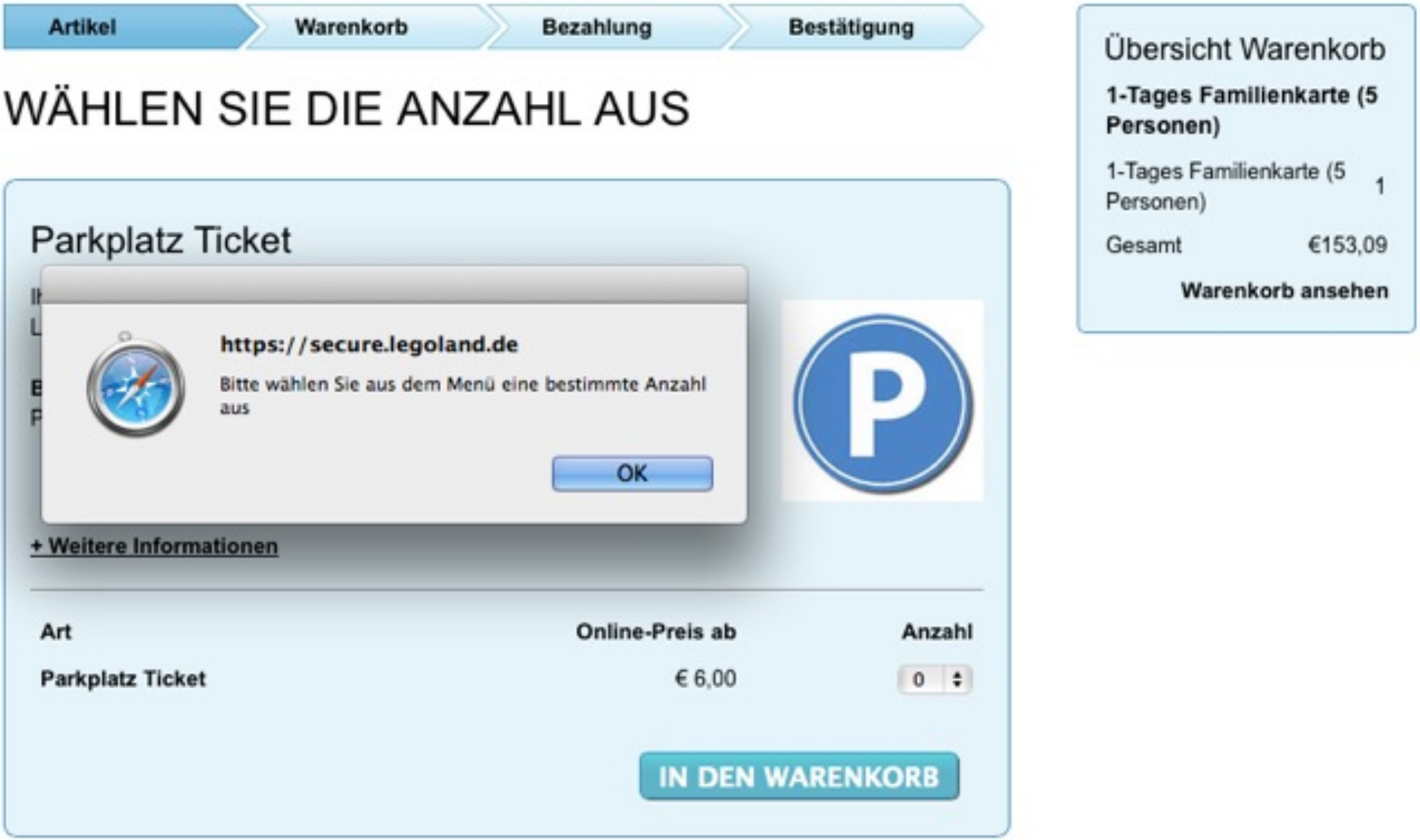
Who Is Responsible for Error Correction?

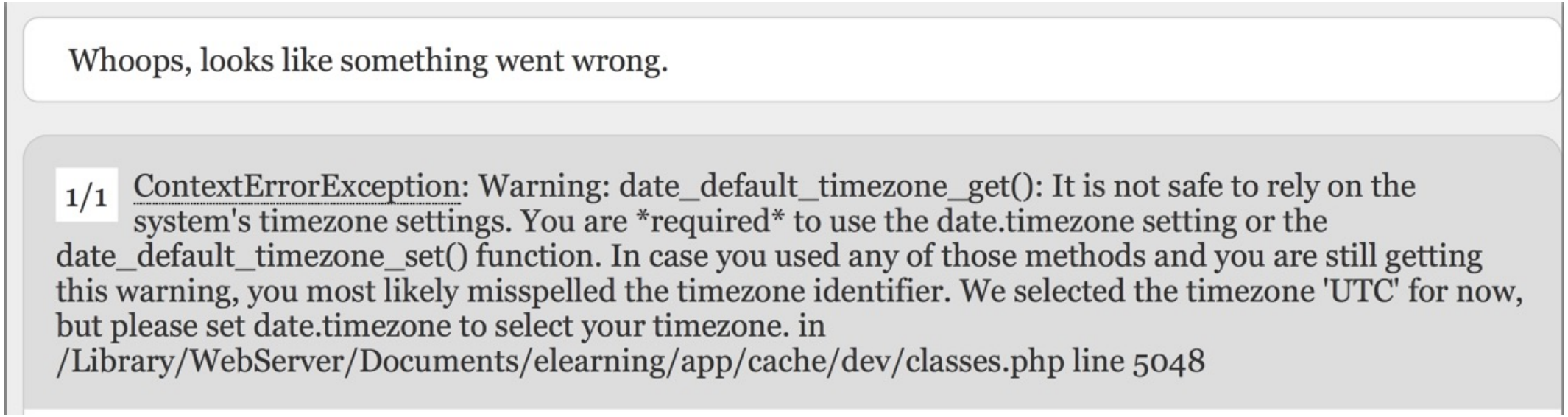
www.klm.com (2014!)

Avoidable Errors



Expressive Error Messages…

- describe the problem as specifically as possible
- contain a suggestion to solve the problem
- are polite



Error message from the “symfony” Web framework

(Not Only) Making Errors Undone: Undo

http://static3.businessinsider.com/image/529e7e42ecad04c15ddfbba2/heres-how-to-undo-a-sent-email-in-gmail.jpg

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Classical List of Rules (Mostly Covered…)

Ben Shneiderman: Designing the User Interface
See: www.cs.umd.edu/users/ben/goldenrules.html

1. Strive for consistency.
2. Cater to universal usability.
3. Offer informative feedback.
4. Design dialogs to yield closure.
5. Prevent errors.
6. Permit easy reversal of actions.
7. Support internal locus of control.
8. Reduce short-term memory load.

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Interface Animations in OSX

https://www.youtube.com/watch?v=KHYEbcqWtz4

Interface Animations in a Game

https://www.youtube.com/watch?v=HTQbbrqNre0

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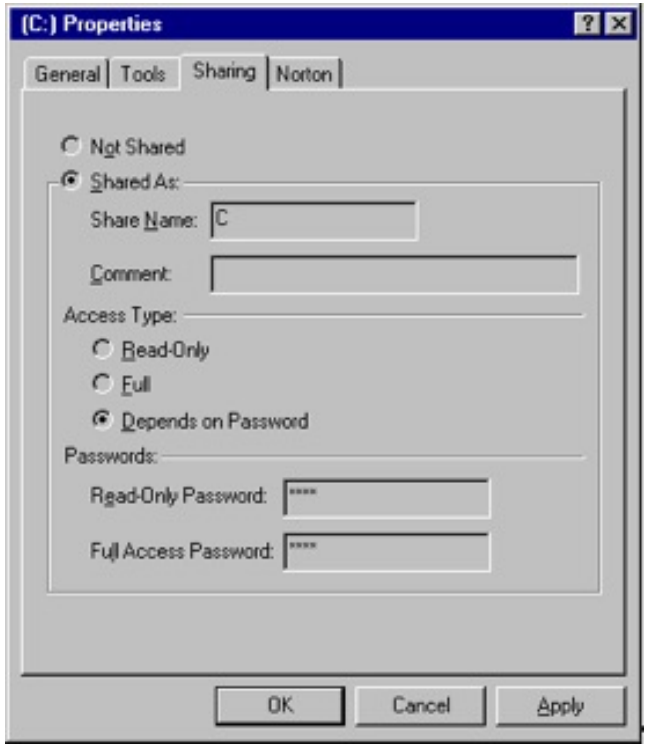
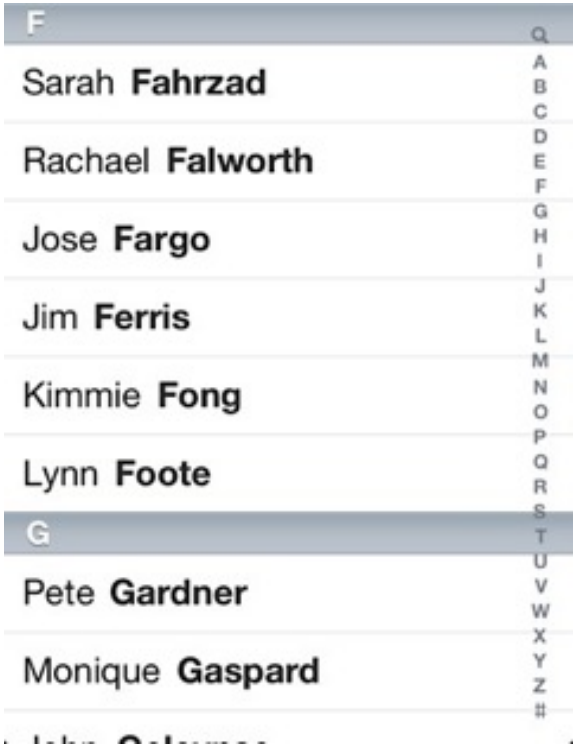
UI Elements with Physical Analogy





Physics Analogy in the Extreme: Bumptop

Chapter 7 - Basic Rules for UI Design

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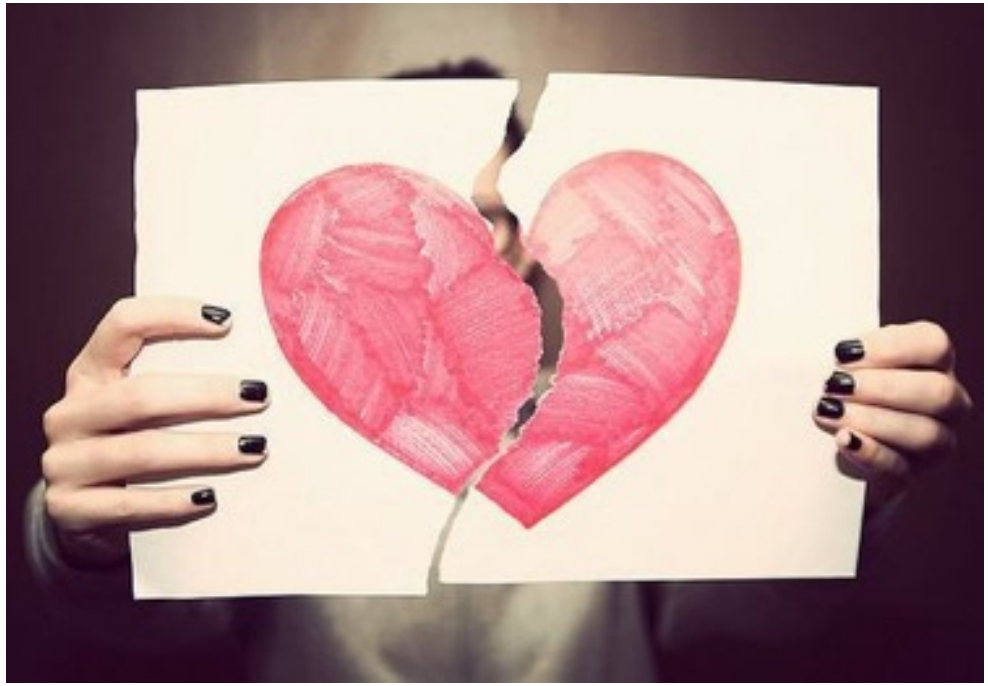
Metaphor ???

http://www.logomarket.de/images/P/17223.jpg

http://politik-digital.de/wp-content/uploads/Flaschenhals.jpg



http://cdn.maedchen.de/bilder/warum-wuerdest-du-ein-perfekt-gutes-herz-brechen-wollen-500x347-1339282.jpg

Teletype Terminal as Metaphor

http://startup.nmnaturalhistory.org/content/images/artifacts/36_l.jpg

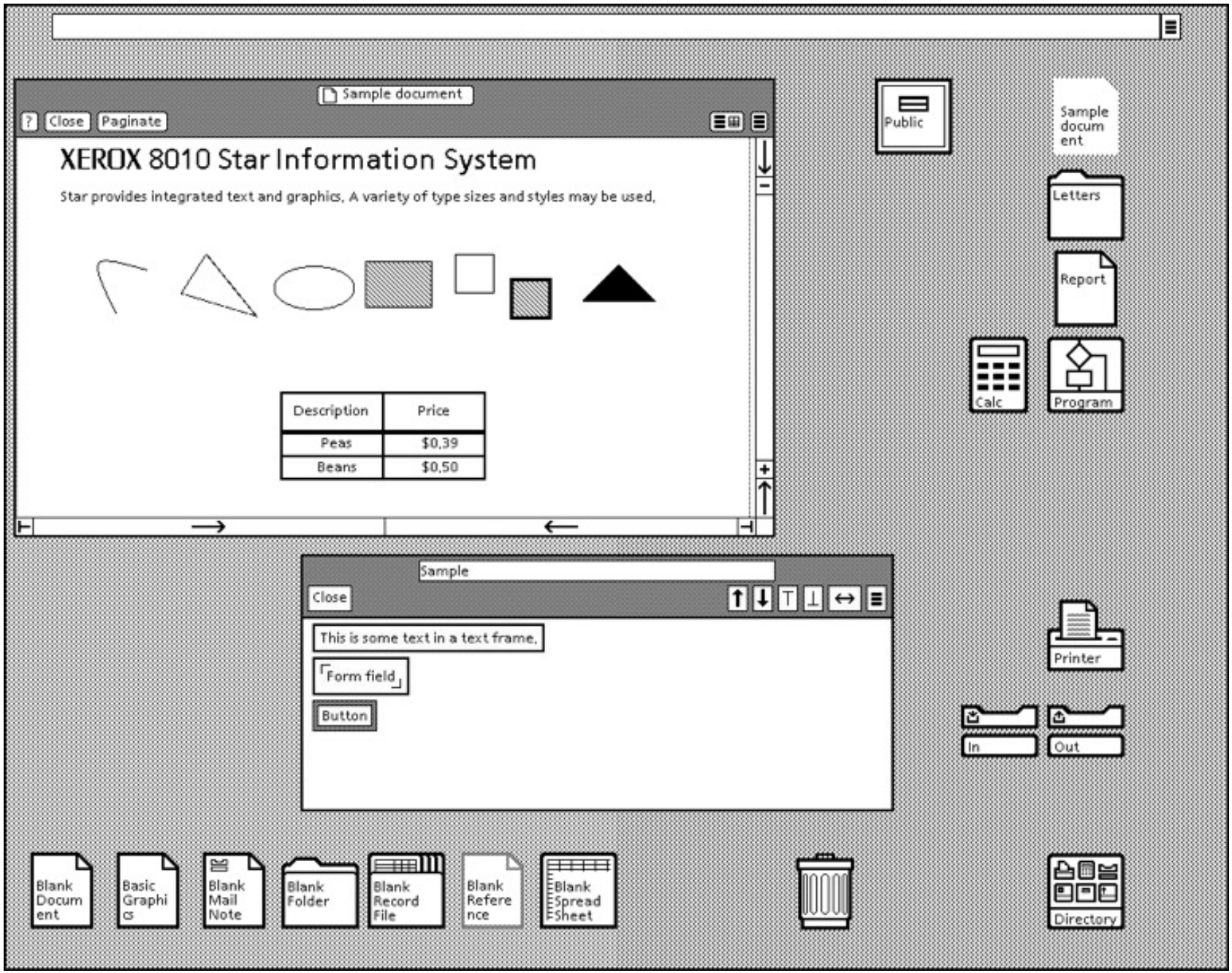
http://s7.computerhistory.org/is/image/CHM/102647895p-03-02?$re-zoomed$

USASCII code chart

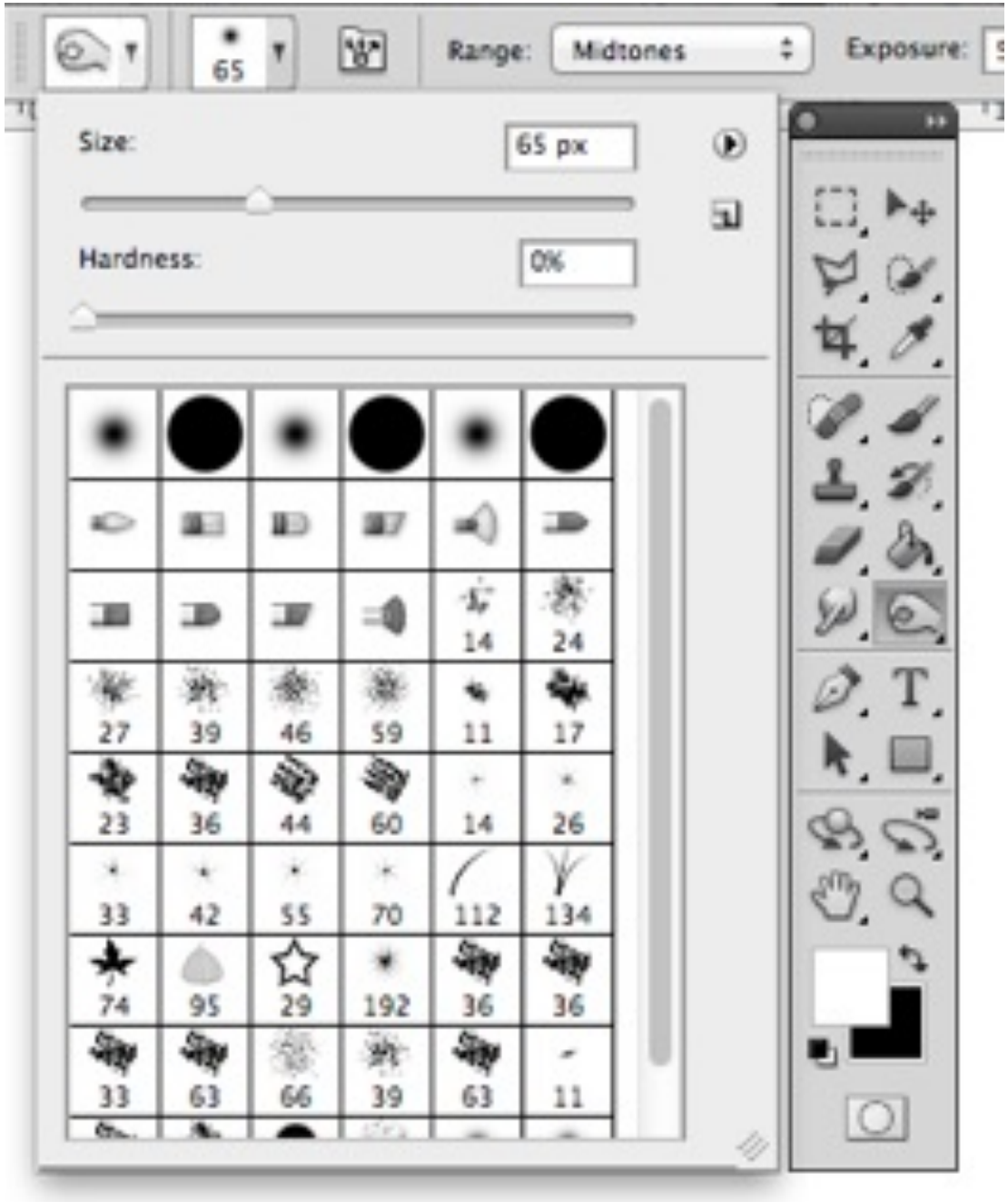
b_7 b_6 b_5 →	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
Bits b_4 ↓	b_3 ↓	b_2 ↓	b_1 ↓	Column → / Row ↓	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

Source: Wikipedia

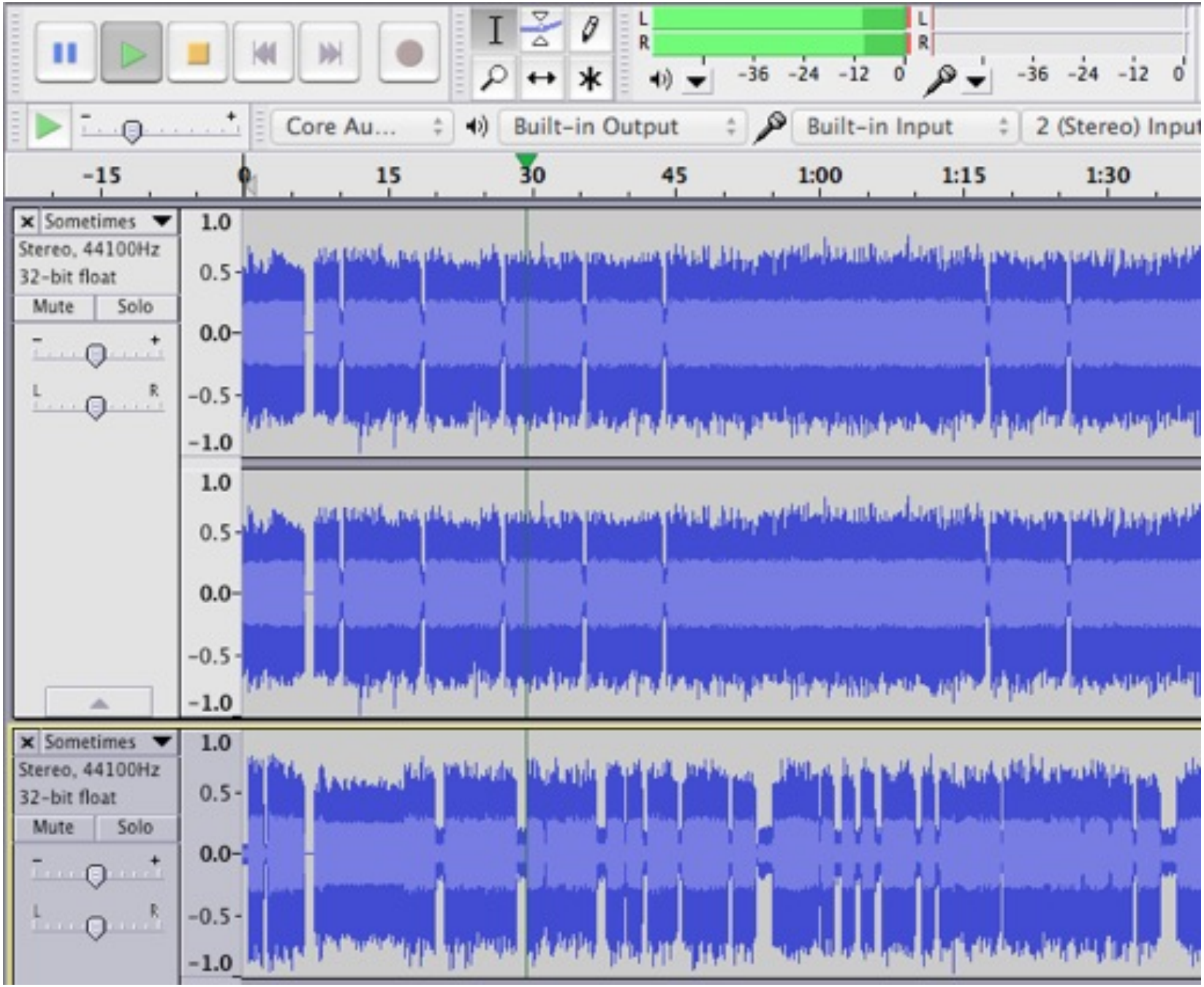
Desktop as Metaphor



Specialised Metaphors I

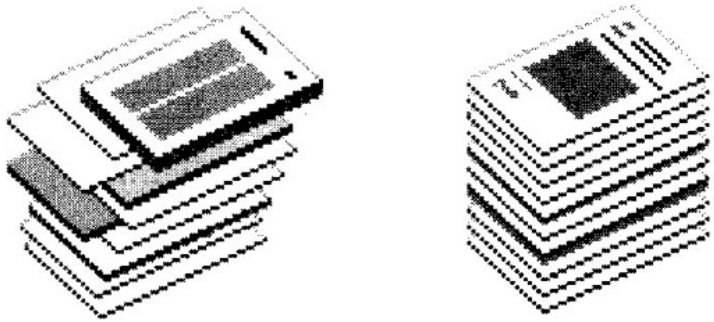


Specialised Metaphors II



Microsoft: At home with Bob

Example: “Pile” Metaphor (Mander et al., CHI’92, Apple)



(a) (b)

Figure 1. Piles on the desktop. In general, piles can contain various media, such as folders and individual documents. The pile in (a) was created by the user, and is consequently disheveled in appearance. In addition, the system can create piles for the user, based on rules explicitly stated by the user or developed through user-system collaboration. These piles have a neat appearance, as shown in (b), to indicate that there is a script, or set of rules, behind them.

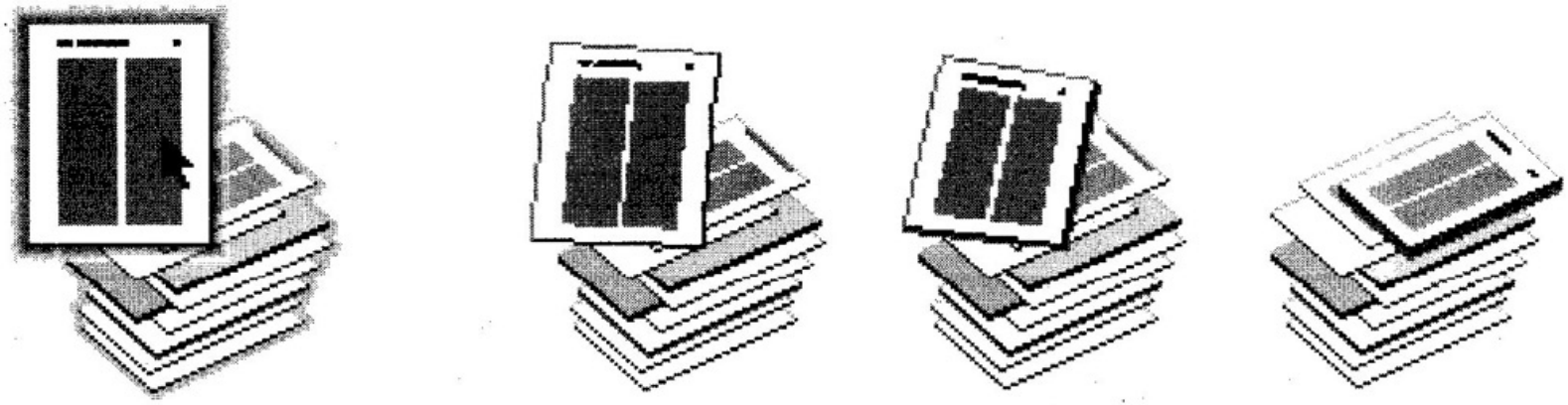
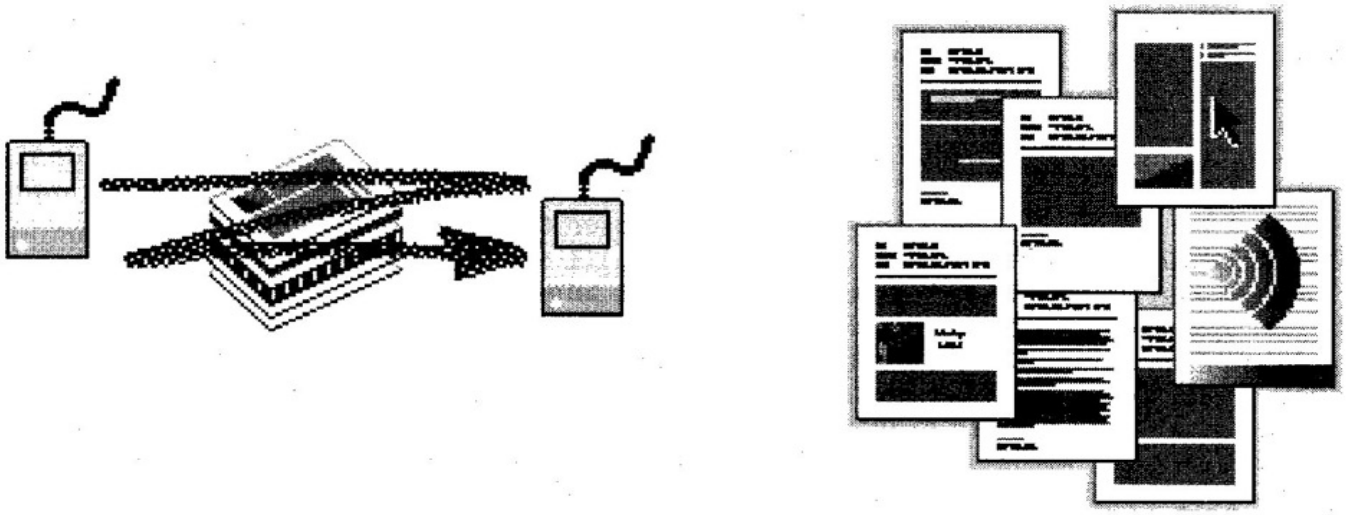
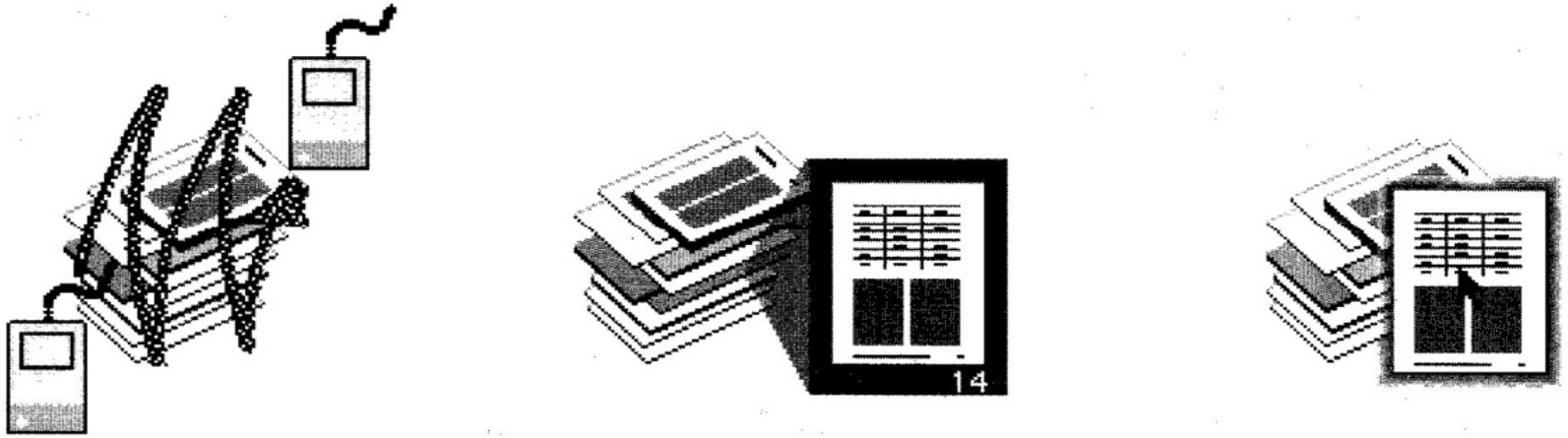


Figure 2. Adding a document to a pile. If a document is positioned over an existing pile, the pile highlights to show that it can accept the new document. When the mouse button is released the document ‘drops’ onto the pile.



(a) (b)

Figure 4. Browsing by spreading out a pile. Gesturing sideways with the mouse pointer, or with a finger in the case of a touch screen, causes the pile contents to spread out. Individual items can now be directly manipulated.



(a) (b) (c)

Figure 5. Browsing while maintaining the pile's structure. Gesturing vertically with the mouse pointer as shown in (a), or with a finger in the case of a touch screen, generates a 'viewing cone' (b) that contains a minature version of the first page of the item under the pointer. This viewing cone will follow the vertical position of the pointer; the miniature changes as the pointer moves over each item. The user can move through the pages of an item in the viewing cone by using the left and right cursor keys on the keyboard. When an item is visible in the viewing cone, it can be selected by clicking the mouse button. The item then appears next to the pile on the desktop, as shown in (c).

15 Years Later: “Flip 3D”, “Cover Flow”, “Stacks”