

Interaction Design

Chapter 11' (July 4, 2012, 9am-12pm):

Interaction beyond the desktop – yesterday and tomorrow

Your first memory of (multi)-touch?

Multi-touch



<https://en.wikipedia.org/wiki/IPhone>

Apple's iPhone

IBM's Simon phone

- ▶ *Phone calls,*
- ▶ *Faxes,*
- ▶ *E-mails,*
- ▶ *Cellular pages.*
- ▶ *Applications*
 - *address book,*
 - *calendar,*
 - *appointment scheduler,*
 - *calculator,*
 - *world time clock,*
 - *electronic note pad,*
 - *handwritten annotations*
 - *standard and predictive touchscreen keyboards.*



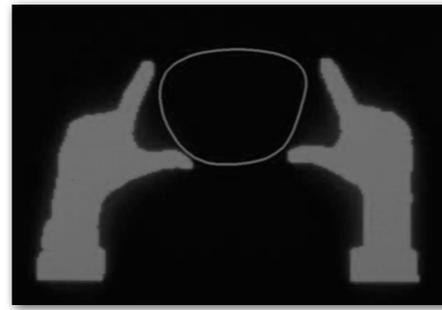
The long nose of innovation



1972 : PLATO IV



1979 : Put that there



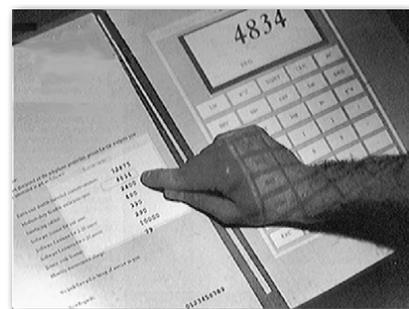
1983 : Videoplace



1985 : Multitouch tablet

(...) "new" technologies - like multi-touch - do not grow out of a vacuum. While marketing tends to like the "great invention" story, real innovation rarely works that way.

In short, the evolution of multi-touch is a text-book example of what I call "the long-nose of innovation".



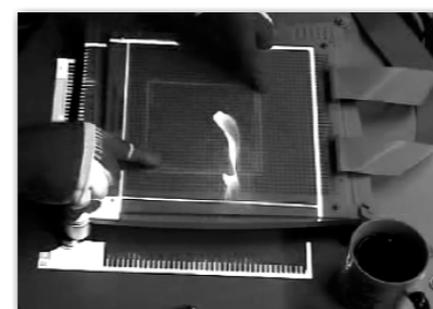
1991: Digital Desk



1991: Bricks



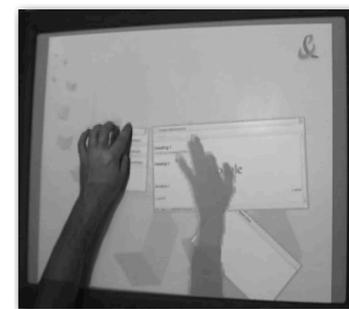
1999 : Augmented surfaces



2001 : DiamondTouch



2004 : DiamondSpin



2006 : DigiTable

Why now?



1994 : Disclosure



1995 : Johnny Mnemonic



2002 : Minority report



2005 : The island



2008 : Quantum of solace



2008 : Iron man

Interactive surfaces

- ▶ Shared display
 - Collaboration
 - Space control
 - Input management
- ▶ Focus (+ context?)
 - Lack of overview
 - Lack of personal control / privacy.

NYU - Perceptive pixel (FTIR)



Beyond mouse and keyboard

- ▶ Surface computing
- ▶ Mobile
- ▶ Wearables
- ▶ Augmented reality
- ▶ Mixed reality
- ▶ Tangibles
- ▶ Ambient technologies
- ▶ Gestures
- ▶ Multimodal interaction

Mobile UI

- ▶ Attention
- ▶ 1 handed interaction
- ▶ Limited space



Designing Interactions
Rob Haitani from Palm

Wearables

▶ On the body devices

- Always accessible
- Glanceable

▶ Problems

- energy
- attention
- interaction



<http://www.sonymobile.com/us/products/accessories/smartwatch/>



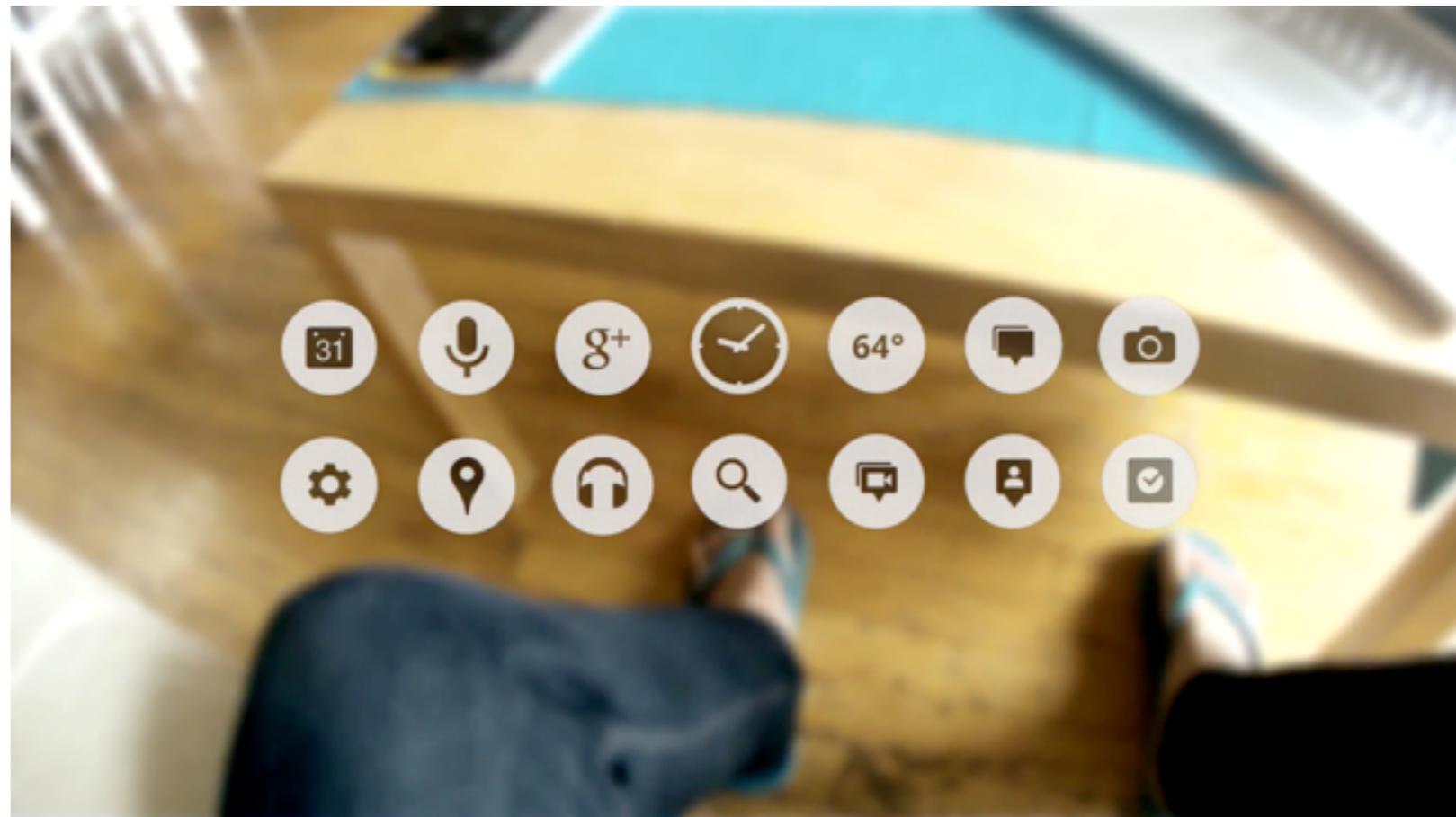
Steve Mann's experiments

Steve Mann's "wearable computer" and "reality mediator" inventions of the 1970s have evolved into what looks like ordinary eyeglasses.



https://en.wikipedia.org/wiki/Steve_Mann

<https://plus.google.com/111626127367496192147/about>



<https://plus.google.com/111626127367496192147/about>

Augmented reality

- ▶ Augmenting our physical environment with digital information



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iRiS - Intuitive Remote
Interaction System

<http://www.sebastianboring.com/projects.php?view=iris>

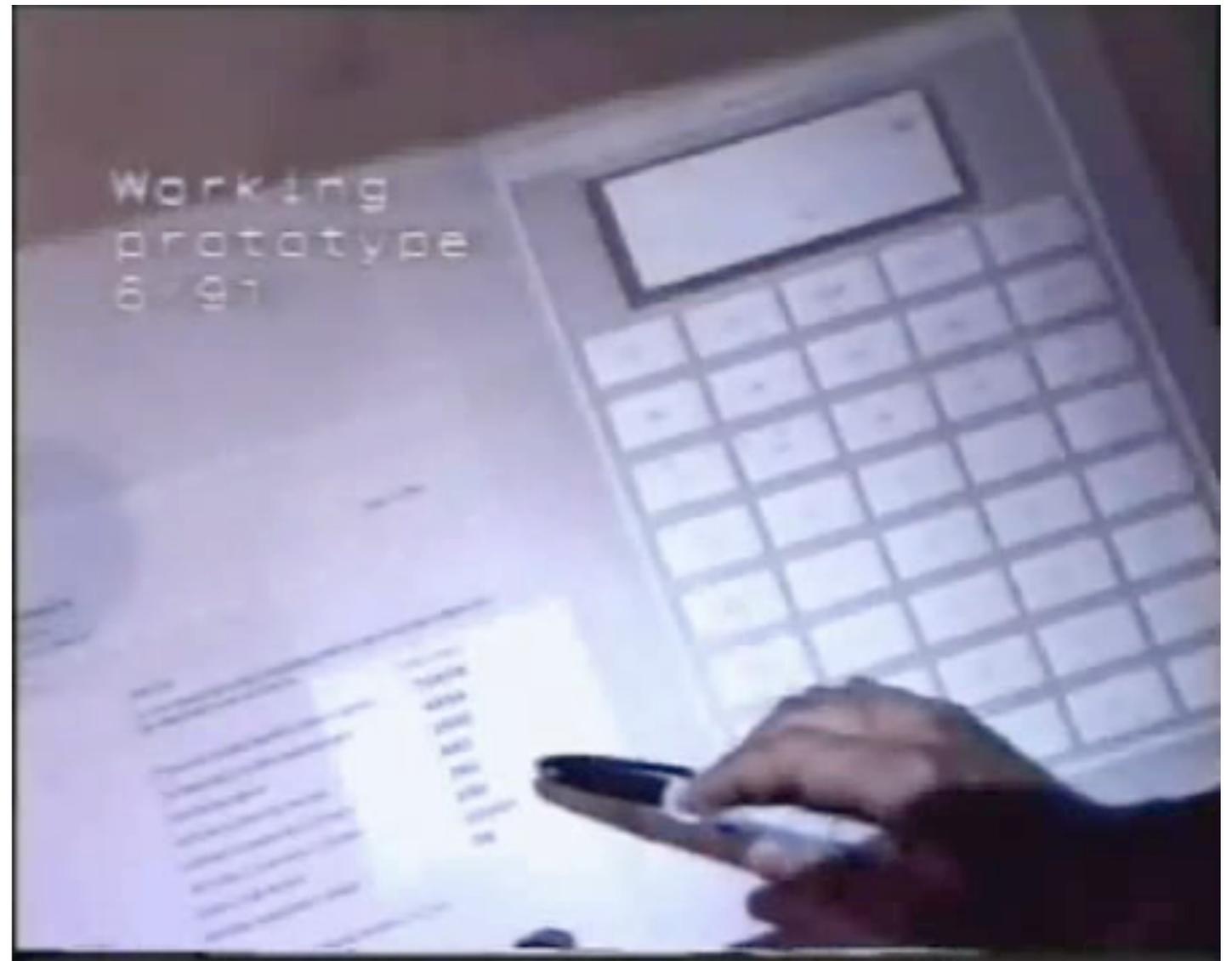
Mixed reality

- ▶ Back and forth between the physical and the digital.
- ▶ New but re-use of familiar elements.
- ▶ Problems:
 - capture/tracking
 - consistency

Wellner's Digital Desk

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Wellner's Digital Desk

Tangible interfaces

- ▶ Everyday objects
- ▶ Actuated
- ▶ Ambient

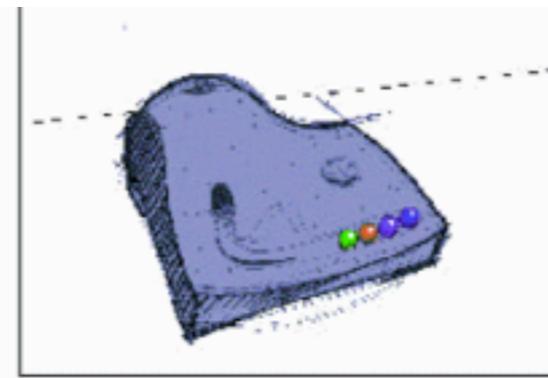
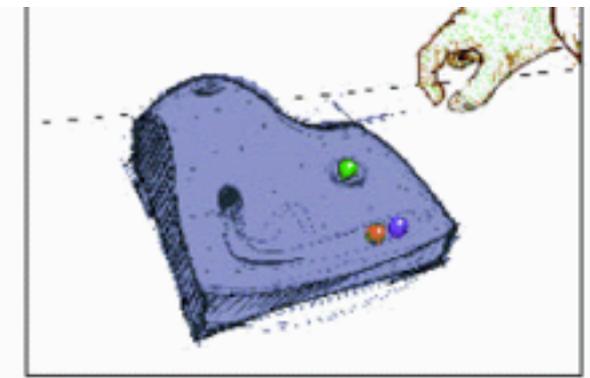


Figure 6.i Incoming messages await...



The user listens to a message... Figure 6.ii

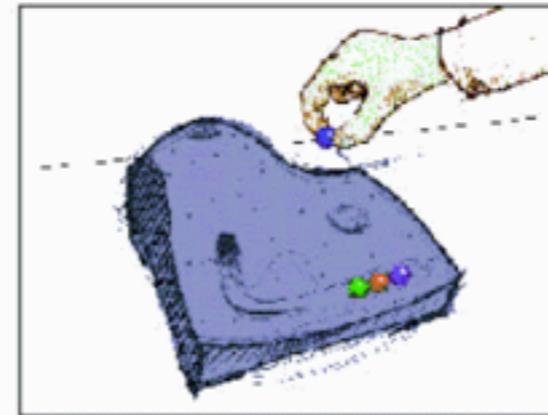
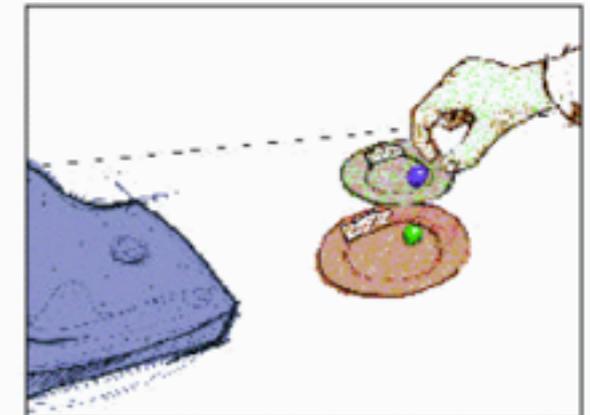


Figure 6.iii ...the user moves the message



...to each roommate's in-tray. Figure 6.iv

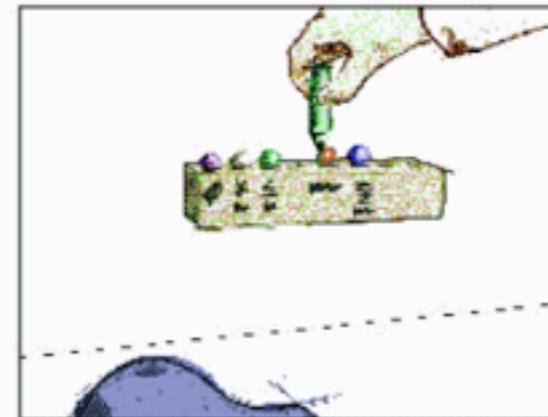
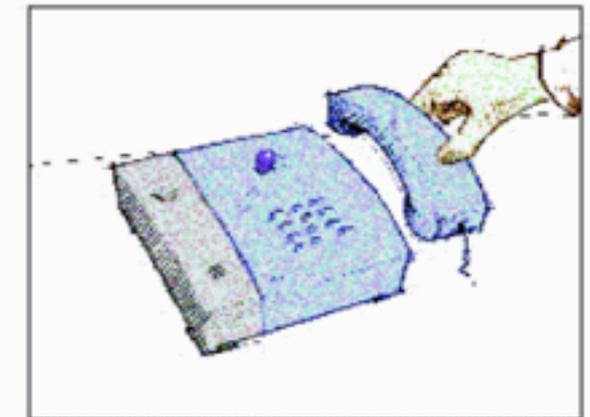


Figure 6.v Here the user stores an incoming message



Moving the marble to the phone dials the number stored in the message that the marble 'contains' Figure 6.vi

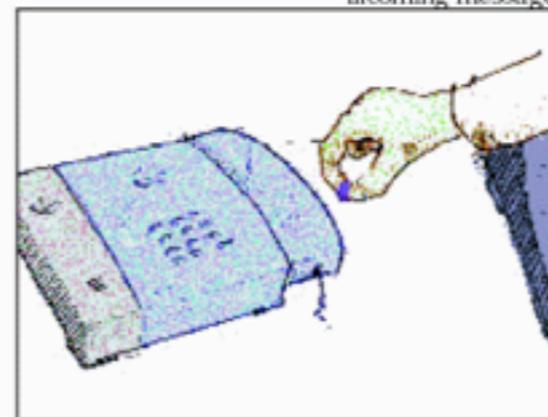


Figure 6.vii The marble is returned to the answer machine to be 'recycled'

The Marble Answering Machine
Durrell Bishop, 1992

Stills from Director animation

Tangible interfaces



Nabaztag

<https://www.sifteo.com/>

Tangible interfaces



Nabaztag



<https://www.sifteo.com/>

Ambient technologies

- ▶ Moving between:
 - background and,
 - foreground of attention



<http://goodnightlamp.com/>

Ambient technologies

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<http://goodnightlamp.com/>



<http://interaction.lille.inria.fr/~rousseau/digital-library/media/2002-minority-report/>

Gesture based interaction

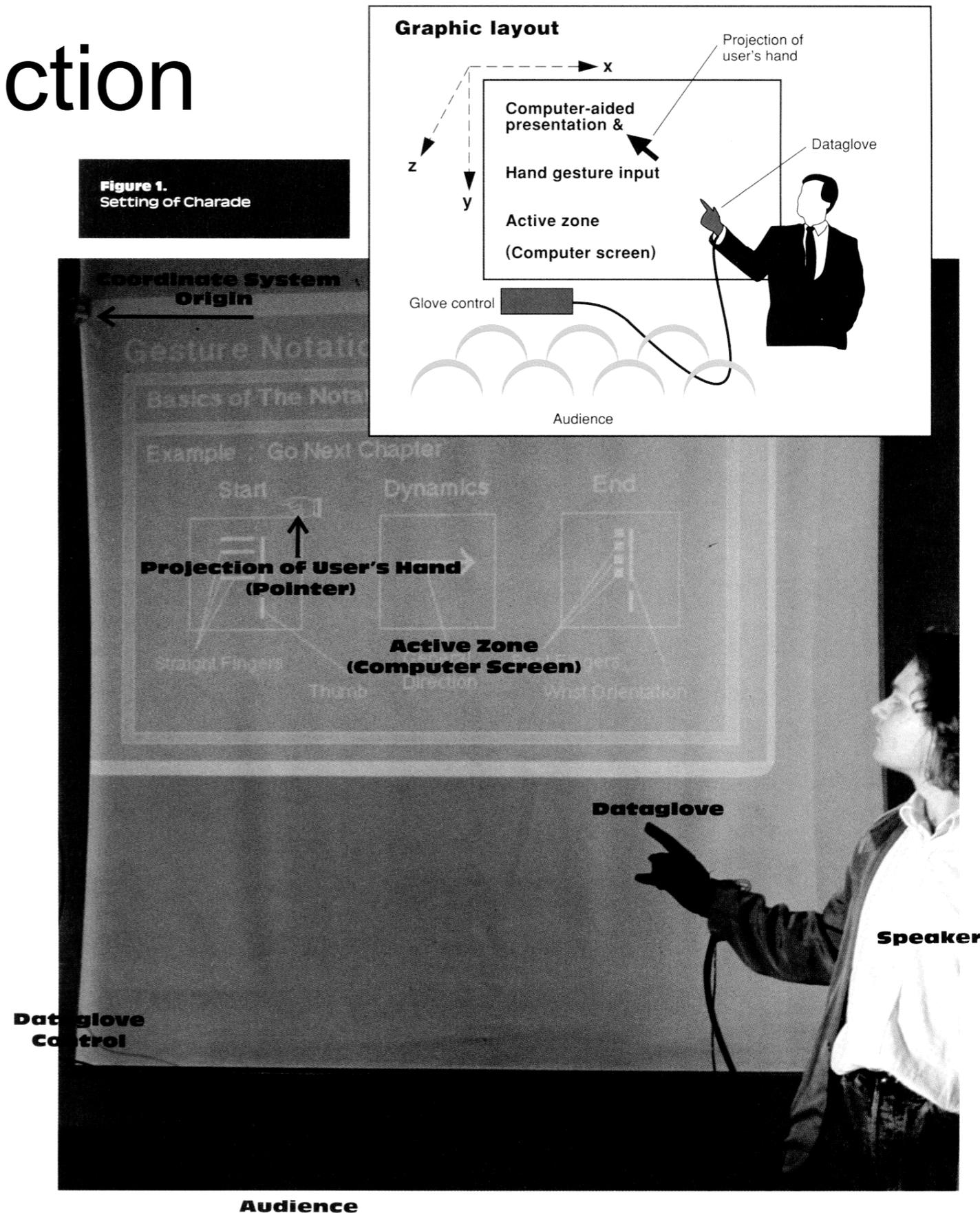
► Benefits:

- Re-use a form of communication easy to learn.
- Terse and powerful interaction
- Direct interaction

► Problems:

- Fatigue
- Non self-revealing
- Immersion syndrome
- Segmentation of gestures

► Today: Wii, Kinect, Leap...



Sharade: Baudel & Beaudouin Lafon 1993

Making Sense of Sensing Systems

- ▶ When I address a system, how does it know I am addressing it?
- ▶ When I ask a system to do something how do I know it is attending?
- ▶ When I issue a command (such as save, execute or delete), how does the system know what it relates to?
- ▶ How do I know the system understands my command and is correctly executing my intended action?
- ▶ How do I recover from mistakes?

see Bellotti et al., CHI 2002

Multimodality

► Definitions:

- Multimedia generally refers to an interface that produces output in two or more modes.
- Multimodal generally refers to an interface that can accept input from two or more combined modes.



Modalities

▶ Input:

- mouse
- pen
- speech
- audio (non-speech)
- tangible object manipulation
- gaze, posture, body-tracking

▶ Output

- Visual displays
- Haptics: Force Feedback
- Audio
- Smell
- Taste

Motivations

- ▶ Hands busy / eyes busy
- ▶ Mutual disambiguation
- ▶ Faster input
- ▶ More “natural”

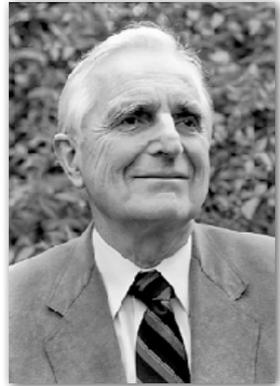
What is intuitive or natural?

Natural User Interfaces?



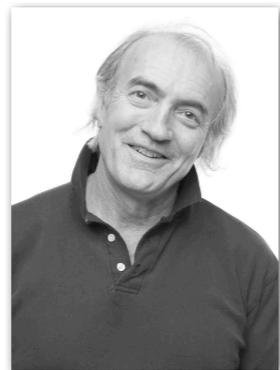
Dennis Wixon | UX Week 2008

On learning



Douglas Engelbart in Thierry Bardini's *Bootstrapping* (p. 28)

*When interactive computing in the early 1970s was starting to get popular, and they [researchers from the AI community] start writing proposals to NSF and to DARPA, **they said** well, what we assume is that **the computer ought to adapt to the human [...] and not require the human to change or learn anything. And that was just so just soantithetical to me. It's sort of like making everything to look like a clay tablet so you don't have to learn to use paper.***



Bill Buxton on the *power law of practice*

*Don't waste people skills. They're really expensive to acquire and we're already too busy. (...) **One of the key things is whenever possible to not force you to learn something new but to do the design in a way that exploits the skills you already have. (...) Now there are some places (...) where if the value is there, it's worth learning something new.***

Don Norman on natural interfaces

*“Control of our systems through interactions that bypass the conventional mechanical switches, keyboards, and mice is a welcome addition to our arsenal. Whether it is **speech, gesture, or the tapping of the body's electrical signals for "thought control,"** all have great potential for enhancing our interactions, especially where the traditional methods are inappropriate or inconvenient. But they are not a panacea. **They come with new problems, new challenges, and the potential for massive mistakes and confusion** even as they also come with great virtue and potential.*

*All new technologies have their proper place. All new technologies will take a while for us to figure out the best manner of interaction as well as the standardization that removes one source of potential confusion. **None of these systems is inherently more natural than the others. The mouse and keyboard are not natural. Speech utterances will have to be learned and gestures carefully developed and standardized through time.** The standards don't have to be the best of all possibilities. The keyboard has standardized upon variations of qwerty and azerty throughout the world even though neither is optimal--standards are more important than optimization.*

Are natural user interfaces natural? No. But they will be useful.”



John Underkoffler

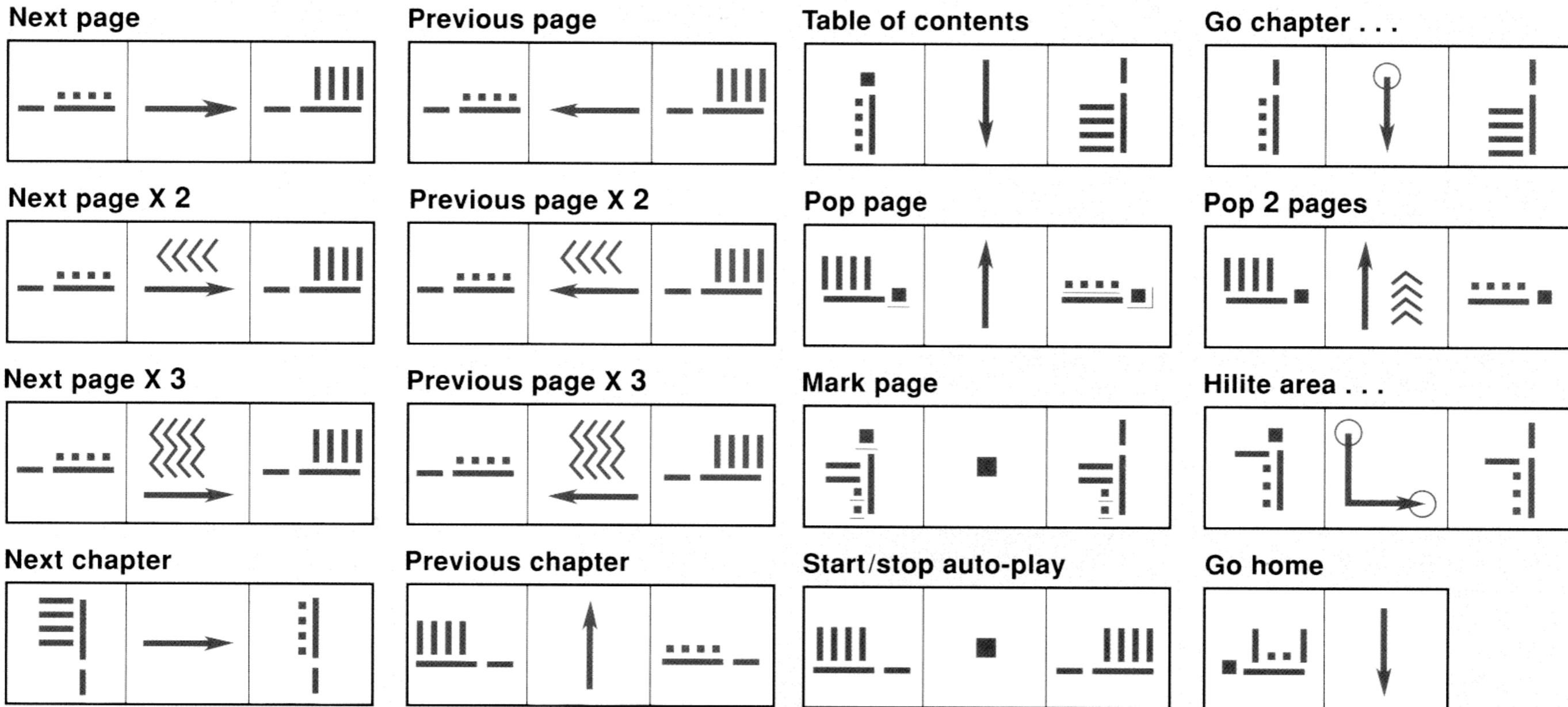
<http://oblong.com/article/085zBpRSY9JeLv2z.html>

*You adapt the gestural language from the Luminous Room work. **You train the actors to use this language.** They become adept, even though it is partly an exercise in mime. **The production will shoot the actors performing gestural tasks in front of an enormous transparent screen, but the screen will be blank, a prop.** Graphics will be composited onto the screen in post-production. You understand that for a sense of causality to emerge the actors must be able to clearly visualize the effects of their gestural work. You assemble a training video showing this.*

When the time comes to shoot, the director explains what sequence of analysis should occur in each scene. You translate this into the gestural language. You explain what graphical elements the actors would be seeing on different parts of the screen, how they are manipulating those elements. You make sure that a detailed account of all this is subsequently available to the editor and the visual effects people. Continuity of the original intent is critical. The cameras roll.

*The movie appears in 2002. **The scenes of gestural computation show something apparently real.***

Gesture language in Sharade:



How do you cope with break-downs?

How do you cope with break-downs?



Seamless / seamful

From M.Weiser, UIST'94
Building Invisible Interfaces

Is a seamless building one in which you never notice as you move from place to place?

Making everything the same is easy;

Hard is letting everything be itself, with other things

Goal: seamful systems, with beautiful seams

see Chalmers, M. and Maccoll, I. (2003)
Seamful and seamless design in ubiquitous computing