Situated Interaction:

Creating a **partnership** between people and intelligent systems

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in|situ|

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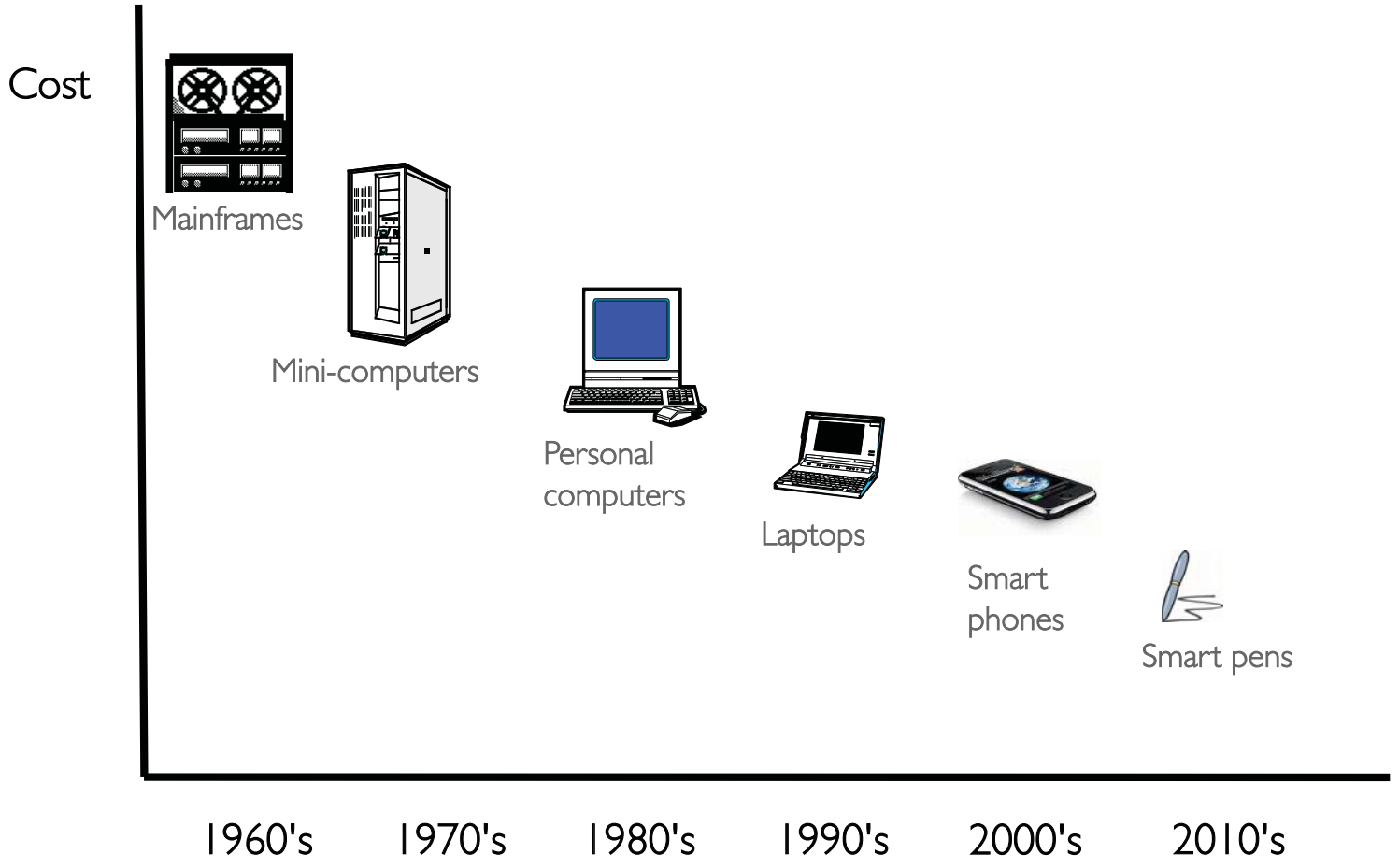
Computers are changing…



an interesting article in yesterday's New York Times …

What is the goal of computer science ?

Is the focus on the computer ?

Should we always try to make computers **smarter** ?

Are we seeking the 'perfect' model of human behavior to handle the '**human-in-the-loop**' ?

What is the goal of computer science ?

Is the focus on the computer ?

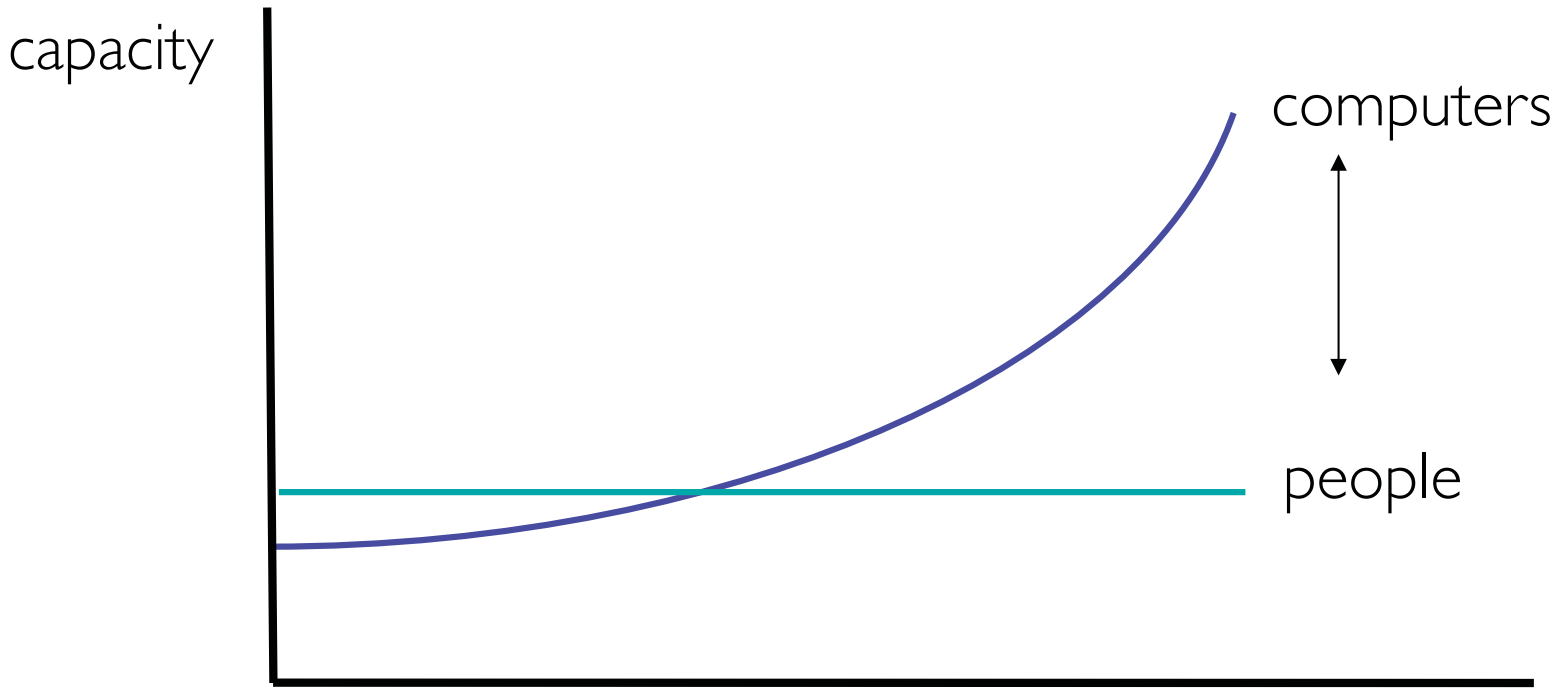
Should we always try to make computers **smarter** ?

Are we seeking the 'perfect' model of human behavior to handle the '**human-in-the-loop**' ?

Or perhaps we should think about role and the **interaction** between the human and the computer

Computers have changed but people have not !

How do we make sure that we take advantage of the strengths, not the weaknesses, of each ?



Three interaction paradigms

Computer as **tool**

- First person interfaces
- Empower users

Human-Computer Interaction

Three interaction paradigms

Computer as **tool**

- First person interfaces
- Empower users

Human-Computer Interaction

Computer as **servant**

- Second person interfaces
- Delegate tasks

Artificial Intelligence

Three interaction paradigms

Computer as **tool**

- First person interfaces
- Empower users

Human-Computer Interaction

Computer as **servant**

- Second person interfaces
- Delegate tasks

Artificial Intelligence

Computer as **medium**

- Third person interfaces
- Communicate

Multi-media

Interaction Située in|situ|

Joint lab : INRIA, Univ. Paris-Sud, CNRS

Focus on Human-Computer **Interaction**

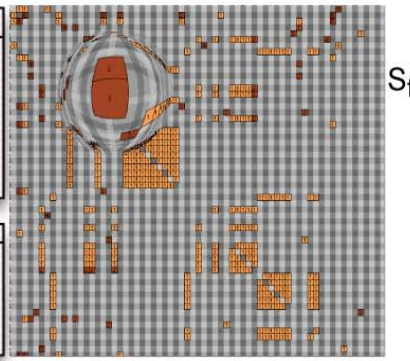
to augment human capabilities

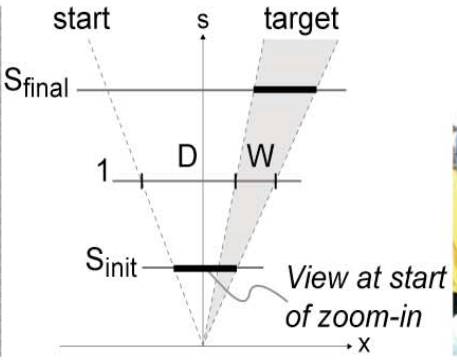
to generate novel forms of interaction

to explore the next generation of interactive systems

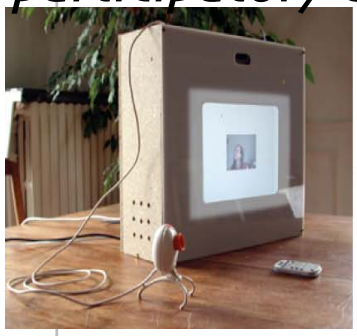
in|situ| research themes

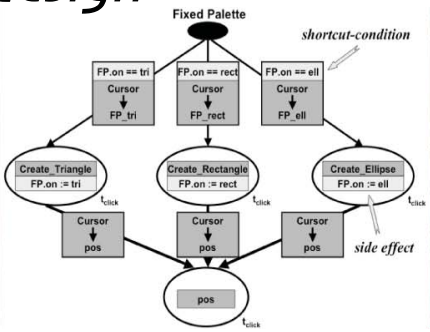
interaction paradigms

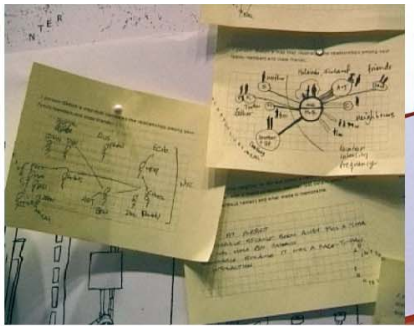


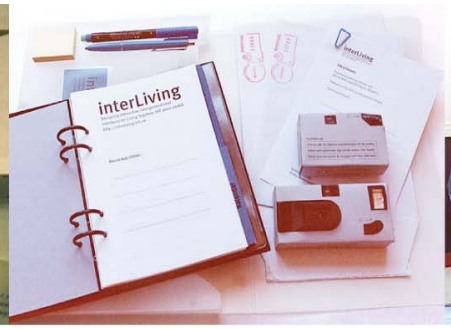


participatory design

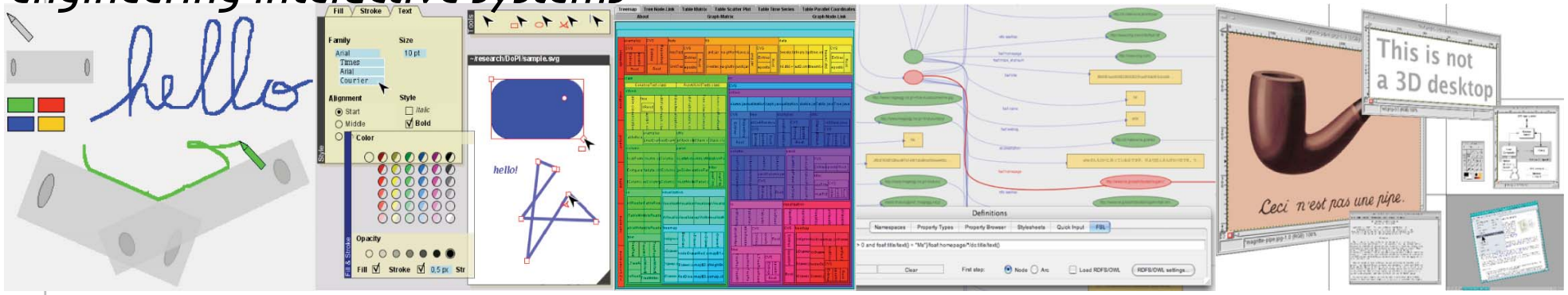








engineering interactive systems



Shift in perspective

Re-examine our goals :

Not how to make ***computers*** smart …

Shift in perspective

Re-examine our goals :

Not how to make ***computers*** smart …

but how to make ***people*** smart

Focus on **interaction in context**

Interaction Située = Situated Interaction

Focus on **interaction**

we cannot effectively model user behavior

without taking context into account

Data is what you can measure

the rest is context

Plans versus situated action (L. Suchman)

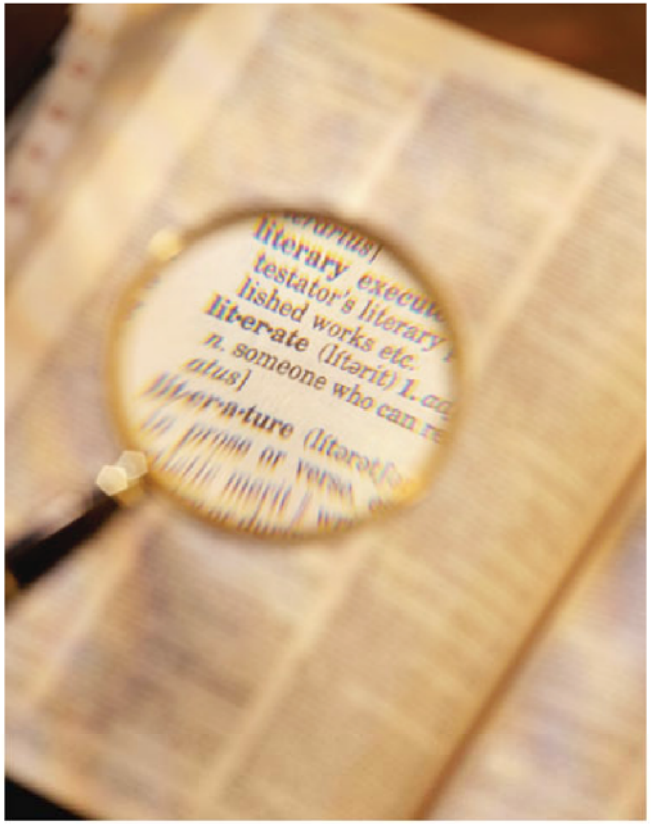
Human-computer partnerships

Instead of trying to replace people
or just augment their existing skills

why don't we create
human-computer partnerships ?

Let people do what they are good at
and let computers do the same

How do we put the
'**computer-in-the-loop**' ?



Recognizing human behavior

Creating a partnership in which

- users successively reveals their behavior
- computer successively reveal their state

They interact with each other over time

Object Tracker :	Selecting items
Octopocus :	Gesture recognition
Arpege :	Chord recognition

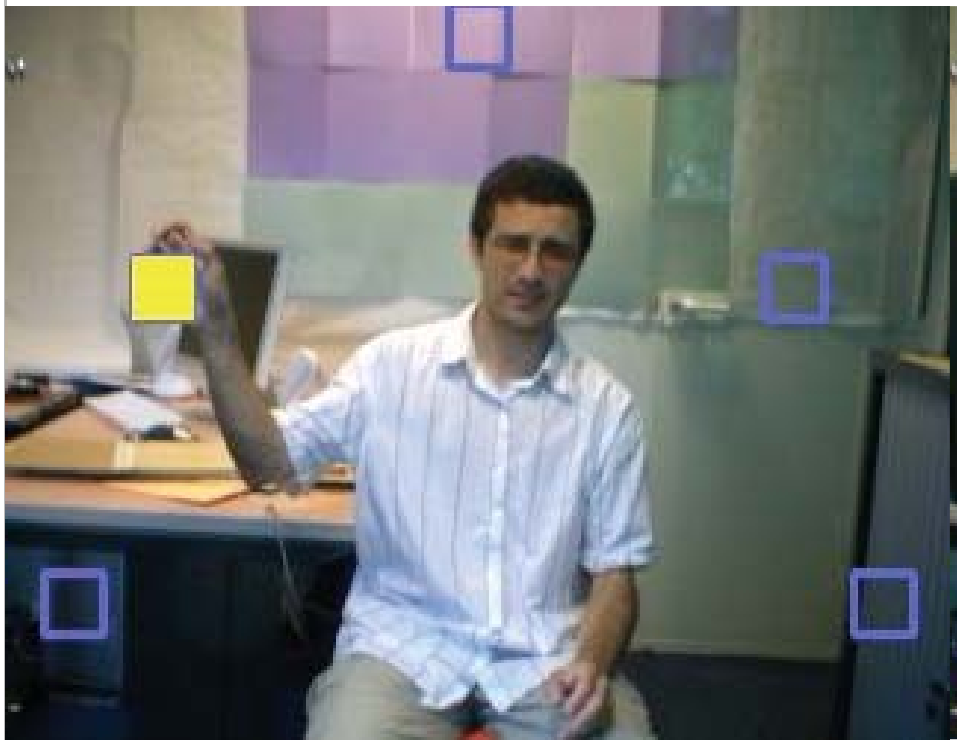
Object tracker: Gesture recognition

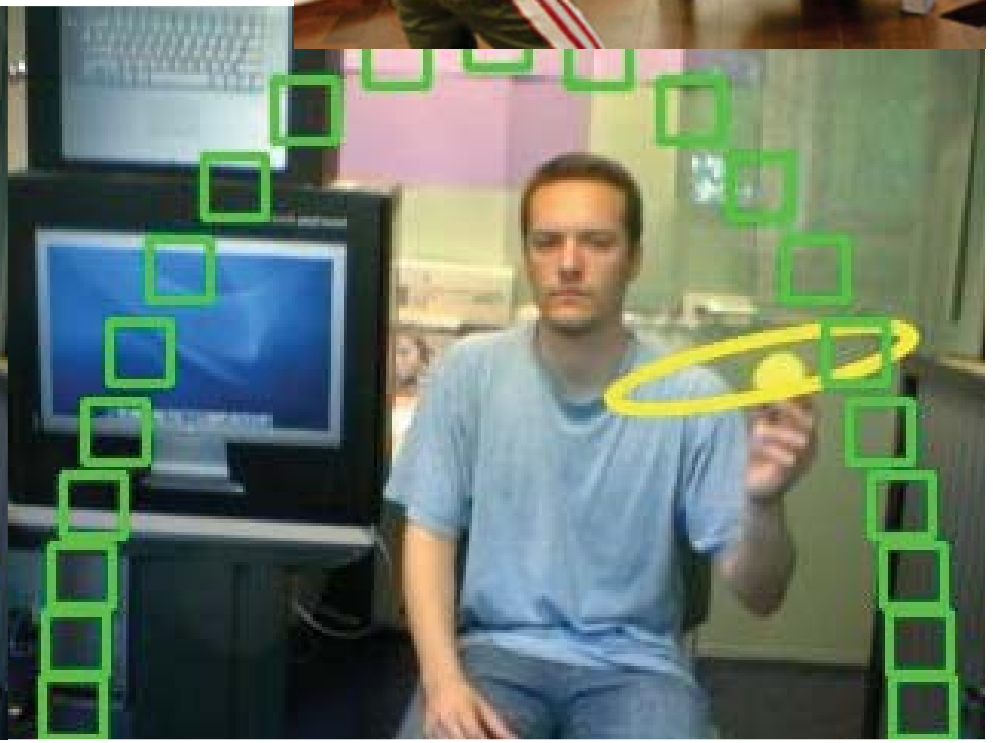
Sony's Eyetoy

Provide users with real-time feedback

User helps guide recognition

by the computer





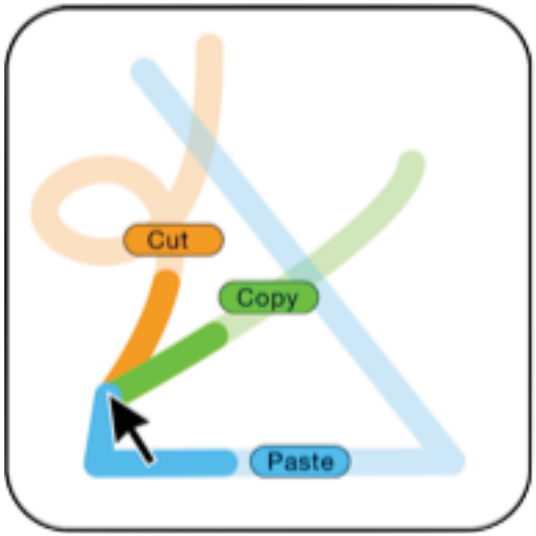
Octopocus: Learning complex gestures

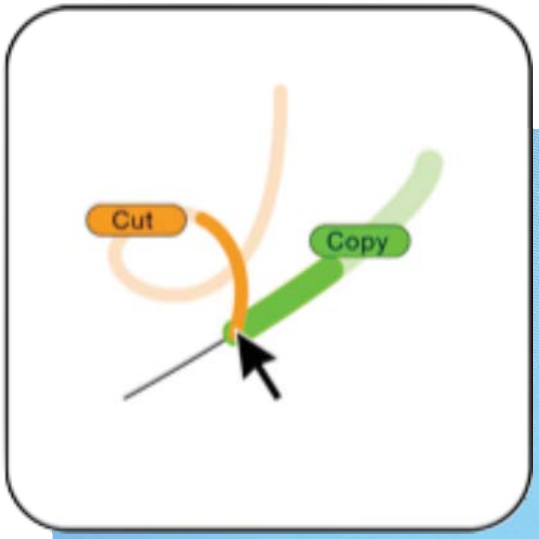
Experts *just do it*

Novices *hesitate* … which activates

feedback to show what the recognizer sees

feedforward to show current available gestures



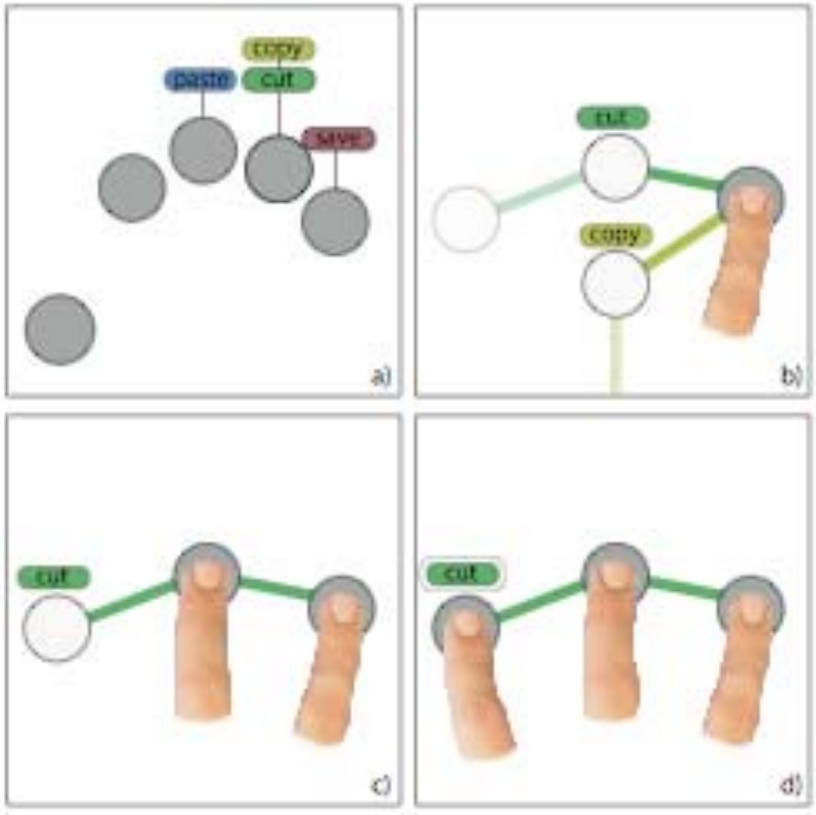


Arpege : Learning chords on a multi-touch surface

Beyond one- and two-finger gestures :

novice to expert transition

feedforward and feedback



Letting users define the interaction

Creating a partnership in which

the user creates the **semantics** of the interaction

with the computer

Interaction Browser :	Linking marks to actions
Knotty Gestures :	Interacting while writing
Musink :	Creating a user-defined language
Façades :	User-reconfigurable interfaces

Interaction browser: User-defined commands

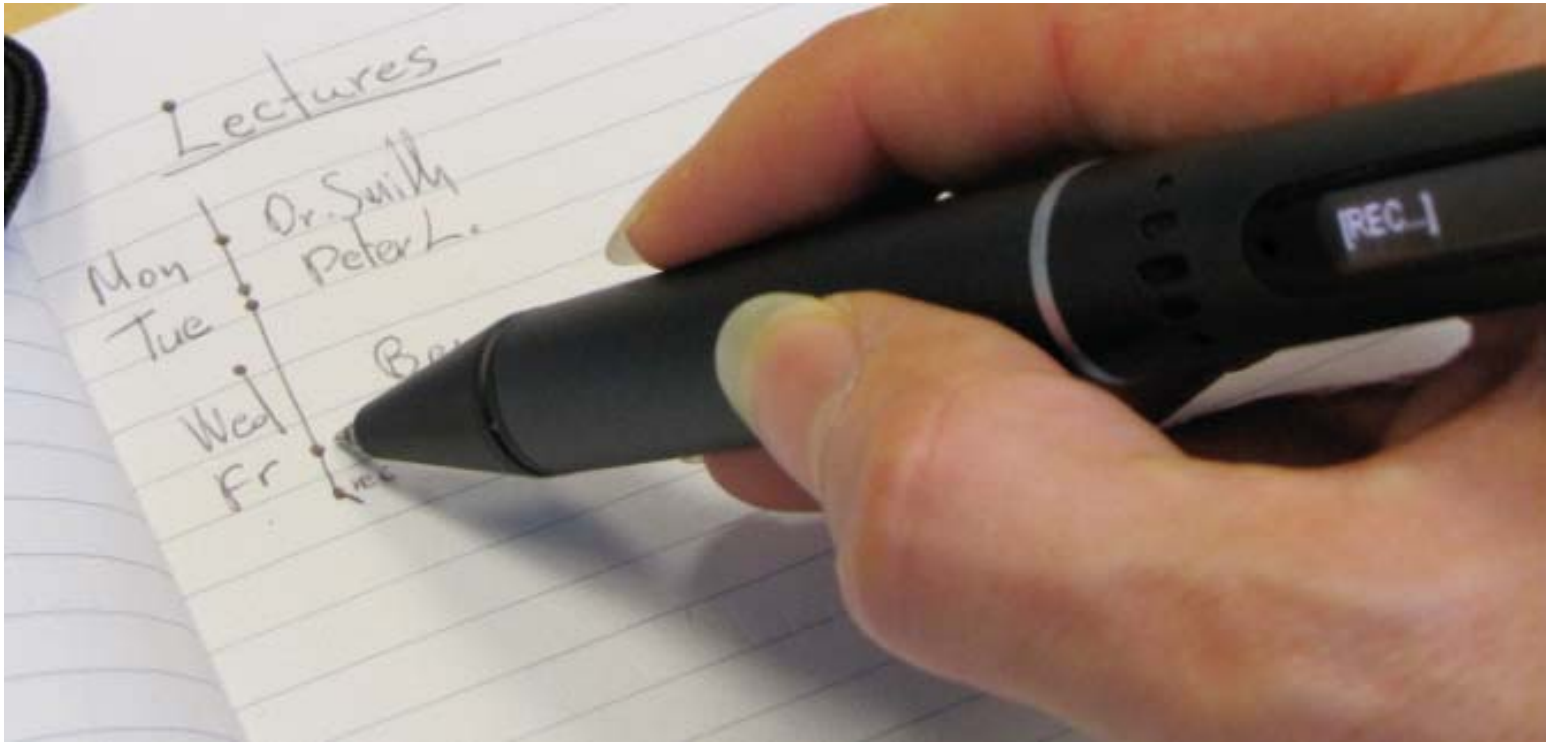
Air traffic controllers annote flight strips

Marks can be linked to RADAR and other computer functions

Users define what marks mean

Knotty Gestures

- Interactive Paper
  - Users interact as they write
    - or define their own gestures
    - and interact with them later

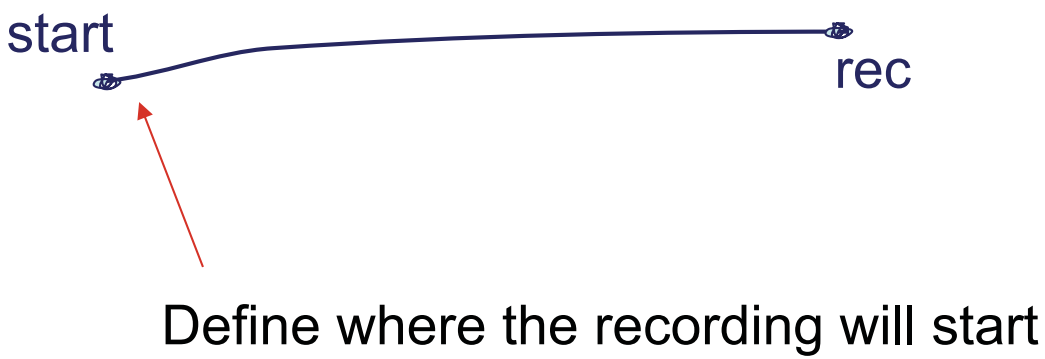


Knotty Gestures: Creating an interactive controller

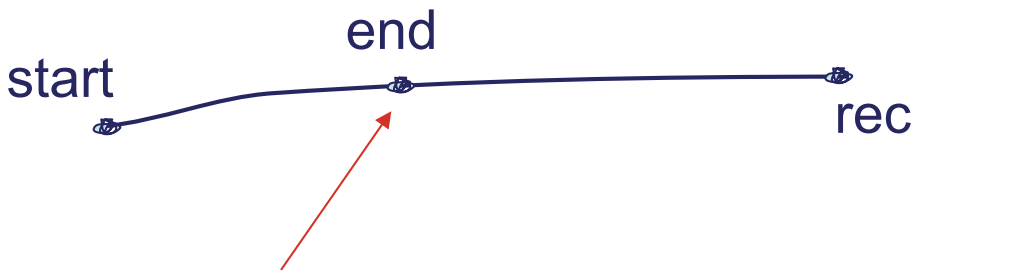
Draw a line with a ‘knotty gesture’ at the end

Choose “recording” to define the type of line

Knotty Gestures: Creating an interactive controller

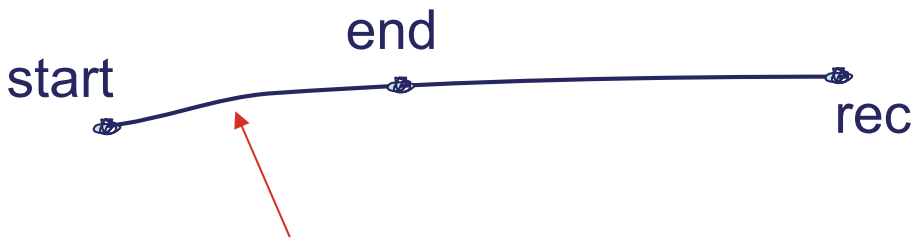


Knotty Gestures: Creating an interactive controller



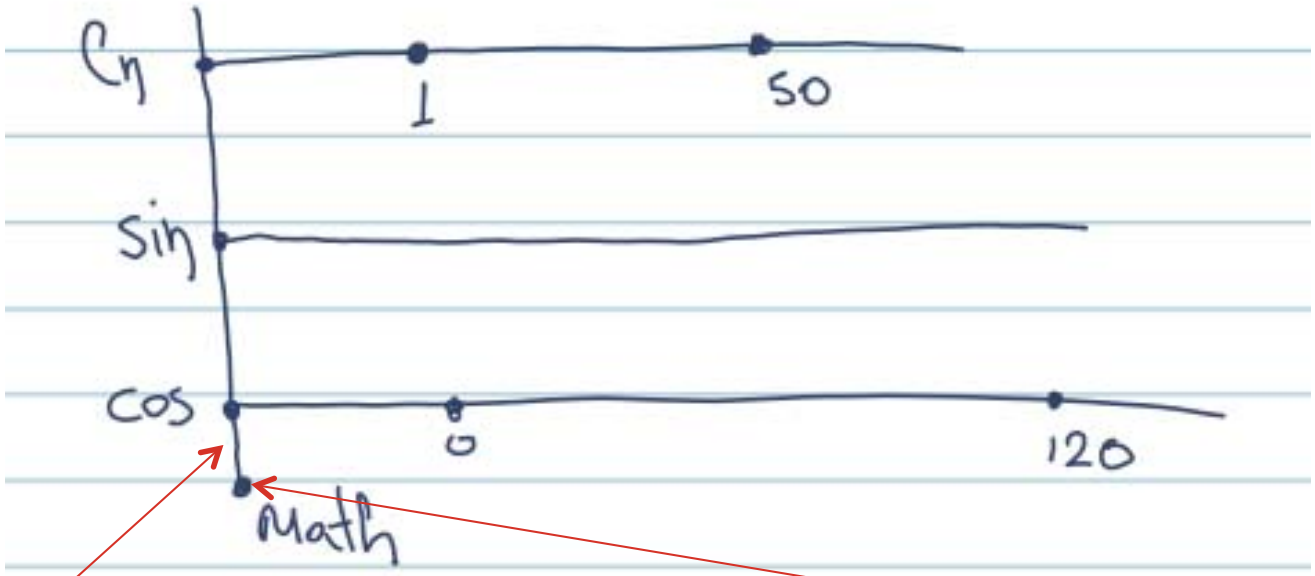
Define an end point for the recording

Knotty Gestures: Creating an interactive controller



Slide the pen along the line to move
forward or backward on the recording

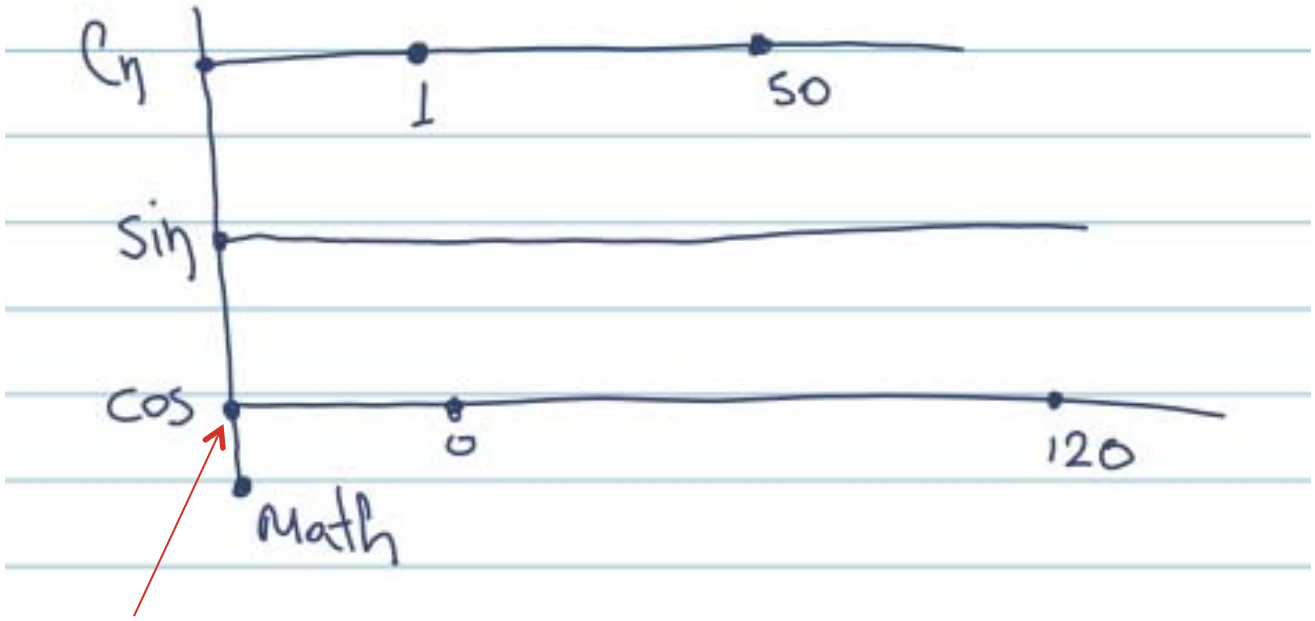
Drawing a Math Calculator



This line acts as a base for attaching mathematical value sliders

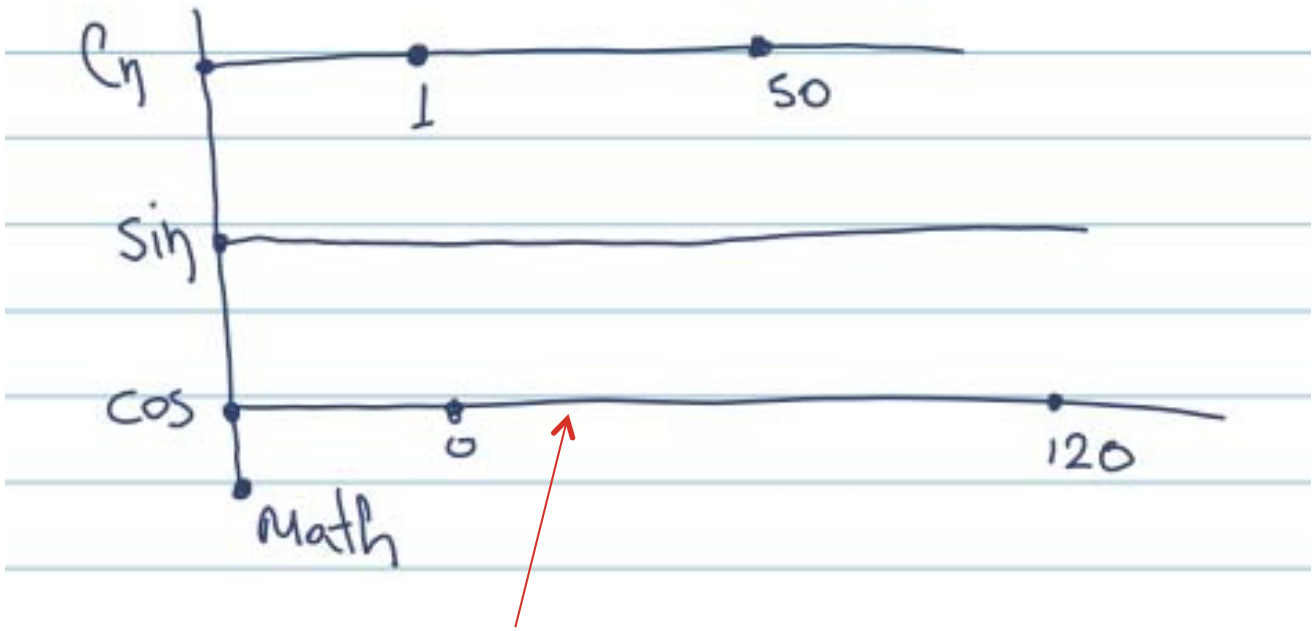
The knotty gesture at the end defines the type

Drawing a Math Calculator



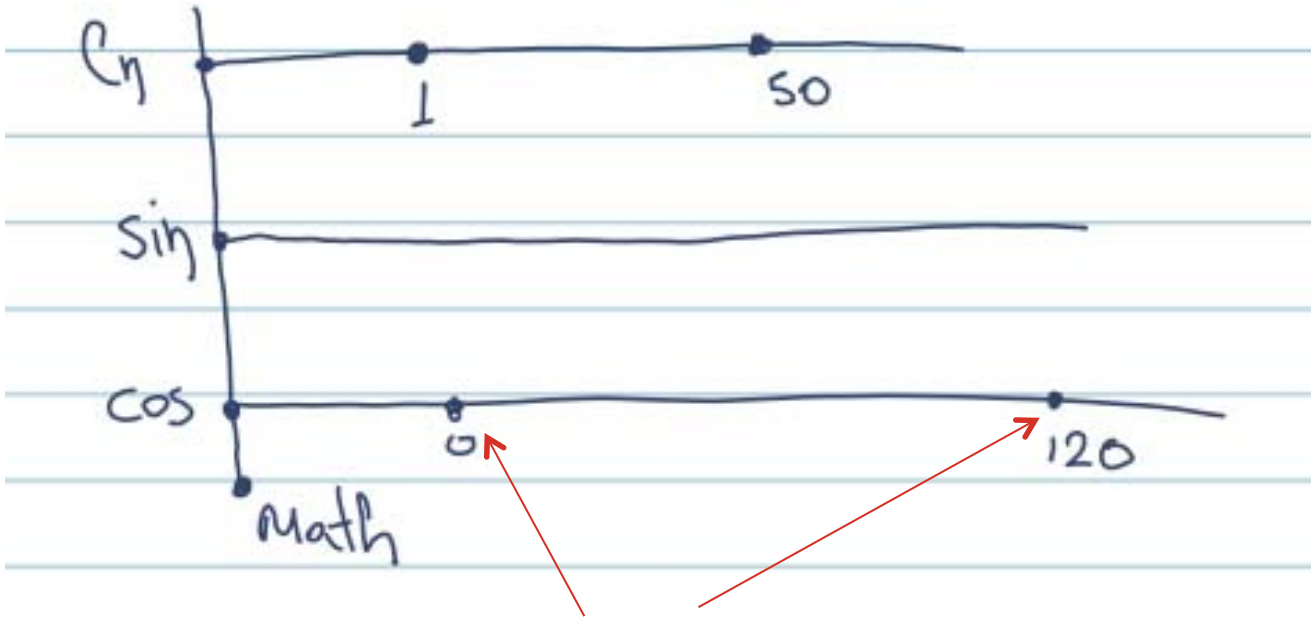
Any knot drawn on line lets the user select a mathematical function

Drawing a Math Calculator



The extensions act as value controllers
Sliding the pen over the line moves through range of function values, shown on the pen display

Drawing a Math Calculator

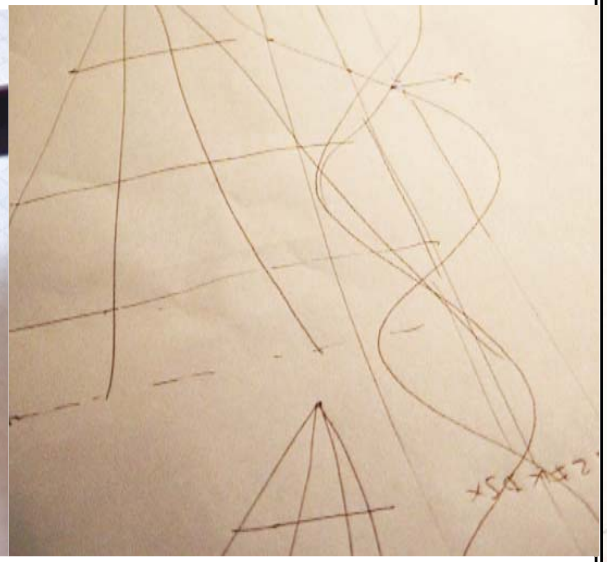


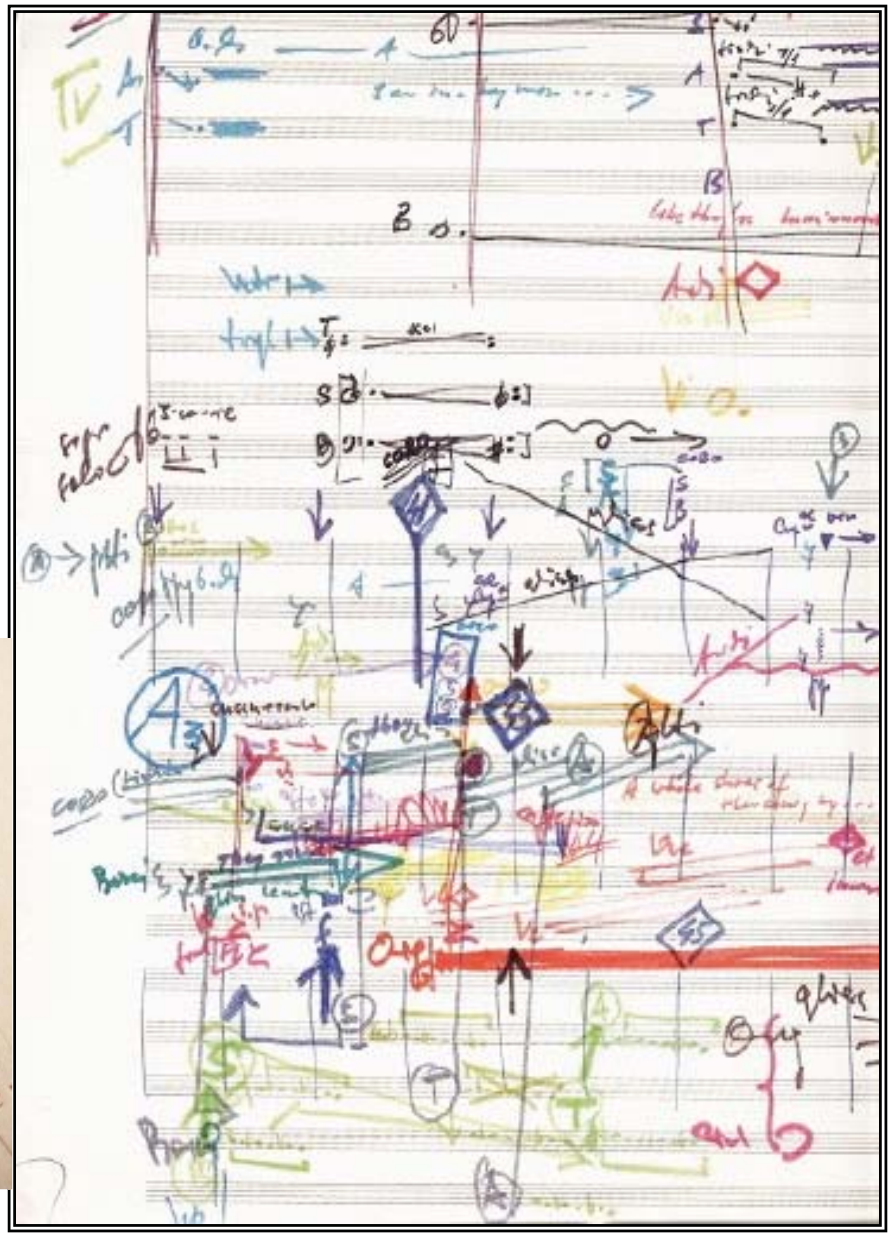
Knots may define ranges or act as traces of past interactions with specific values

Musink

Musicians create their own musical languages on paper

… and go back and forth between paper and computer





Musink: Delayed interpretation

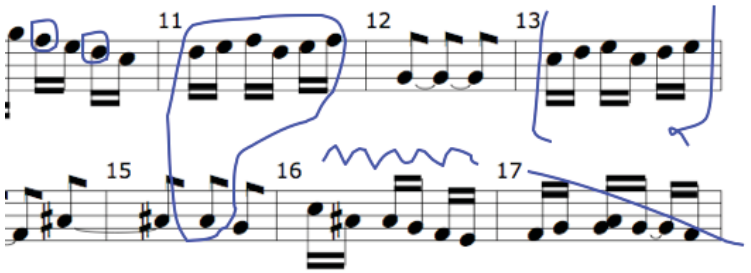
Let them create their own musical symbols

and decide when and how the computer should interpret them

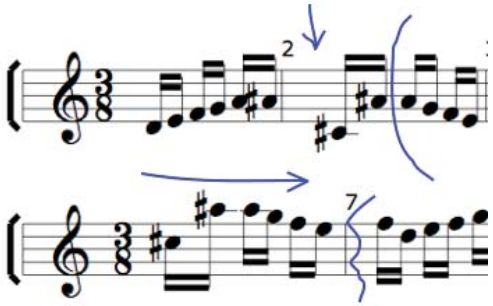
Recognition over time:

Semi-structured delayed interpretation

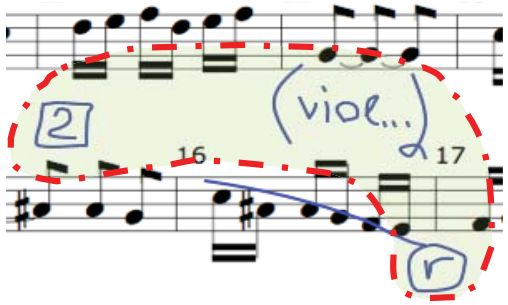
scoping gestures



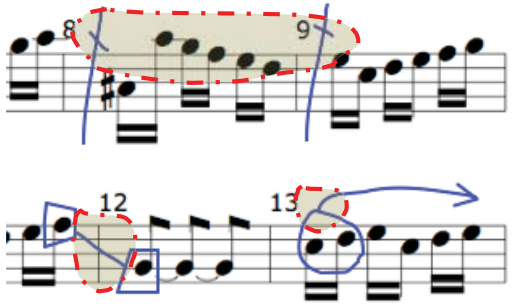
score pointers



textual elements



connectors



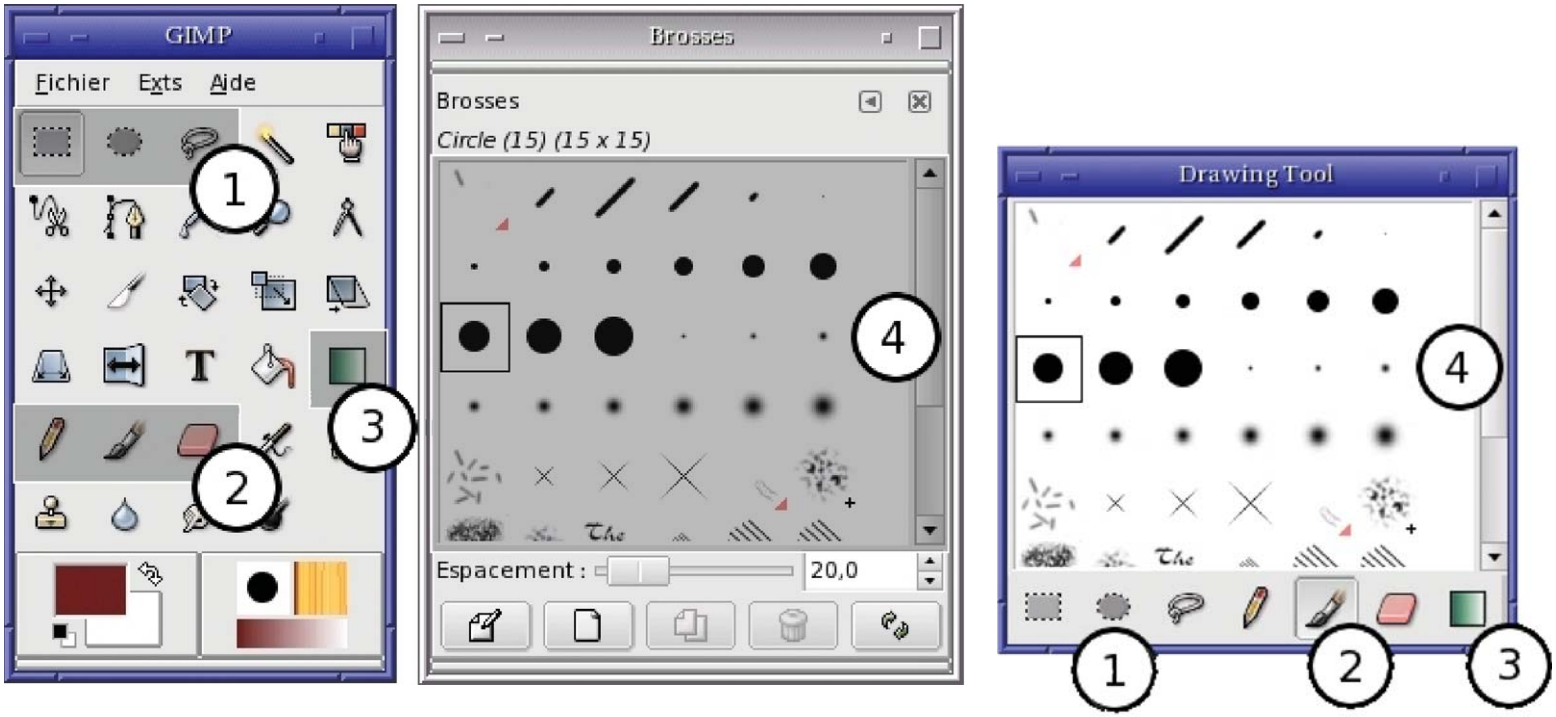
Façades: Reconfiguring interfaces

Users can adopt parts of **any** Linux interface

and reconfigure it for specific needs

Grab three selections from GIMP and choose a brush

and create a new, custom-made palette



What if the computer defines the interaction ?

Creating a partnership in which

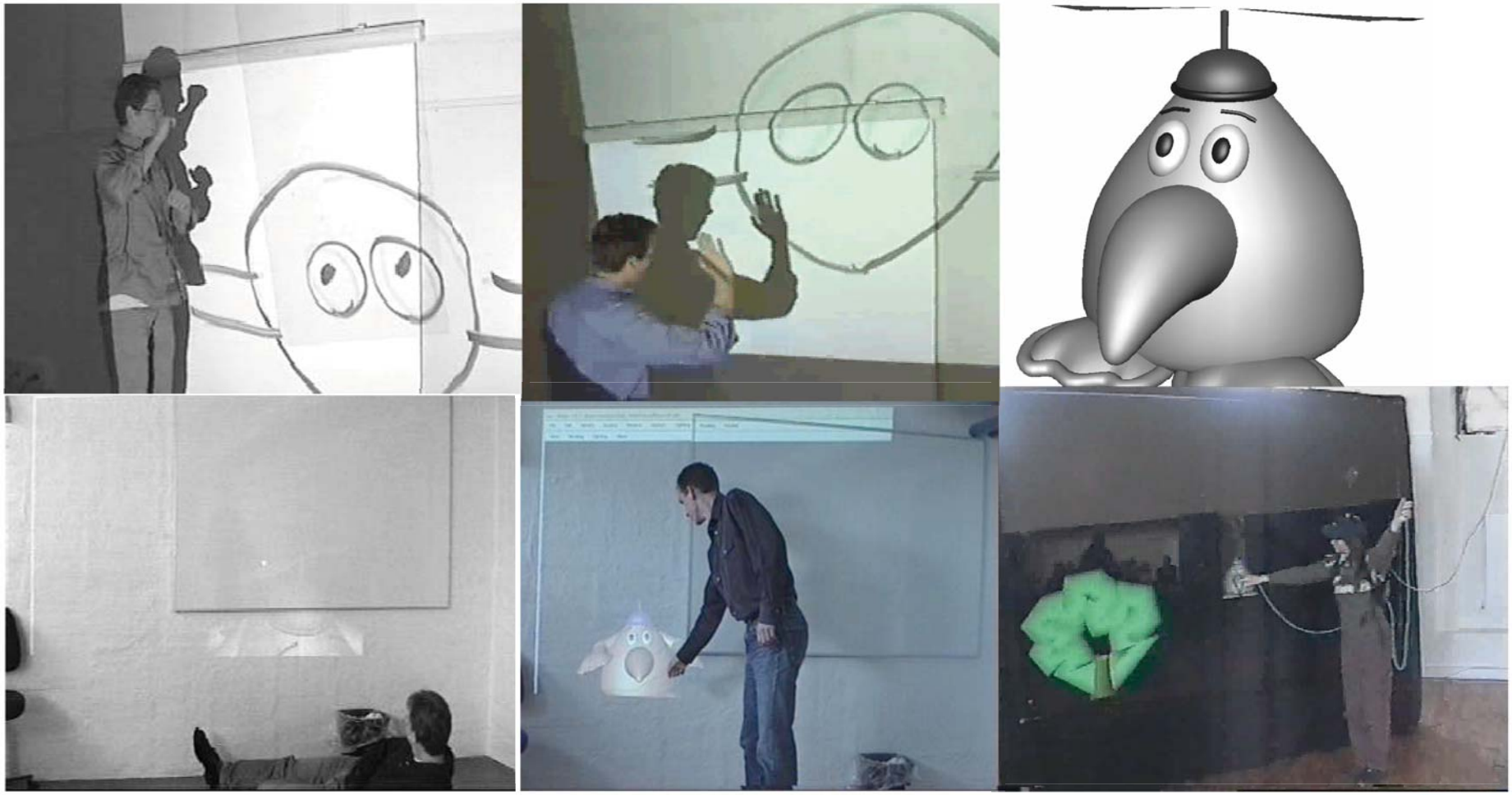
the user thinks she's controlling an avatar

while the computer is 'shaping' her behavior

McPie : Sharing control between user and computer

McPie Who is in control?

'Shaping' behavior: user - system system - user



Co-Adaptation

Similar to the concept of biological **co-evolution**

… but without the DNA

How do we create interactive systems

that are explicitly designed

to support appropriation by users?

We can also help users innovate!

Interactive software use is

a co-adaptive phenomenon

Users ***adapt to the software*** presented to them

Users also ***adapt that software*** for their own purposes

Co-Adaptive systems

Allow users to adapt the system themselves,
for their own needs

… by adding dynamic feedback

… by adding in-context feedforward

… by providing hooks for customization

Situated Interaction

Where do we go from here?

Making people smarter:

by adding computers

Making computers smarter:

by adding humans

Questions?

What if the computer is a communication medium ?

Creating a partnership in which the computer

acts as a mediator between people

Successively revealing information, under user control

Balancing passive awareness and active communication

Video Probe :	Distributed Snapshots
MirrorSpace :	Spatial privacy control
MarkerClock :	Peercare for the elderly
WeMe :	Liquid communication

VideoProbe

- Photos captured via a webcam
  - 3 seconds without movement = 1 image
- Photos shared among households
- Review earlier photos with remote control
- Images fade over time, unless saved

videoProbes installed in people's homes

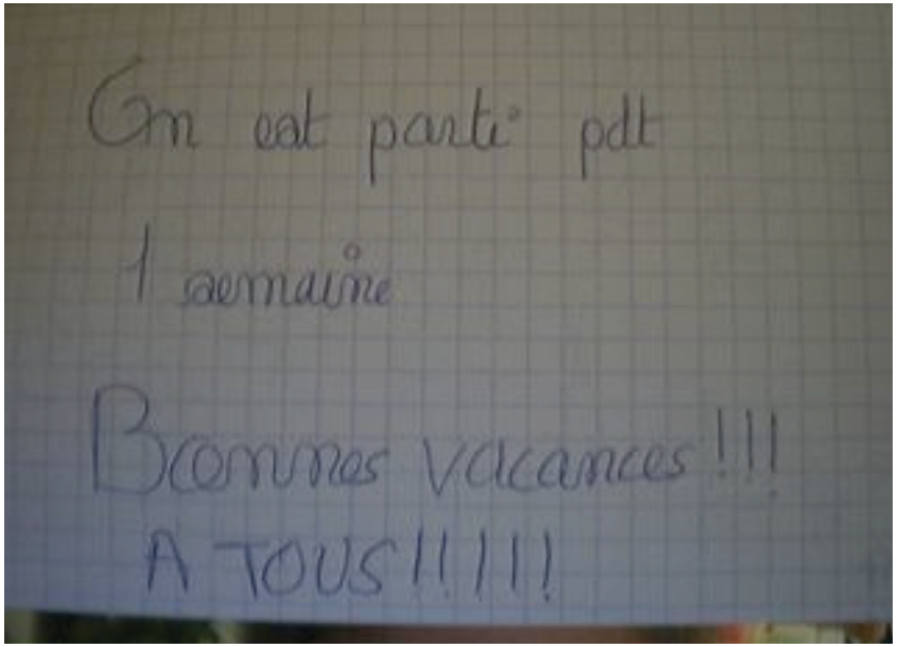
videoProbe

Three kinds of uses:

Shared photos

Shared messages

Shared "day-in-the-life"



We're going away
for a week

Happy Vacation
Everybody!!"

MirrorSpace

Controlling privacy

by moving through space

Far away = fuzzy

Close by = clear

The “fuzzy” effect

(From the Pompidou exhibit)

Merging two images

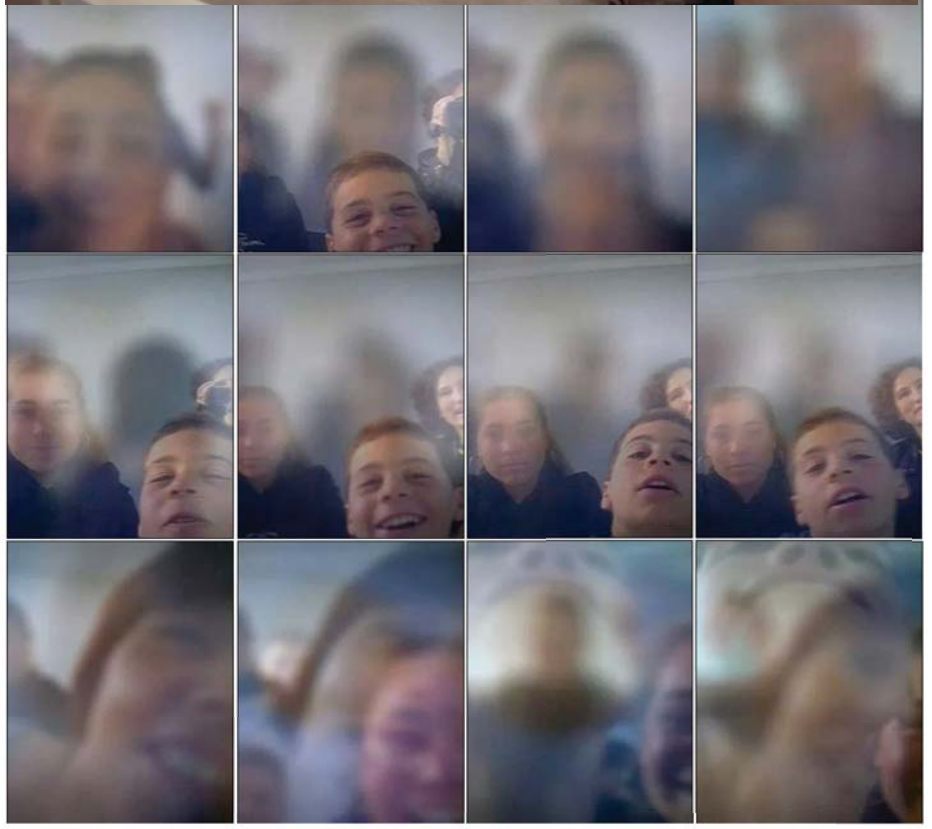
MirrorSpace

Exhibited at:

- La Villette
- Pompidou Centre
- Homes of the elderly

Strangers vs.

family members

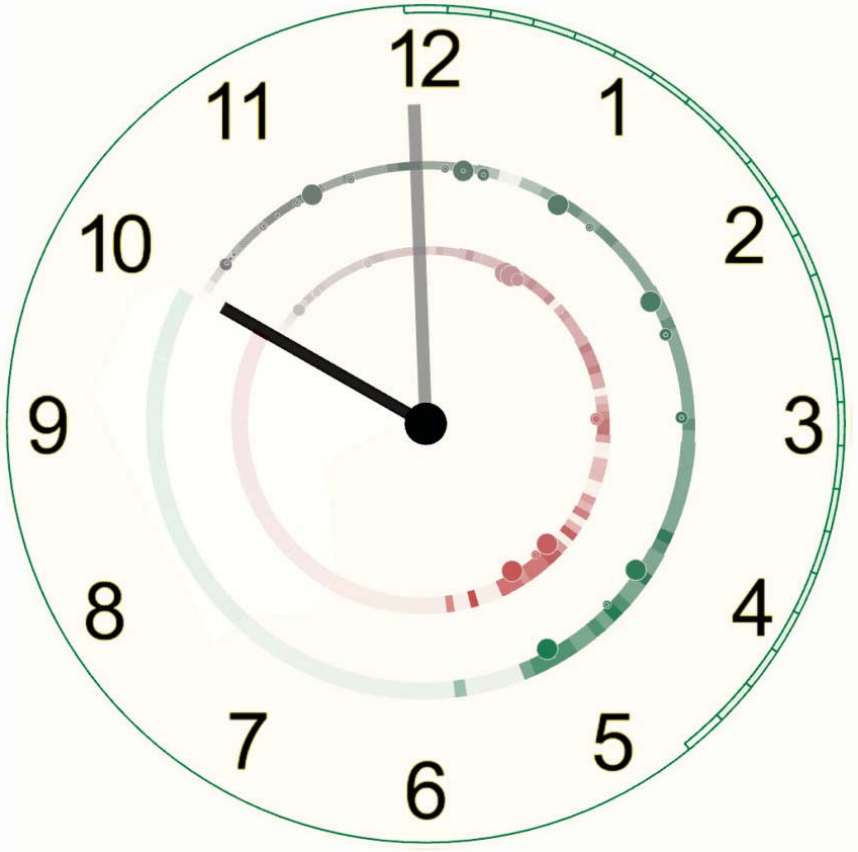


MarkerClock

Communication among the elderly

An augmented clock that:

- lets them see if the other is there
- lets them send a ‘message’
- lets them know a little history



WeMe

Communication appliance supports multiple forms of engagement and interpretation

Bubbles move in response
to ambient sounds
(local and distant)
or
explicit patterns made
by 1-3 people per WeMe

Liquid movement

Ferrofluid

liquid composed of oil and iron nanoparticles

its shape moves in response to changes in the magnetic field

WeMe

Stand-alone reflective object

responds to ambient sound in the room

Audio ‘instrument’

creates on-going patterns

Communication device

from passive presence awareness to negotiated communication

Remote communication

Synchronous interaction

at a distance

Leaving ‘messages’ for the

other household

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Making computers smarter:

by adding humans

Questions?

Developing new forms of interactive environments

Users collaborate locally and at a distance,
recombining and exploring their data

WILD : Wall-Sized Interaction with Large Displays

Interacting with massive amounts of data

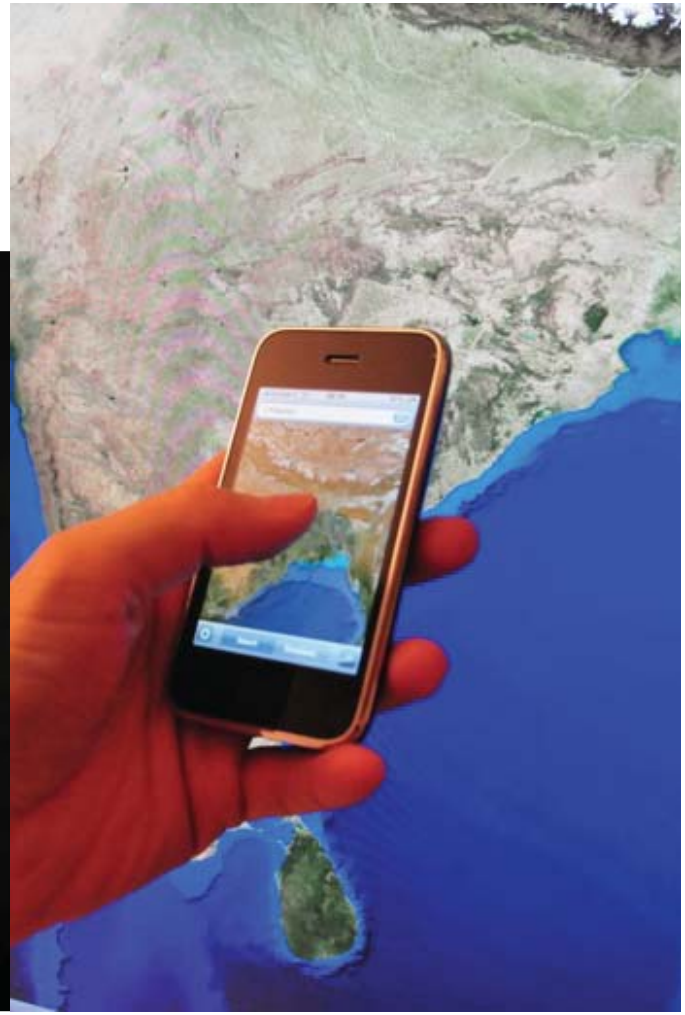
Navigate

Compare

Aggregate

Communicate

New ways of interacting with data



Navigating through galaxies

Neurospin : comparing brains

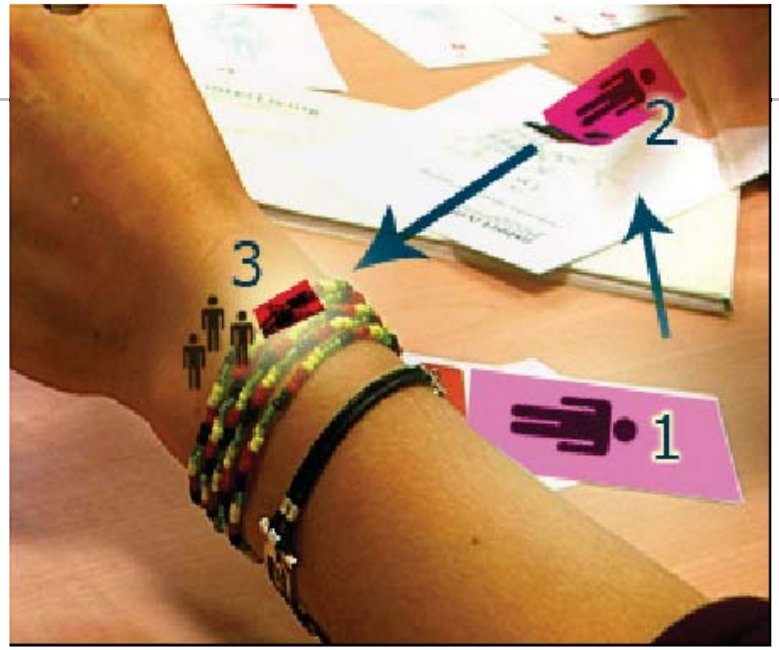
Multiple groups

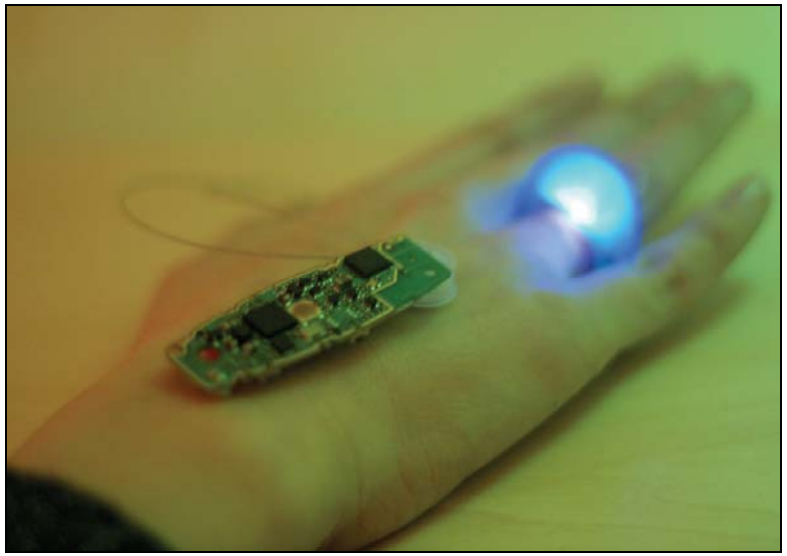
We can create multiple overlapping groups:

Red and green

Telebeads

- Designed for and with teenagers
  - Interactive jewelry/beads
  - Bracelet with friends
  - Phone identifier





Nightboard

Helping remote couples stay in touch

Input:

- movement detector
- laser pointer

Display:

- projection on the ceiling

Supports both direct and implicit interaction

Some examples of augmenting human capabilities

Human memory

PageLinker

Human vision

Sigma Lenses

Human motor skills

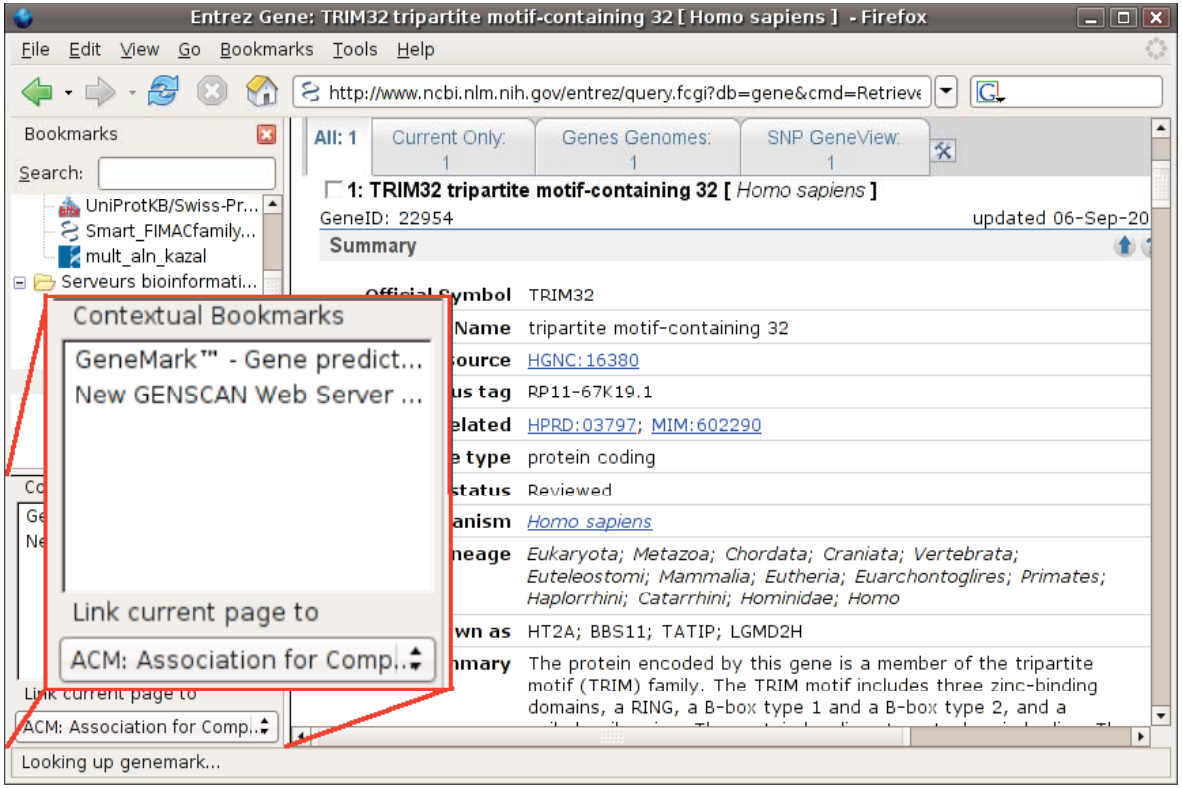
Semantic pointing

PageLinker: contextual bookmarks

Biologists search the web seeking specific algorithms for their data

PageLinker adds a contextual bookmark at successful link sites

Partnership



Sigma Lenses

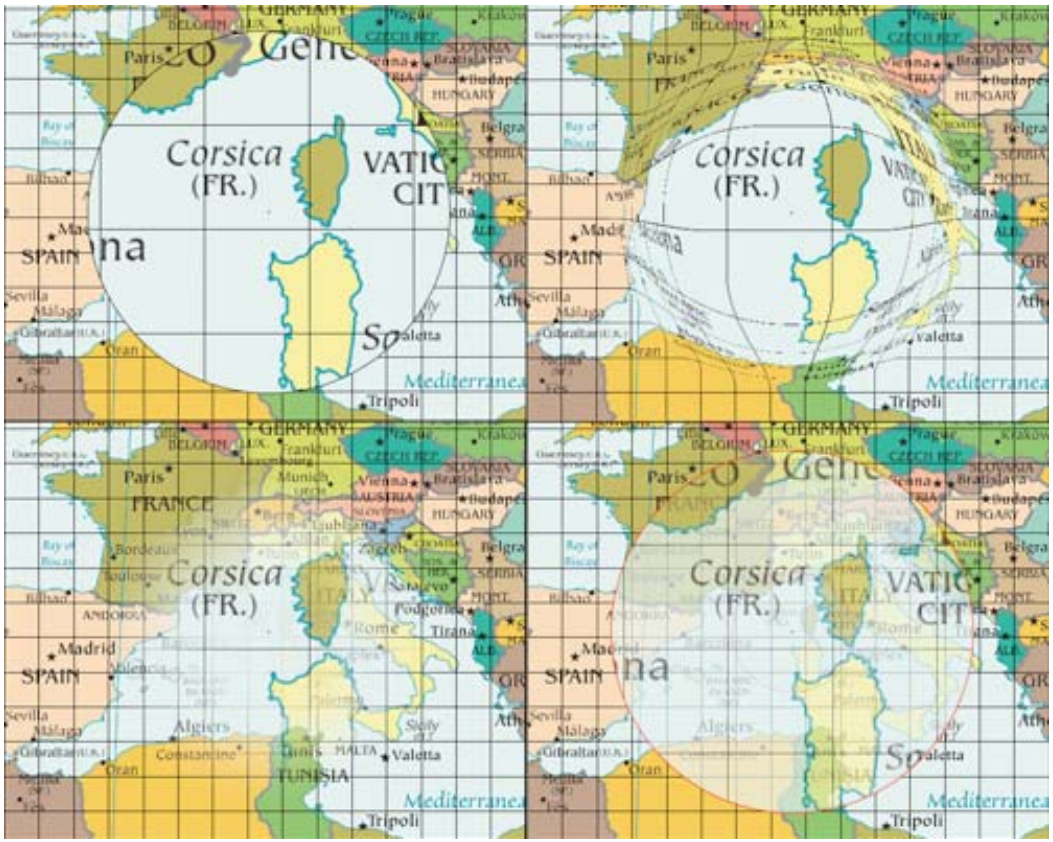
Human visual system organized as focus plus context

Sigma lenses use time and translucence

for more efficient transition

between focus and context

in multi-scale representations



Semantic Pointing

Fitts' law : Robust prediction of pointing speed and accuracy based on target width and distance

What if we disassociate motor and visual space ?

Significantly improves accuracy