

Human-Computer Interaction: Distant pointing


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Rendre utilisable le numérique

Recherche en Interaction Homme-Machine

Laurence NIGAY

EHCI team - Engineering for Human-Computer Interaction
LIG - Grenoble Informatics Laboratory



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LIG

Laboratoire d'Informatique de Grenoble



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LIG

- Joint Research Center



- ~500 members
- ~200 permanent researchers
- ~150 PhD students
- 5 focus areas and 24 research teams

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LIG



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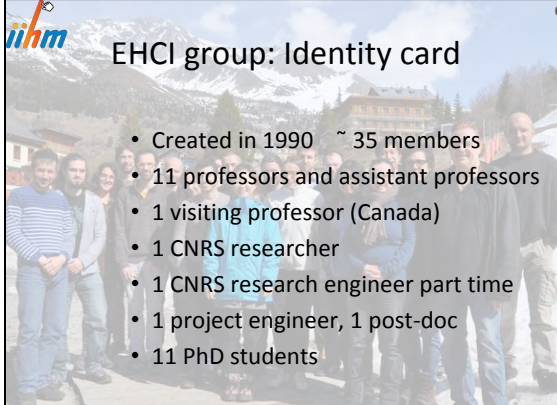
EHCI group



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EHCI group: Identity card

- Created in 1990 ~ 35 members
- 11 professors and assistant professors
- 1 visiting professor (Canada)
- 1 CNRS researcher
- 1 CNRS research engineer part time
- 1 project engineer, 1 post-doc
- 11 PhD students



Human-Computer Interaction: Distant pointing

Scientific domain:
Human-Computer Interaction (HCI) 7

Computer science contribution Supported by Social science

- Designing, developing and evaluating interaction techniques
- Development of conceptual and technical tools based on HCI principles: Utility, Usability, Context

Scientific domain:
Human-Computer Interaction (HCI) 8

3 interaction paradigms

- **Computer-as-tool**
 - Extend human capabilities
- **Computer-as-partner**
 - Task delegation
 - Anthropomorphic means of communication
- **Computer-as-medium**
 - Human communication (CSCW)

HCI: Context 9

- HCI in the context of Digital and Human Ecosystems

– a seamless environment of computing

The Computer for the 21st Century
1991 – M. Weiser

HCI: Context 10

- Ubiquitous computing 1991
M. Weiser Scientific American
- Calm technology

- **Invisible technology**
- **Technology available at any place**
- **Symbiosis of the real and digital worlds**

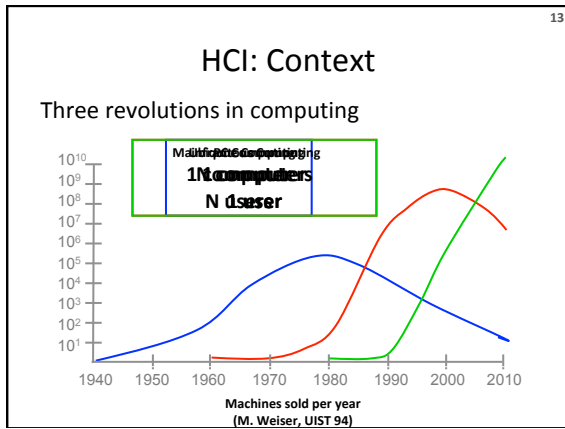
HCI: Context 11

- Virtual Reality

HCI: Context 12

- Embodied Virtuality

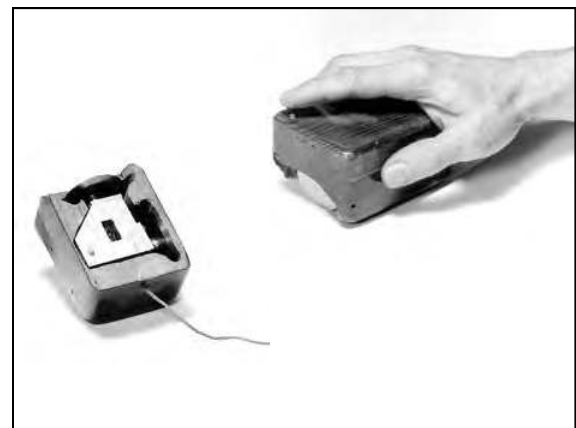
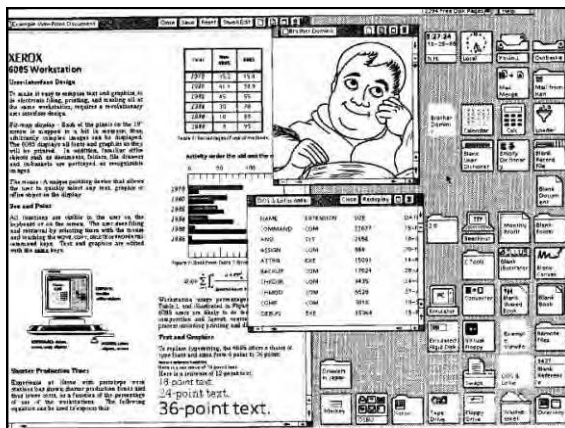
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HCI: Context


- Invisible technology
- Technology available at any place
- Symbiosis of the real and digital worlds



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HCI: Context

A seamless environment of computing



The Xerox Star has reached its limits
<http://www.digibarn.com/>

Computers are everywhere HCI is
« out of the box »

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HCI: Context

Unprecedented challenges for HCI

- Multiple contexts of use
- Multiple small and large interaction surfaces
- Multiple interaction devices
- Interaction adaptation – machine learning
- Combining the real and virtual worlds

One example: Distant pointing


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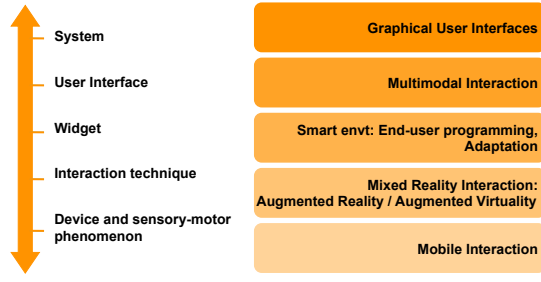
EHCI group: Research themes

- Graphical User Interfaces
- Multimodal Interaction
- Smart envt: End-user programming, Adaptation/Plasticity
- Mixed Reality Interaction: Augmented Reality / Augmented Virtuality
- Mobile Interaction


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EHCI group: Research themes

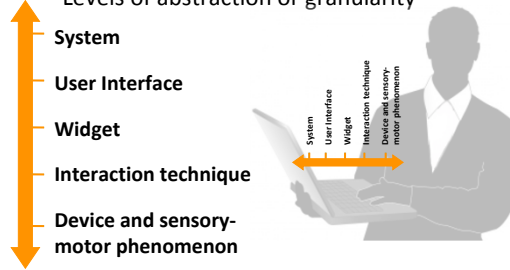


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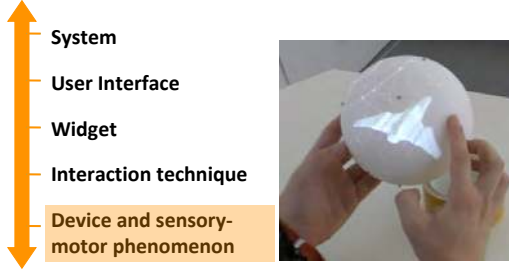
EHCI group: Research themes

- Levels of abstraction or granularity



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EHCI group: Research themes




Human-Computer Interaction: Distant pointing



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EHCI group: Research themes

- System
- User Interface
- Widget
- Interaction technique
- Device and sensory-motor phenomenon



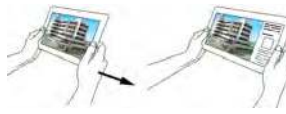
A hand is shown drawing a map on a white, curved surface, likely a part of a spherical interface. The drawing is in blue ink and shows a stylized map with lines and shapes.



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EHCI group: Research themes

- System
- User Interface
- Widget
- Interaction technique
- Device and sensory-motor phenomenon



Two hands are shown holding tablets, with an arrow pointing from the left tablet to the right tablet, indicating a transition or interaction between the devices.



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EHCI group: Research themes

- System
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- Interaction technique
- Device and sensory-motor phenomenon

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EHCI group: Research themes

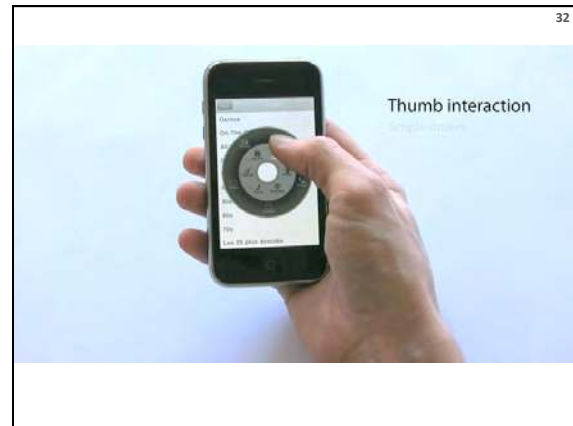
System

User Interface

Widget

Interaction technique

Device and sensory-motor phenomenon



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EHCI group: Research themes

System

User Interface

Widget

Interaction technique

Device and sensory-motor phenomenon

Graphical User Interfaces

Multimodal Interaction

Smart env: End-user programming, Adaptation

Mixed Reality Interaction: Augmented Reality / Augmented Virtuality

Mobile Interaction

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HCI: Context

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One example: Distant pointing

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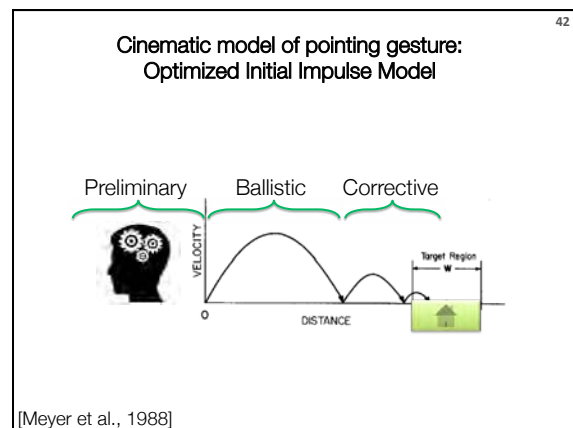
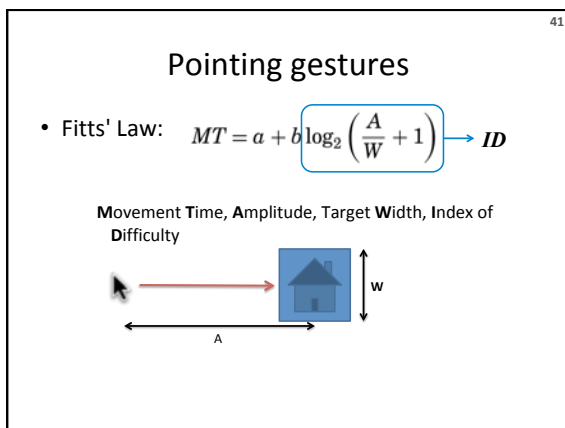
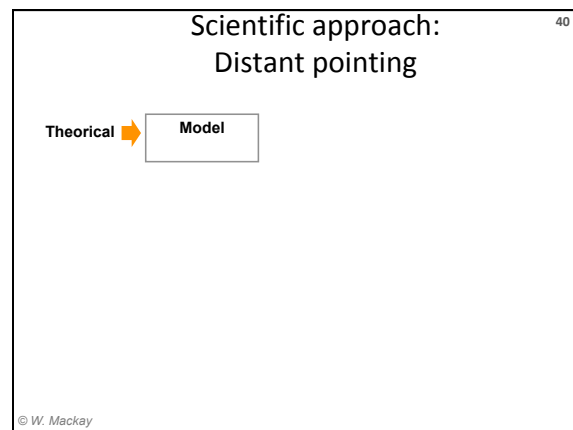
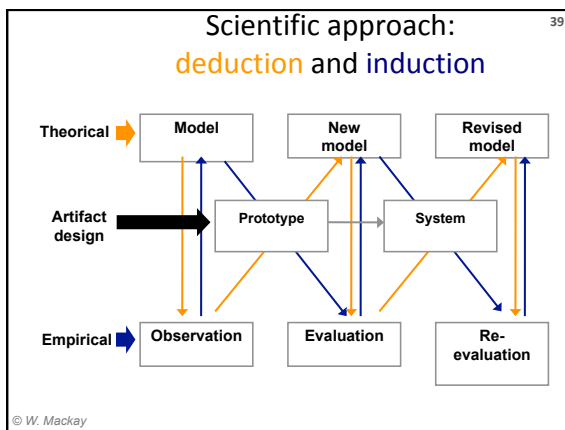
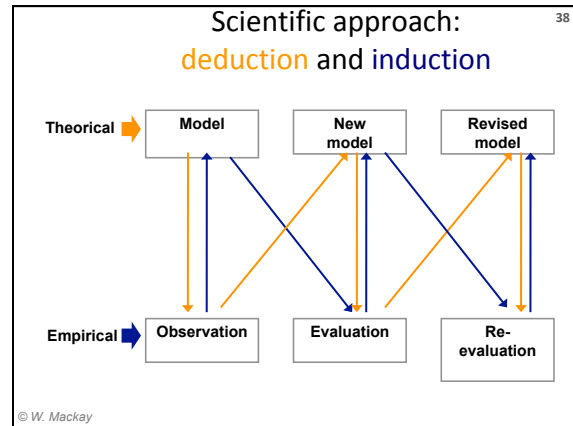
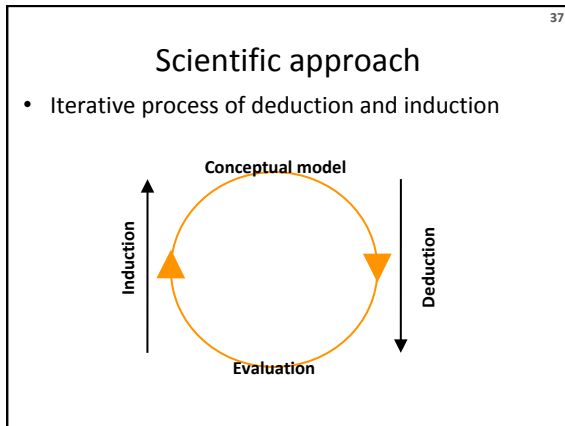
Distant pointing

- Digital targets
- Physical targets

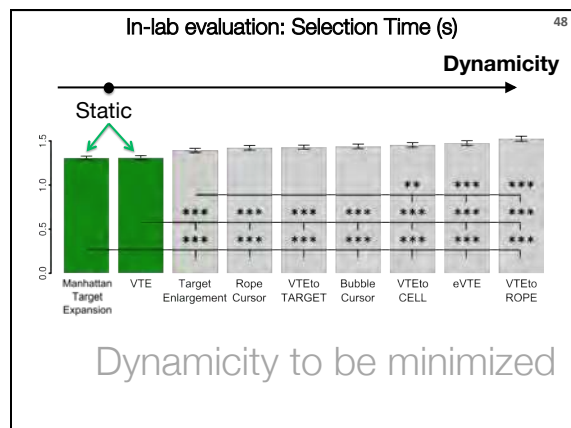
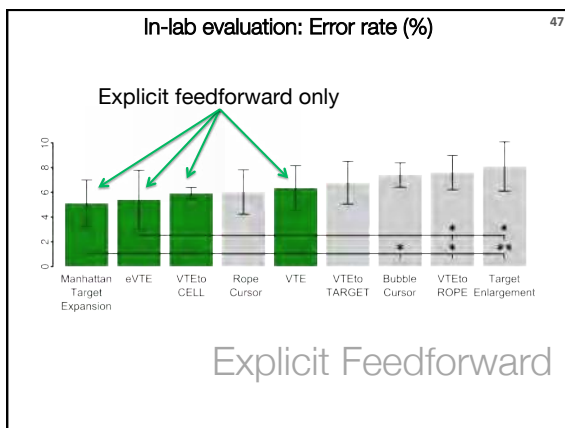
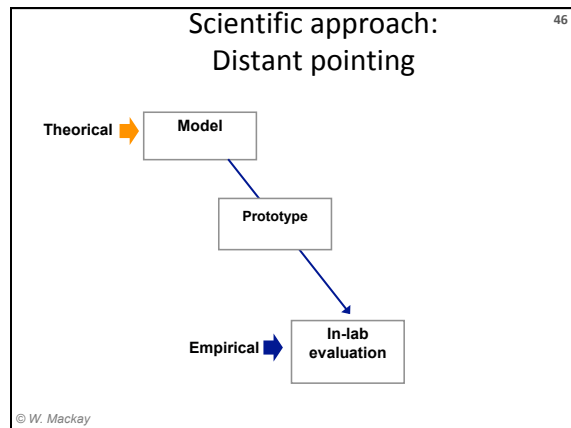
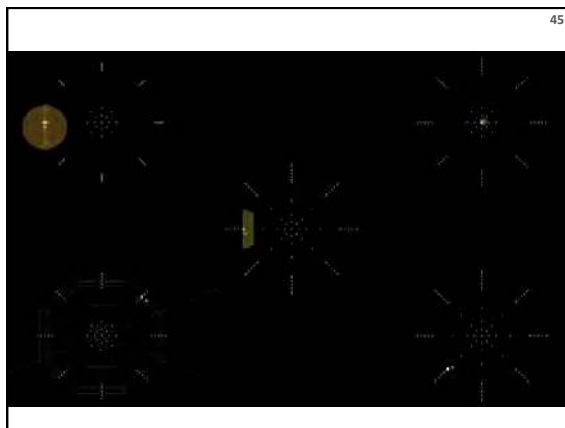
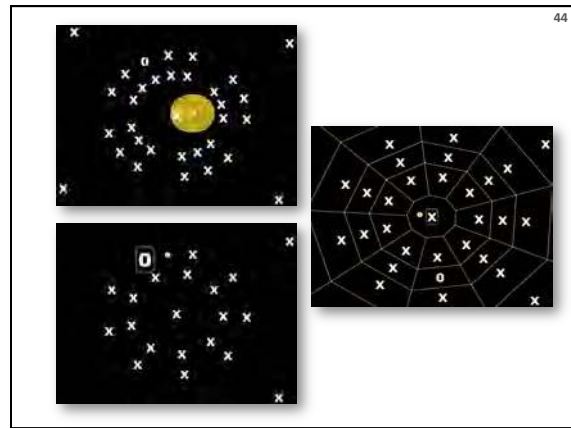
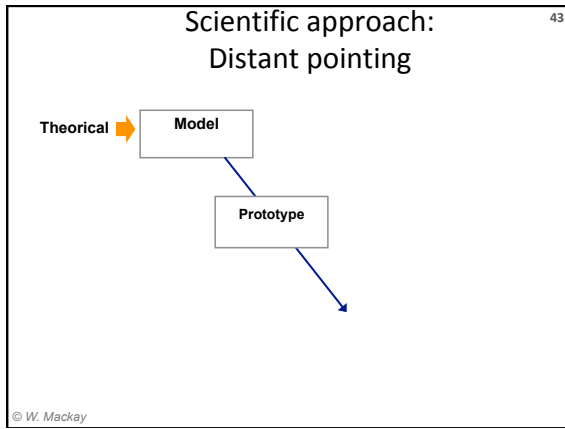
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Distant pointing: digital targets

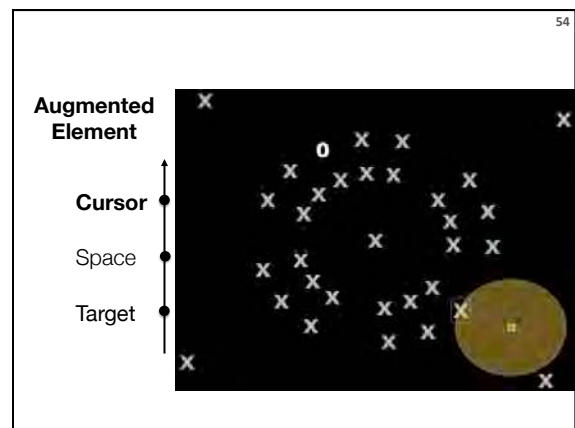
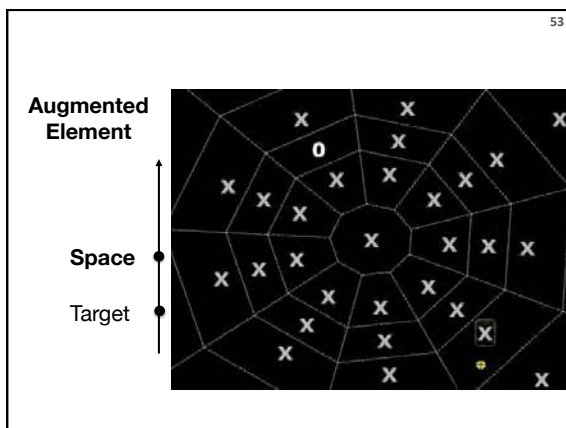
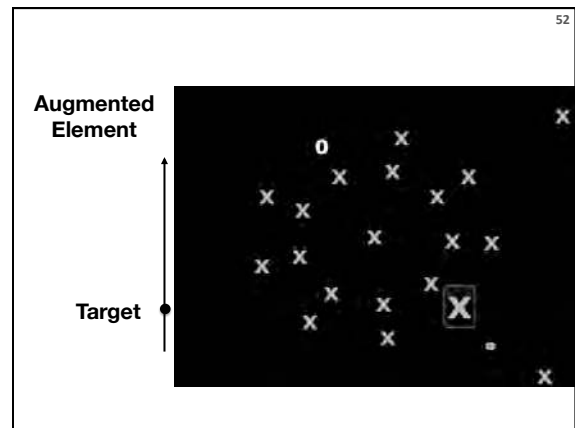
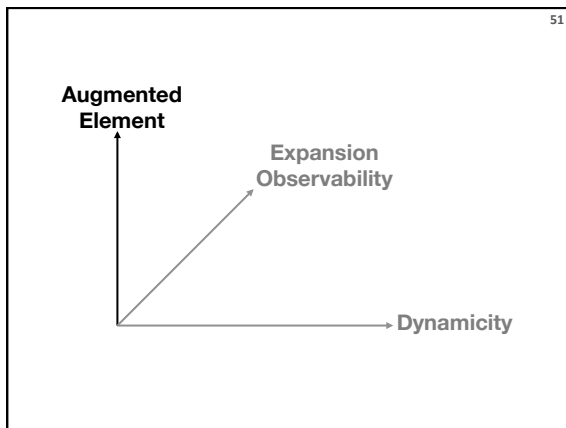
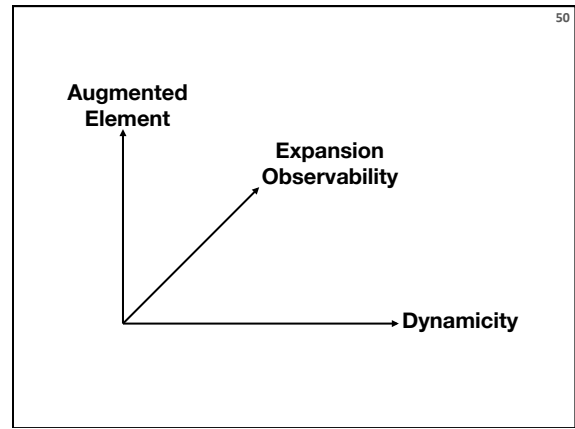
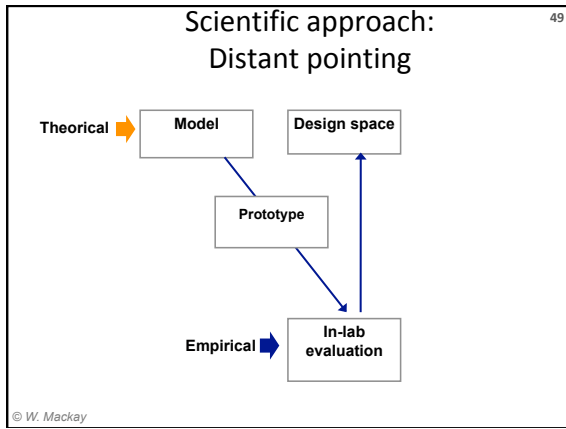
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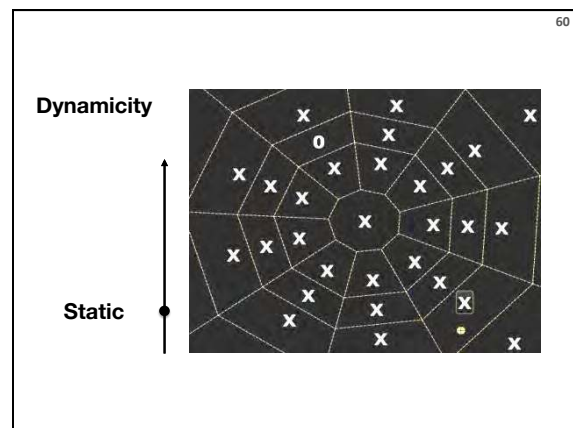
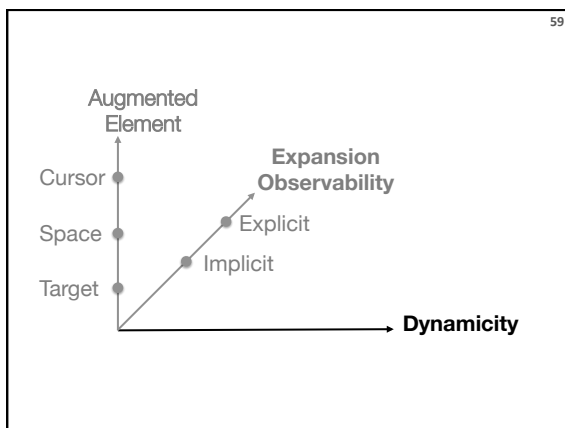
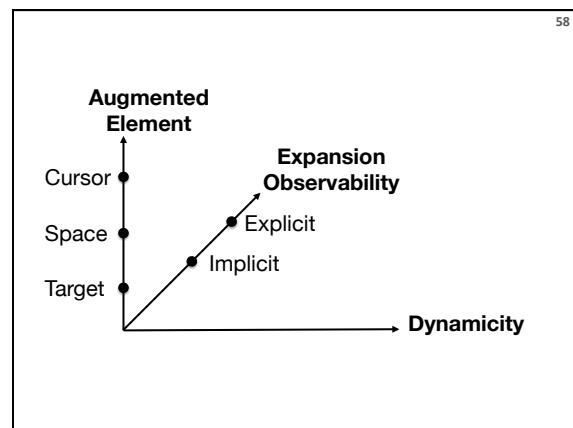
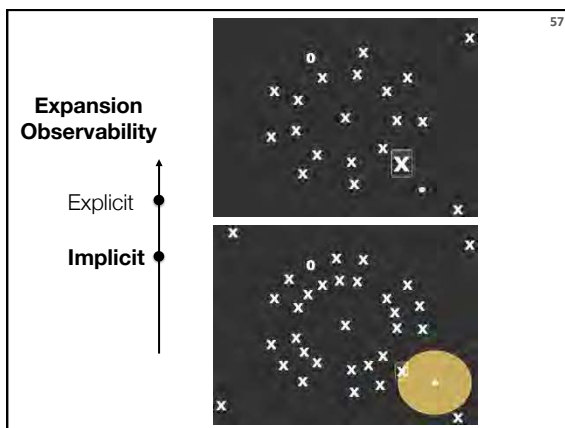
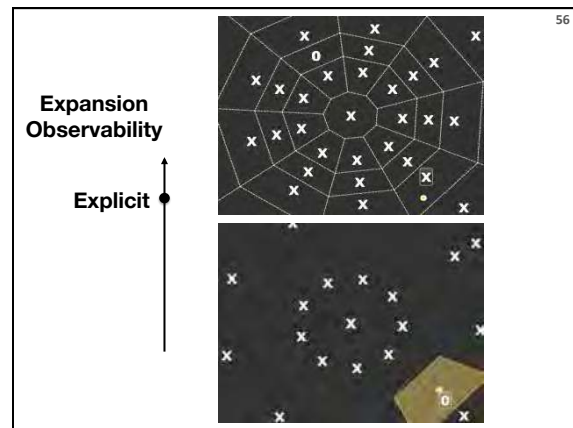
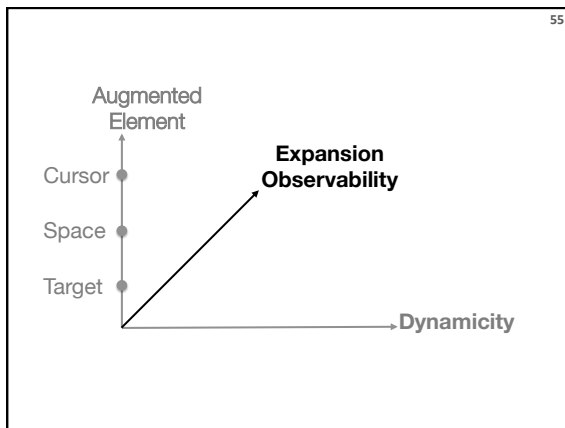
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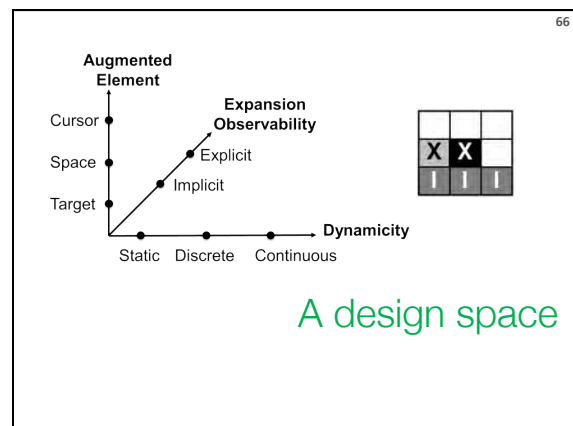
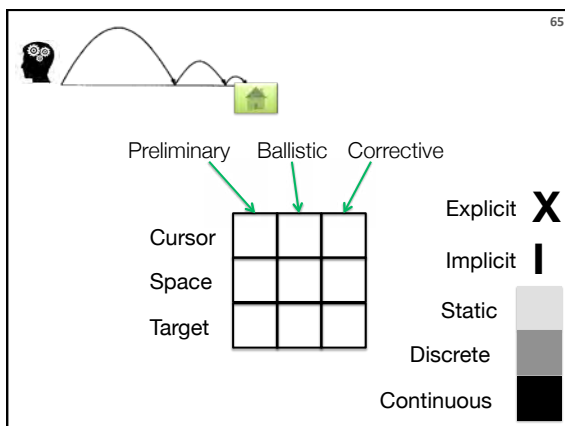
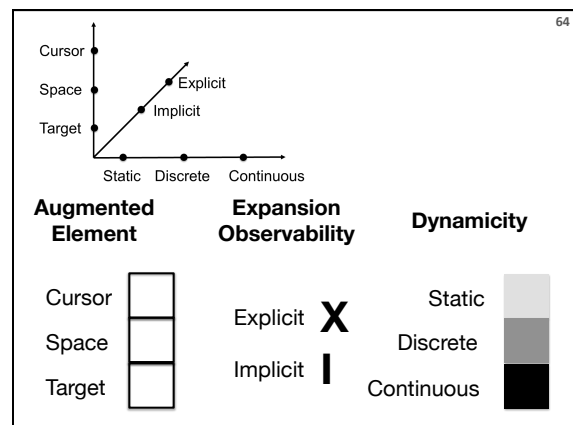
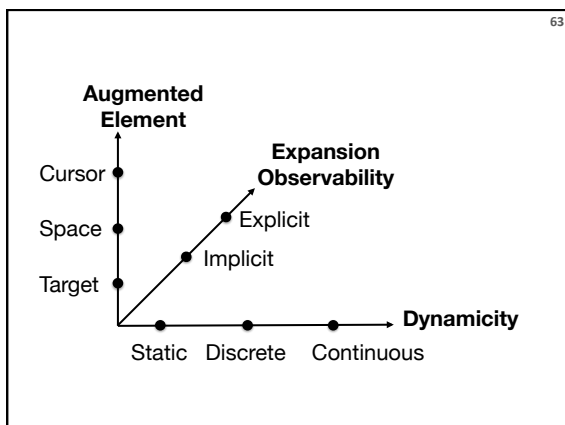
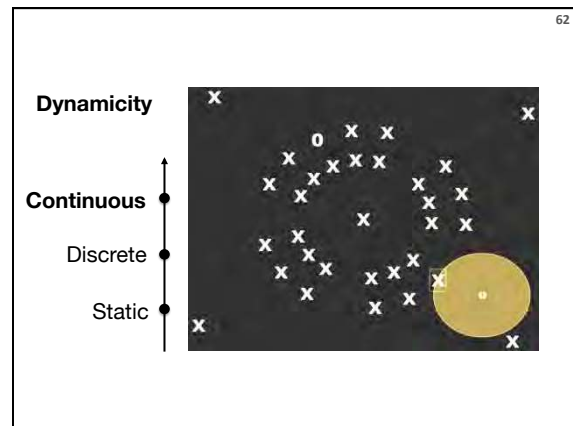
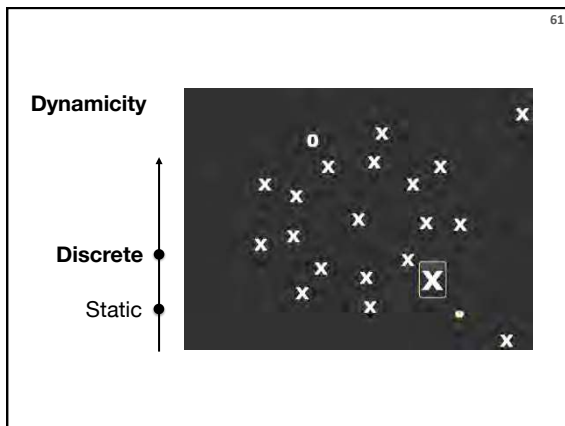
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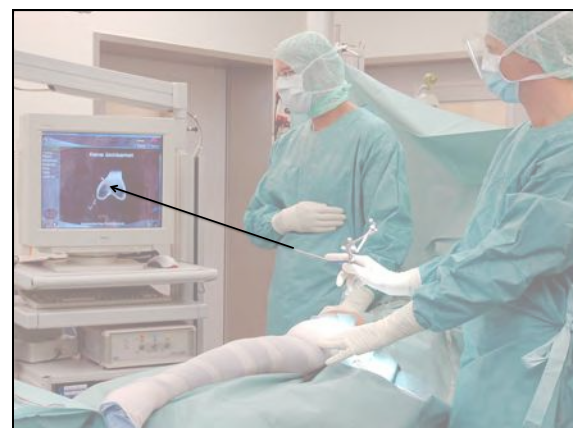
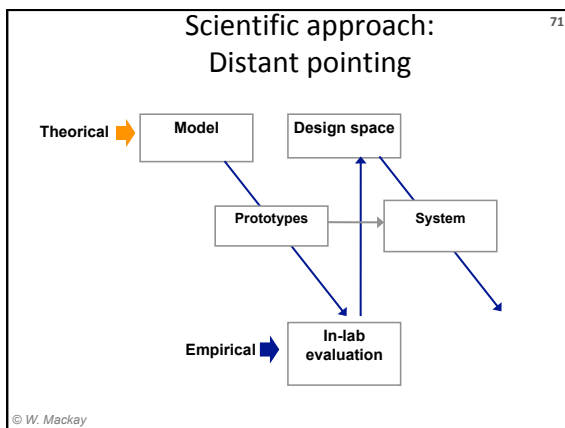
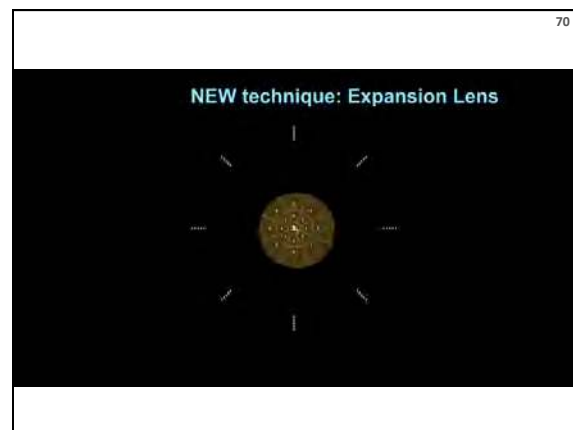
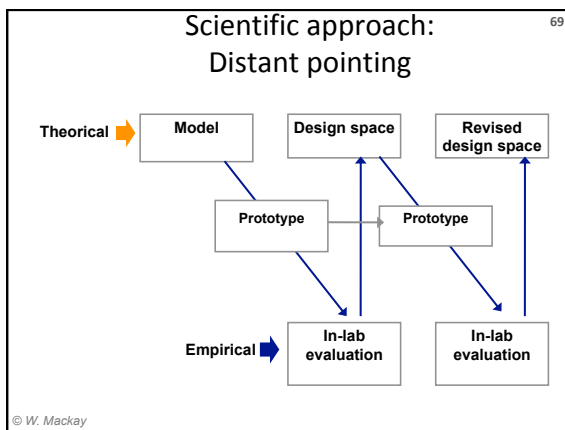
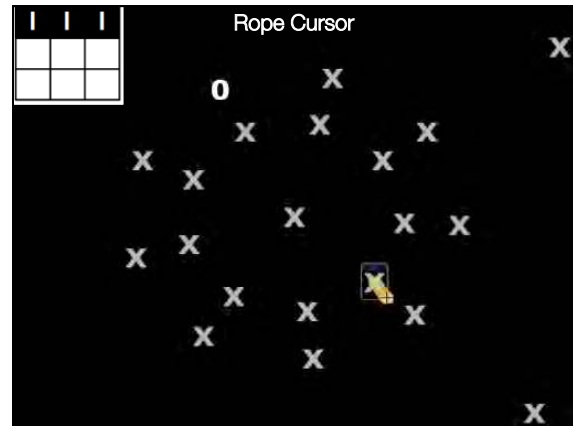
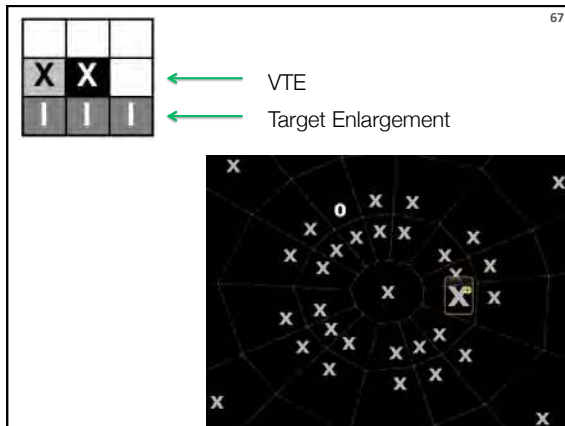
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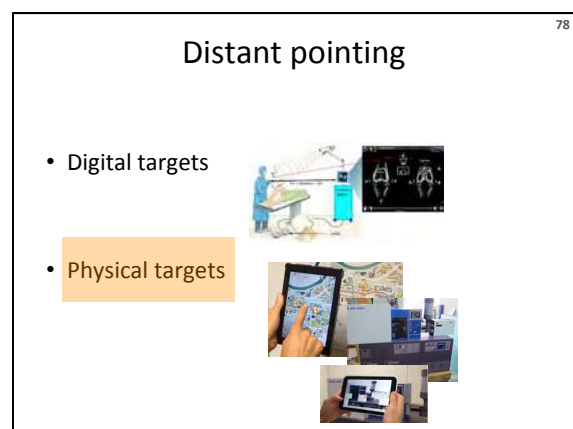
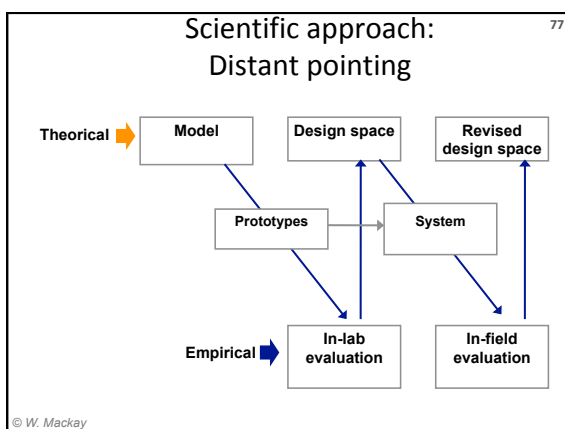
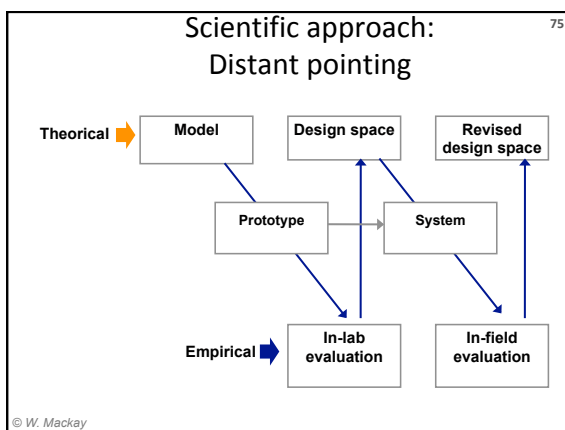
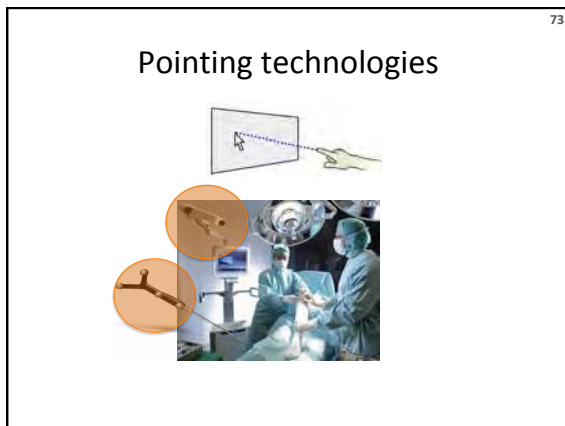
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Human-Computer Interaction: Distant pointing



Human-Computer Interaction: Distant pointing


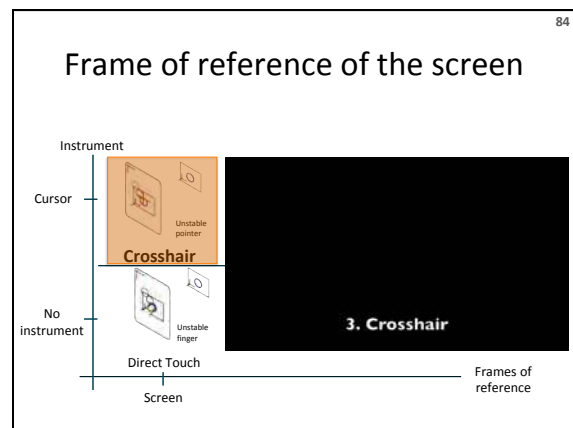
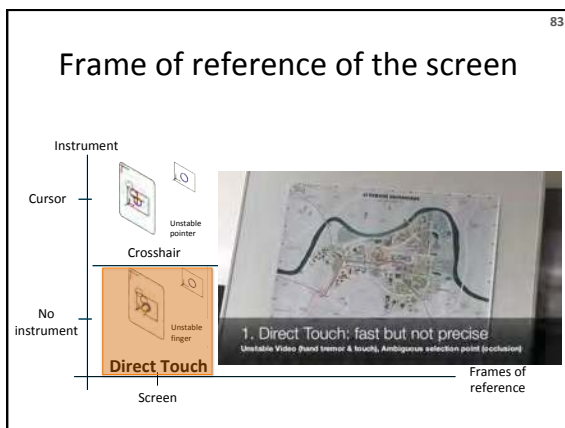
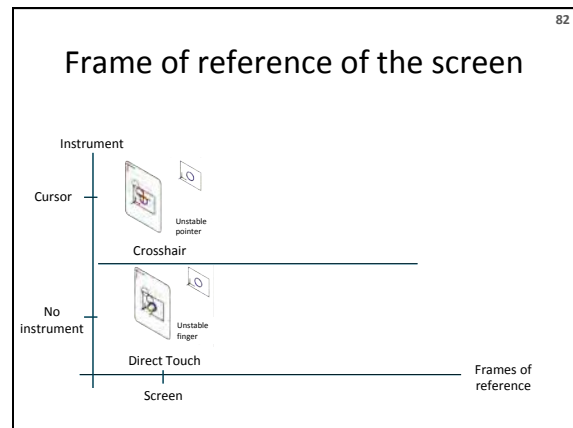
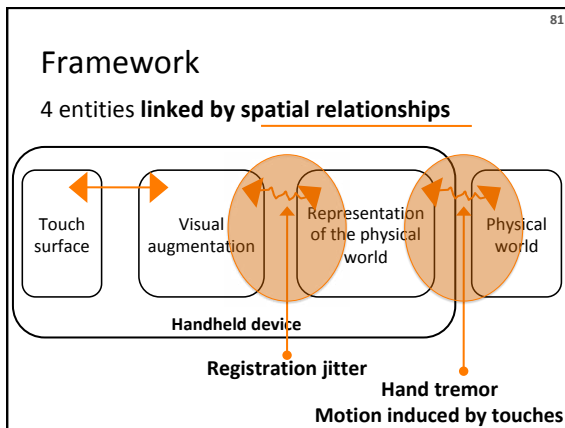
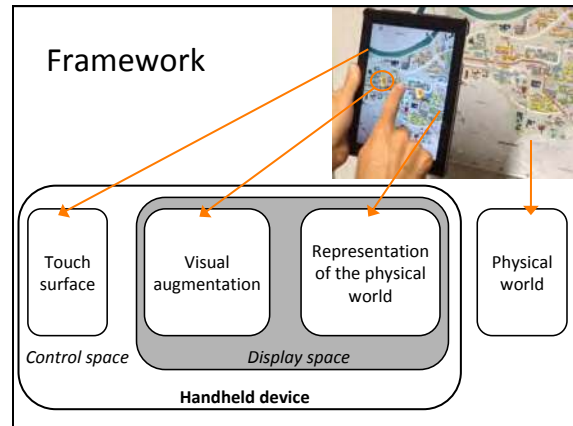


Human-Computer Interaction: Distant pointing

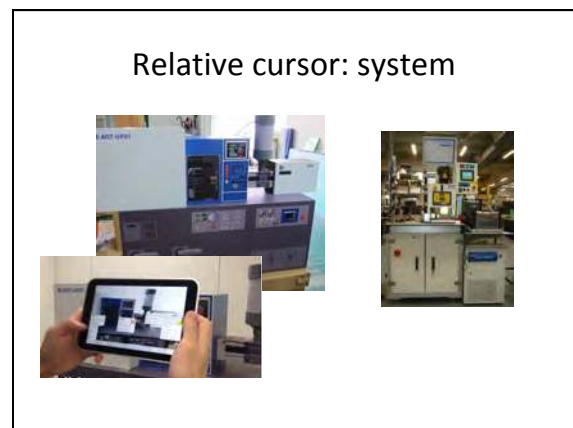
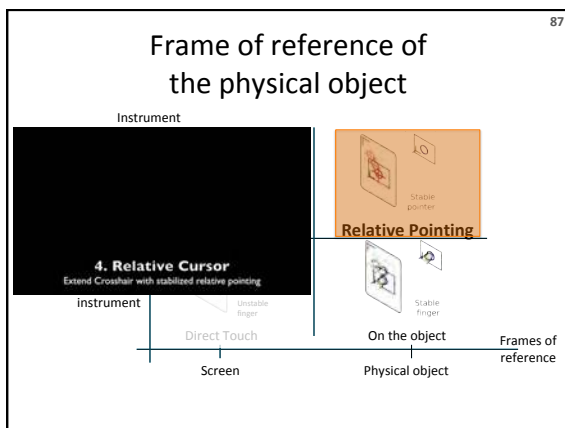
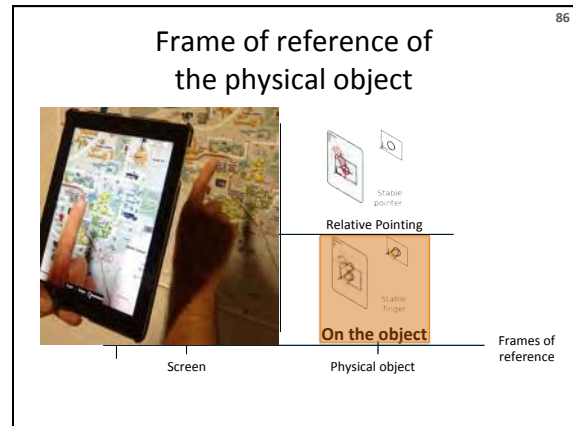
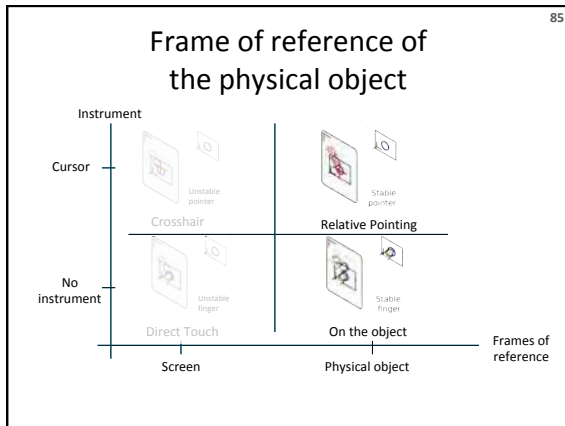
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AR: Pointing at physical targets

- Specific to AR:
 - ‘Real’ AND ‘Virtual’
 - Spatiotemporal relationship between the physical world and digital content
- How to relax the **spatial constraint** while keeping physical/digital colocation?

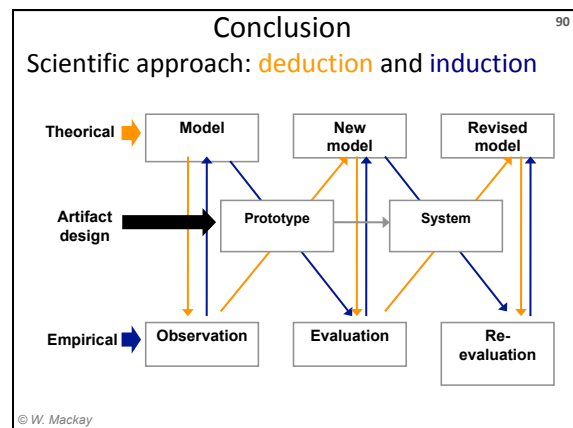
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Distant pointing

- Digital targets
- Physical targets




Human-Computer Interaction: Distant pointing

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Conclusion: Context

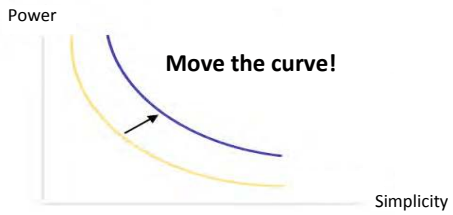
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Conclusion: Research challenge



Power

Move the curve!

Simplicity

© W. Mackay

Thank you for your attention



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