

## Interacting in the Large

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[www.hitl.washington.edu/people/rmay/hispace.html](http://www.hitl.washington.edu/people/rmay/hispace.html)

Video-based tracking to utilize direct, absolute interactions over large screens.



Krueger - METAPLAY (1970)  
Wellner - DigitalDesk (1993)  
Ishii/Ullmer - MetaDesk (1997)  
Rekimoto/Matsushita - HoloWall (1997)

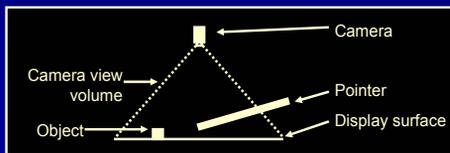
## Points for Consideration

- Direct interaction on large screens provides performance advantages over indirect interaction for selection task.
- Interfaces for large screen interactions are task and group size dependent.

## Human Information Workspace: HI-SPACE

### Design Considerations

Untethered  
Multi-modal Input  
Direct Interaction  
Group Interaction  
Blending Realities



## Why Direct Interactions?

### Direction Interaction Potentials

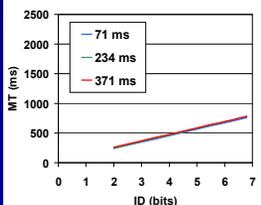
- Draws on users experience in the physical world.
- Reduces user cognitive load.

### Direction Interaction Advantages

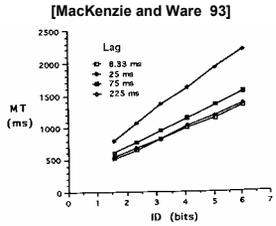
- Faster for target selection.
- Minimizes impact from tracker lag.

## Impact of Lag

### Direct, Absolute Interaction Tapping Results



### Mouse and Desktop Display Selection Results [MacKenzie and Ware 93]



Index of Difficulty:  
 $ID = \log_2(A/W+1)$

## Impact of Lag

### Mouse and Desktop Display Selection Results [MacKenzie and Ware 93]

	Lag (ms)		Performance Degradation
Measure	8.3	225	
Movement Time (ms)	911	1493	63.9%
Error Rate (%)	3.6%	11.3%	214%
Bandwidth (bits/s)	4.3	2.3	46.5%

### Direct, Absolute Interaction Tapping Results

	Lag (ms)		Performance Degradation
Measure	71	371	
Movement Time (ms)	415	432	4.3%
Error Rate (%)	4.5%	4.1%	-7.7%
Bandwidth (bits/s)	9.35	9.17	2.0%

## HI-SPACE Hockey



Structured Interface  
for two players

## HI-SPACE Hockey

## Seattle Art Museum: Virtual Dig

An interactive learning  
experience to help museum  
goers understand where  
the artifacts came from.



May 10 – August 12, 2001  
Used: 10 networked computers  
6 cameras  
6 projectors  
Attendance: 25,000

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