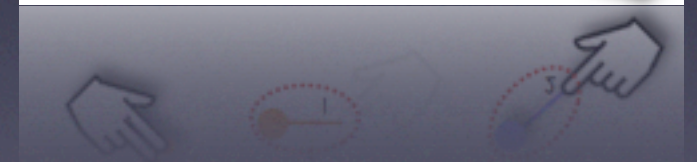
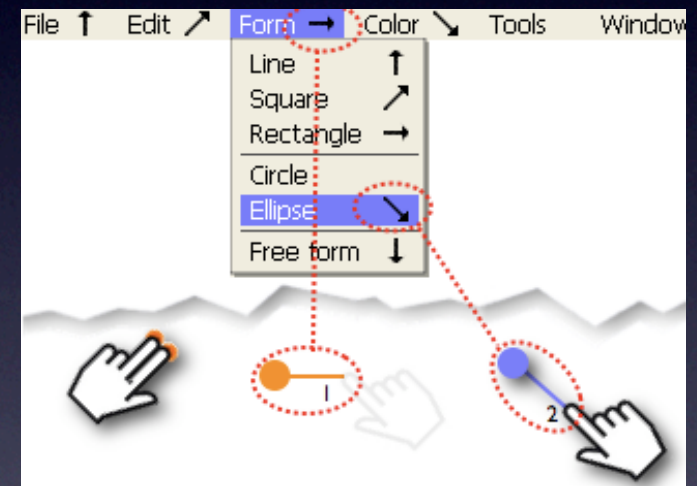
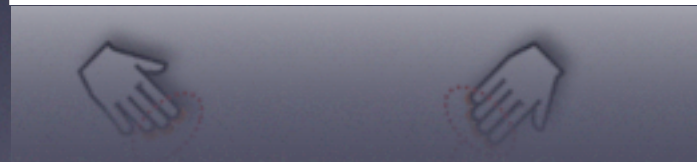
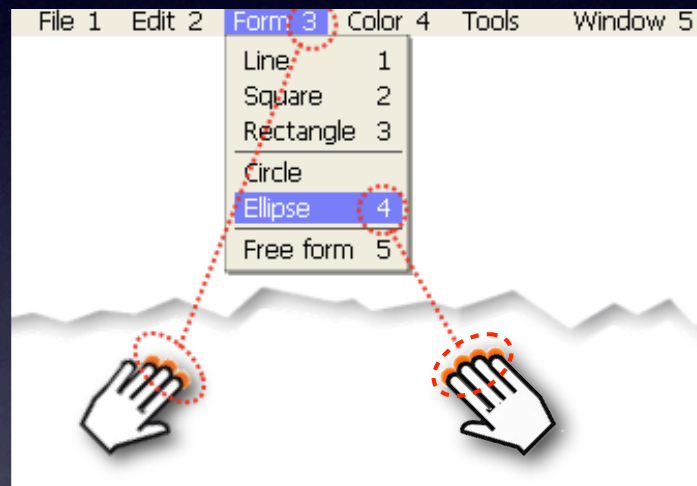


Finger-Count & Radial-Stroke Shortcuts:

Two Techniques for Augmenting Linear Menus on Multi-Touch Surfaces

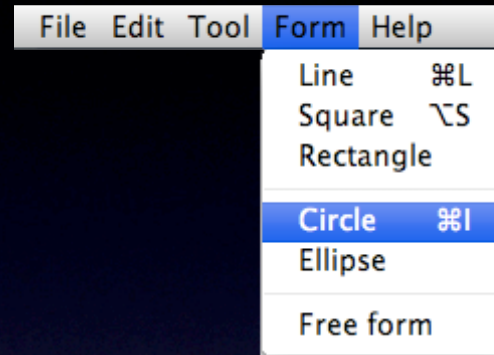
Gilles Bailly
Eric Lecolinet
Yves Guiard

TELECOM
ParisTech

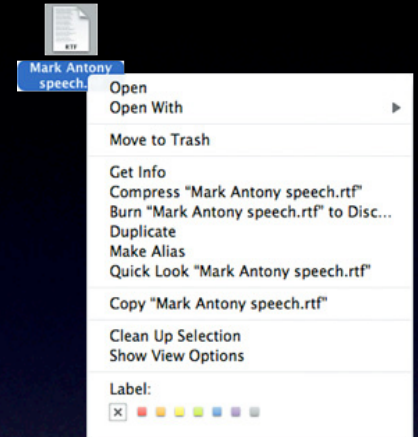


Linear Menus

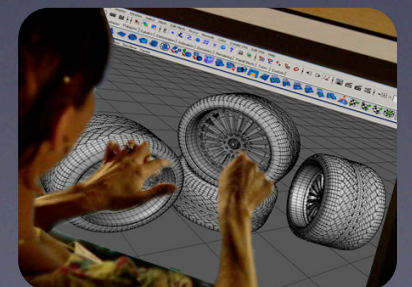
- Very commonly used
- Significant advantages
 - large number of commands
 - novice & expert modes
- Well suited for the PC
 - now available on various interactive surfaces



menubar

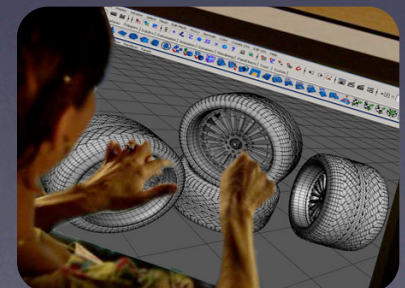
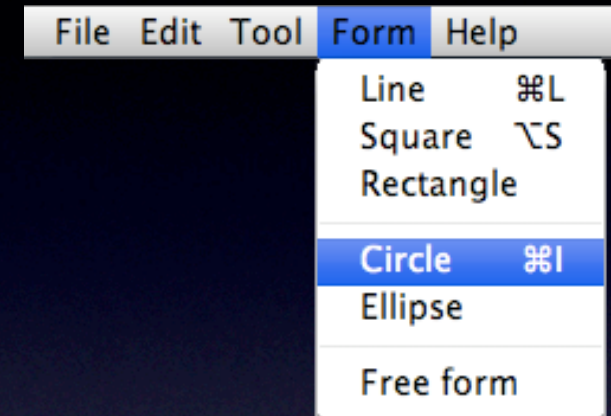


context menu



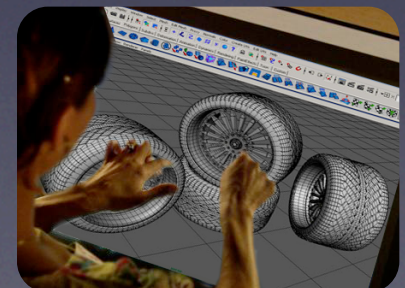
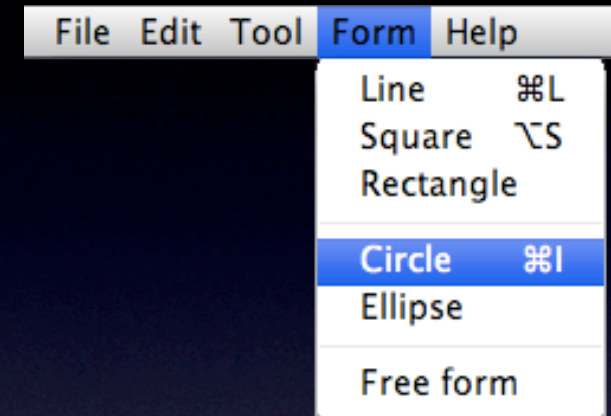
Linear Menus

- Problems
- Not so well suited for interactive surfaces
 - accuracy
 - occlusion
 - no shortcut
 - reachability



Linear Menus

- Problems
 - Not so well suited for interactive surfaces
 - accuracy
 - occlusion
 - no shortcut
 - reachability
- Objectives
 - to augment linear menus
 - to alleviate these problems



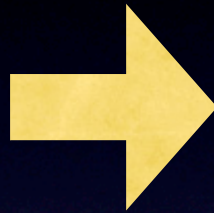
Approach

- Exploiting multi-touch capabilities
 - Two handed & multi-finger Interaction techniques
- Principles
 - Finger-Counting
 - Radial-Stroke

Finger-Counting



Real world (3;2)



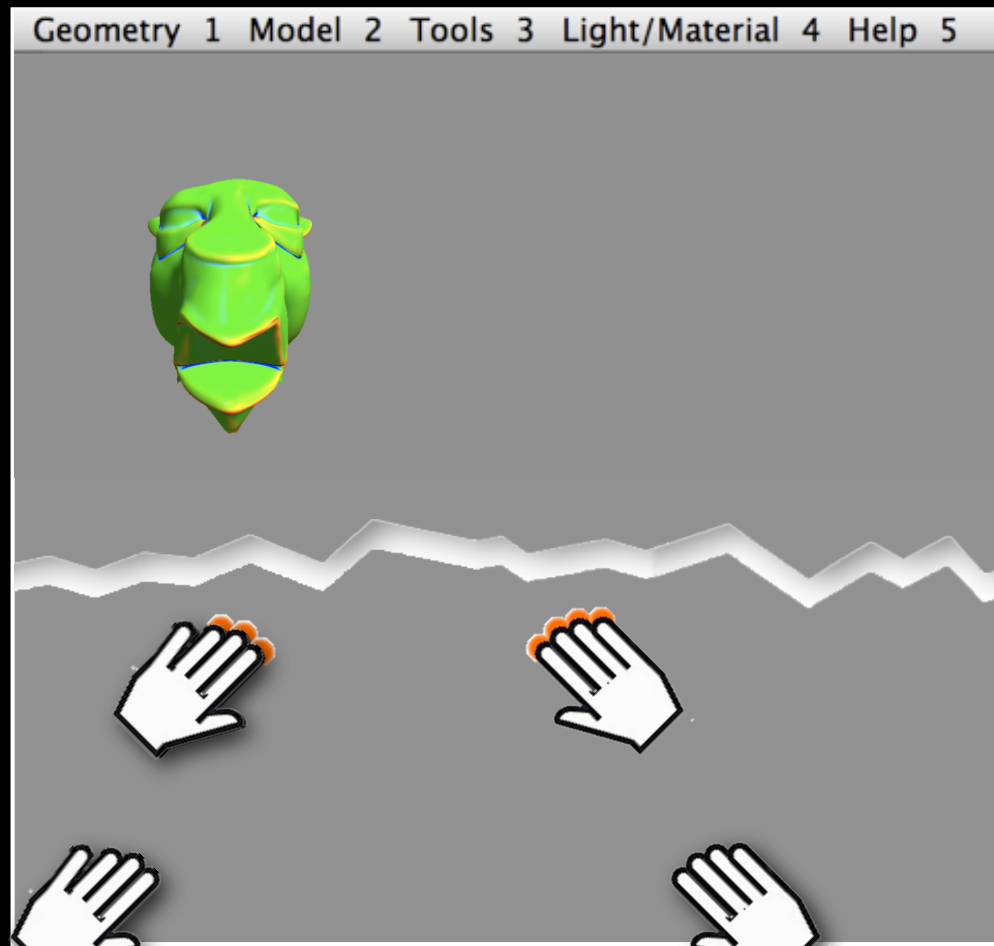
Computer system (3;2)

- Express a pair of integers
 - by counting the number of finger contacts
- Simplicity
 - to understand
 - to perform
 - to recognize

25 = 5x5 input configurations

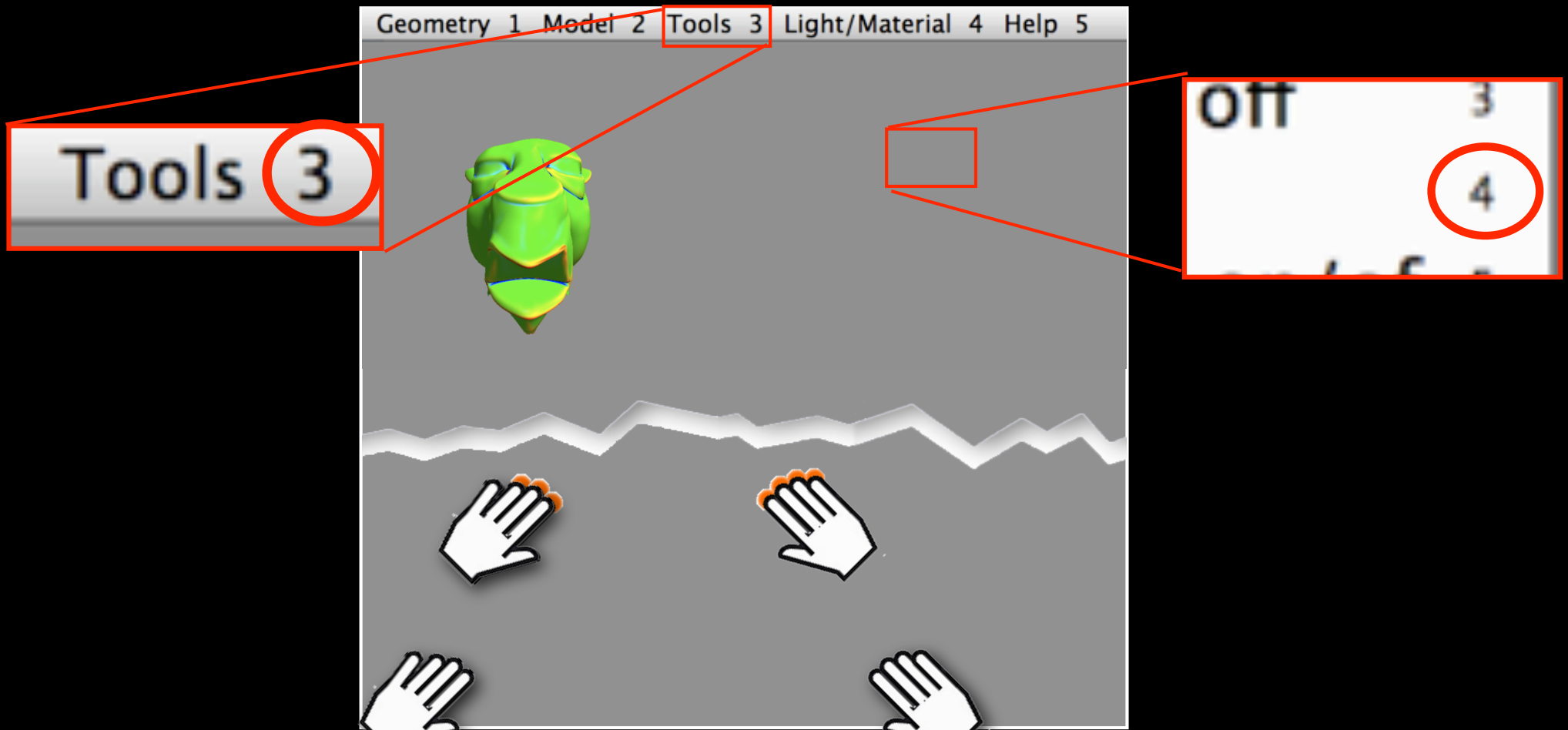
Finger-Count Shortcuts

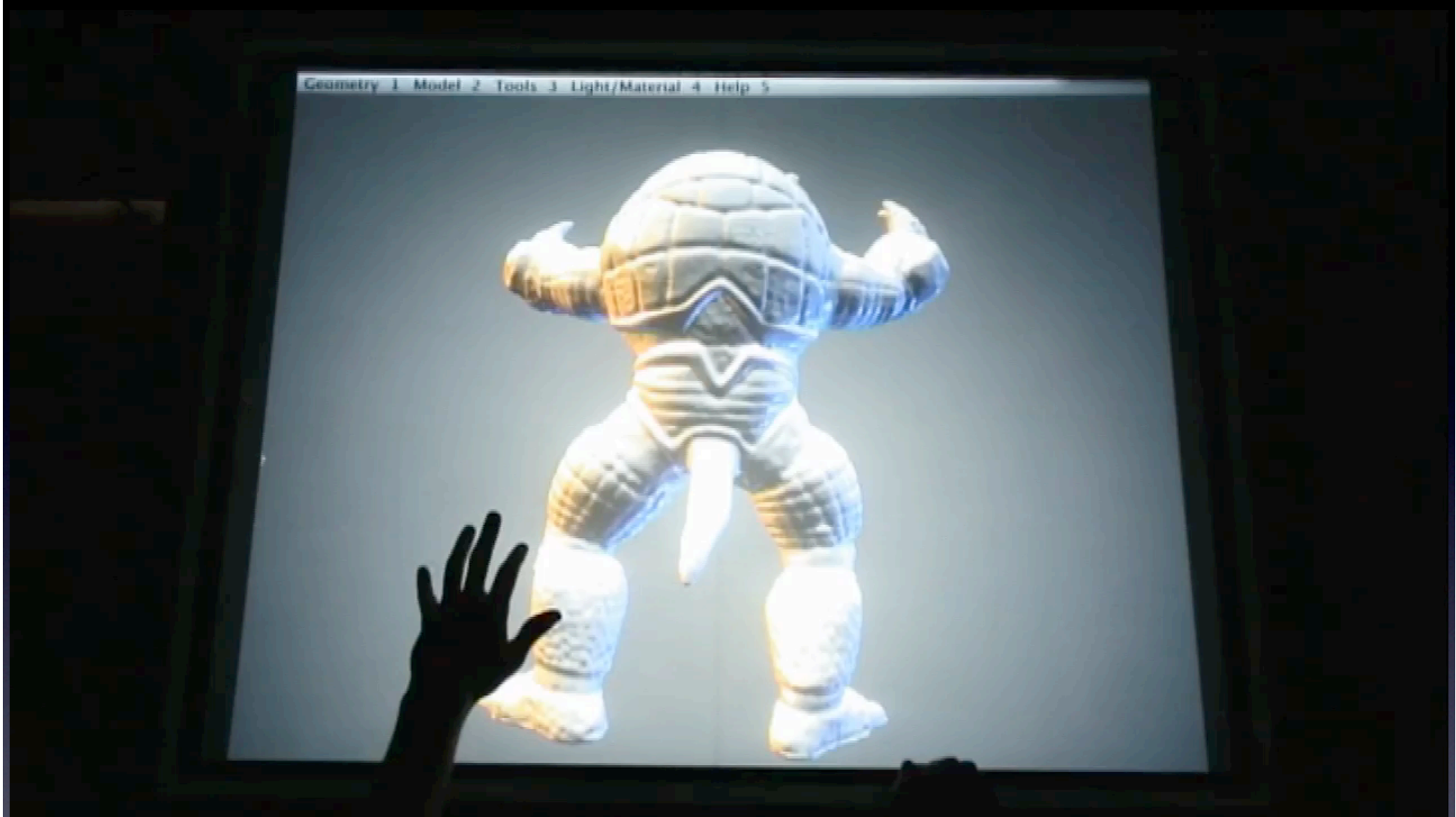
(Novice mode)



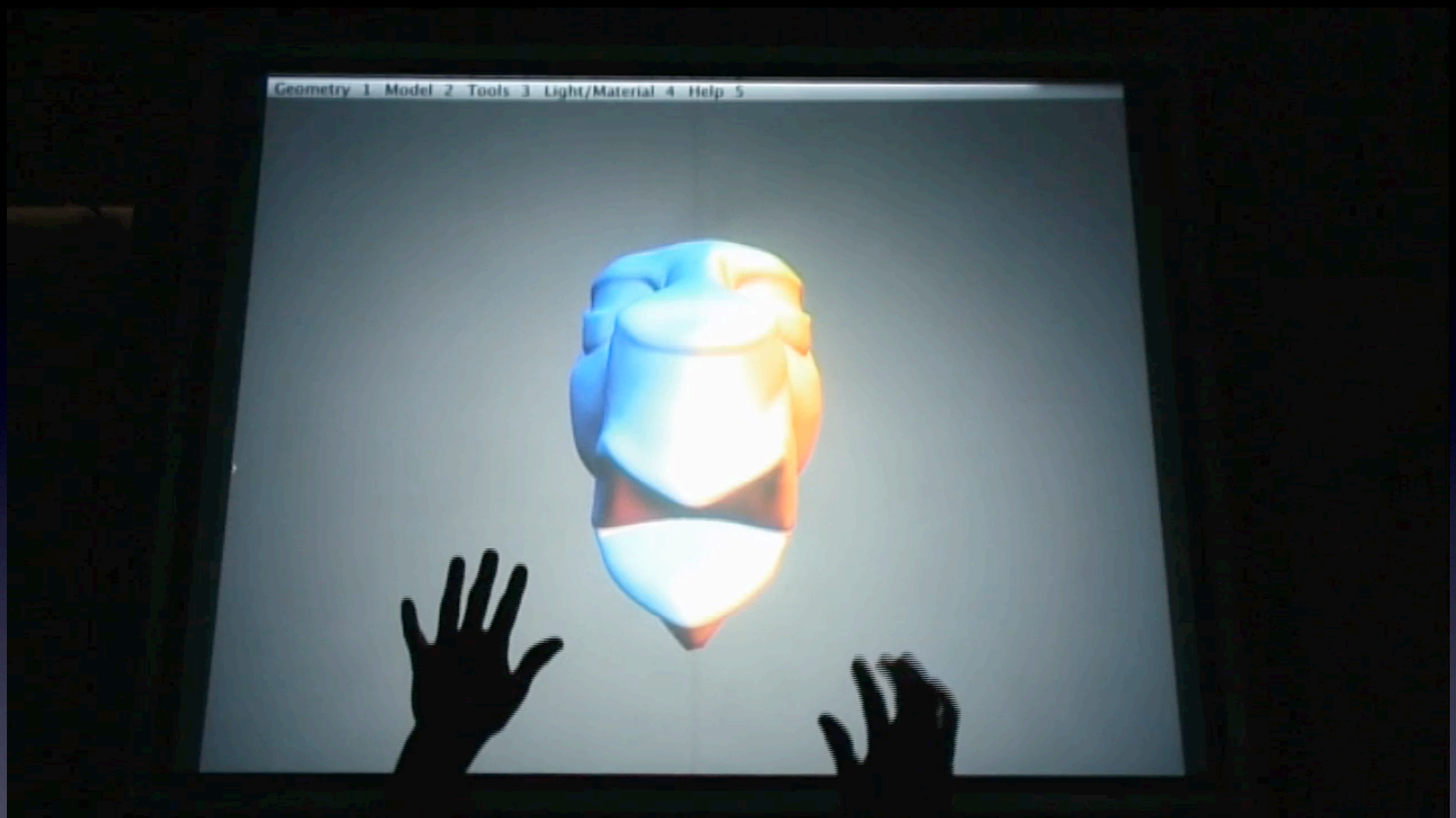
Finger-Count Shortcuts

(Novice mode)





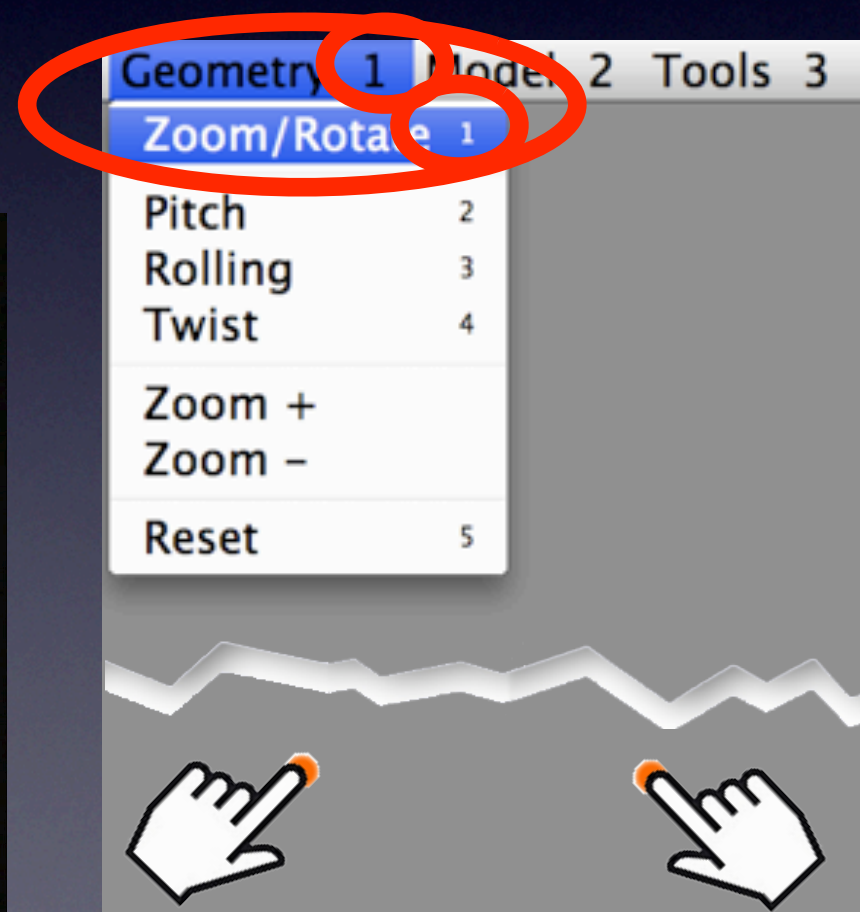
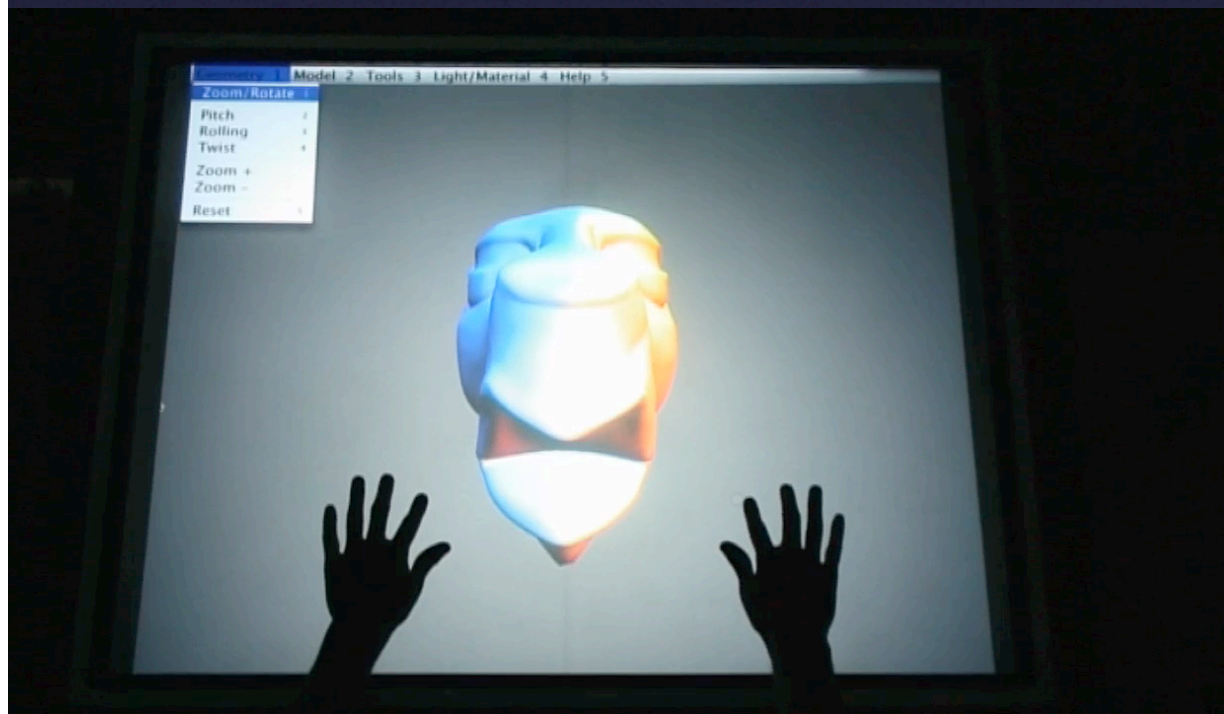
Novice Mode: Exploration



Expert Mode: Eyes-free selection

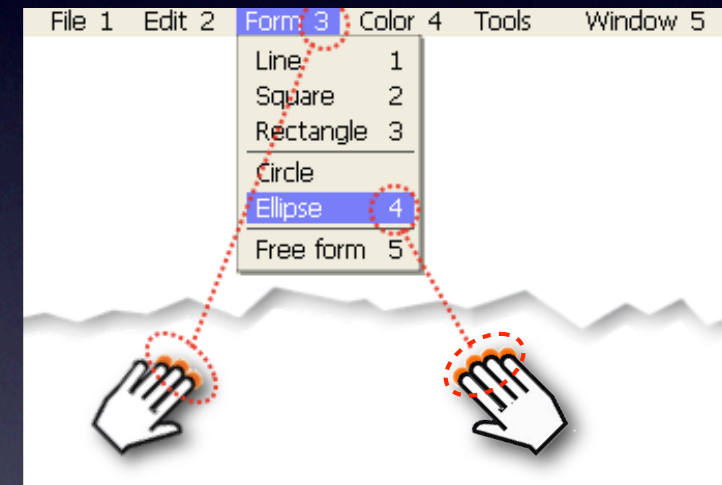
Finger-Count Shortcuts

- Compatible with techniques using drag events
- Example : Zoom and Rotate



Finger-count properties

- Augment Linear menus
- Compatible
- Integration
 - Zoom/Rotate
- Novice mode
 - exploration
- Expert mode
 - eyes-free selection

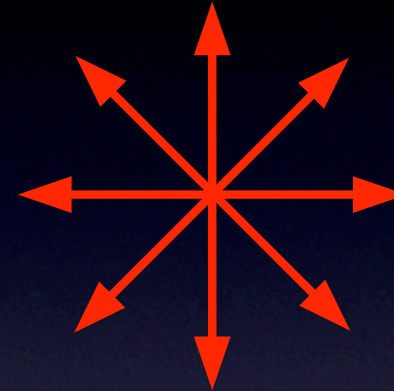


Radial-Stroke Shortcuts

- Principle

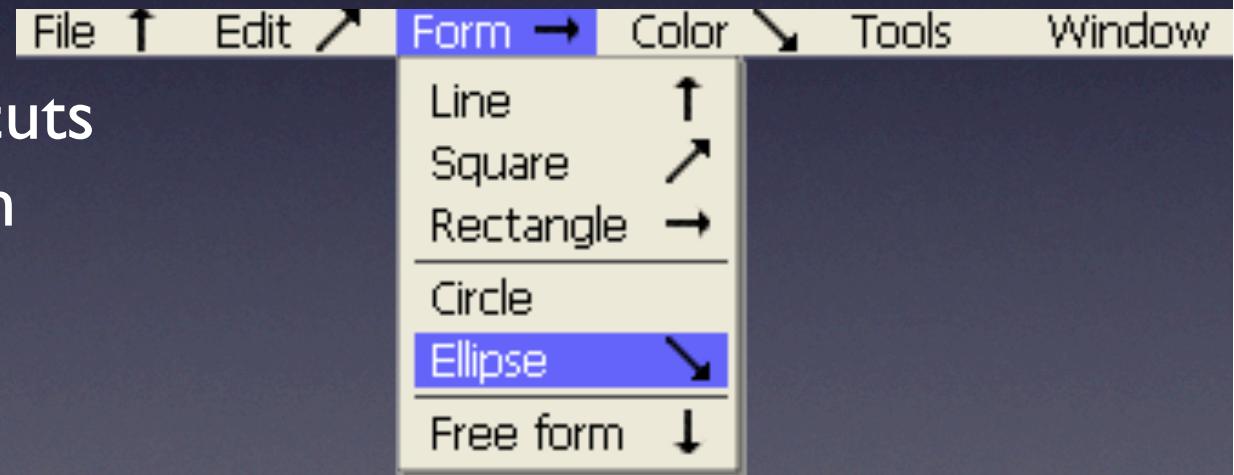
- Radial-stroke

- Marking menus [Kurtenbach 91]
 - Multi-Stroke menus [Zhao 04]
 - Stroke shortcuts [Appert 09]



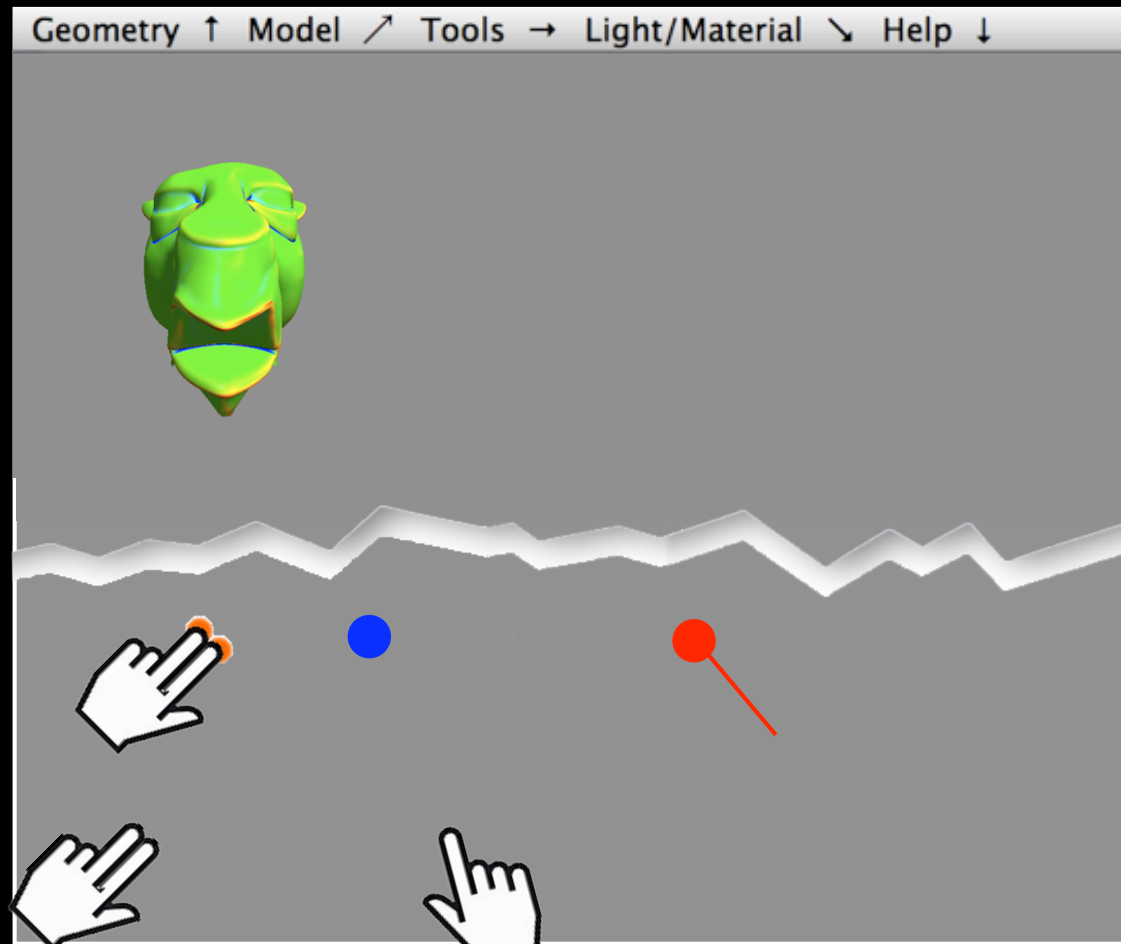
- Technique

- Radial-Stroke shortcuts
 - Two stroke selection
 - 1st stroke: menu
 - 2nd stroke: item



- Menu activation ?

Radial-Stroke Shortcuts (novice mode)





Novice Mode: Exploration



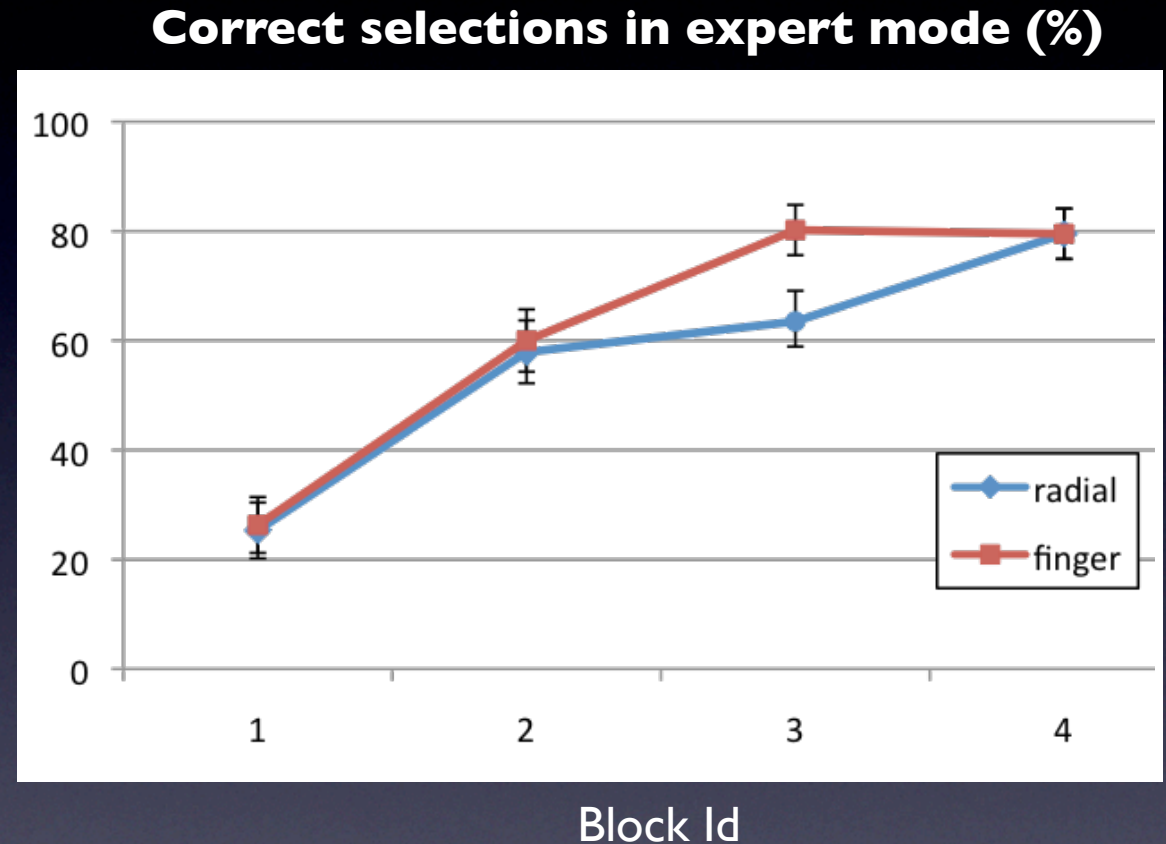
Expert Mode: Eyes-free selection

Analytical comparison

	Radial-Stroke	Finger-Count
Compatible	Yes	Yes
Zoom-Rotate Integration	No	Yes
Nb Shortcuts	$64 = 8 * 8$	$25 = 5 * 5$
Novice Mode (Exploration)	Yes	Yes
Expert mode (Eyes-free selection)	Yes	Yes
Fluid Transition (Novice to Expert)	Yes	Yes
Learning	Yes	?

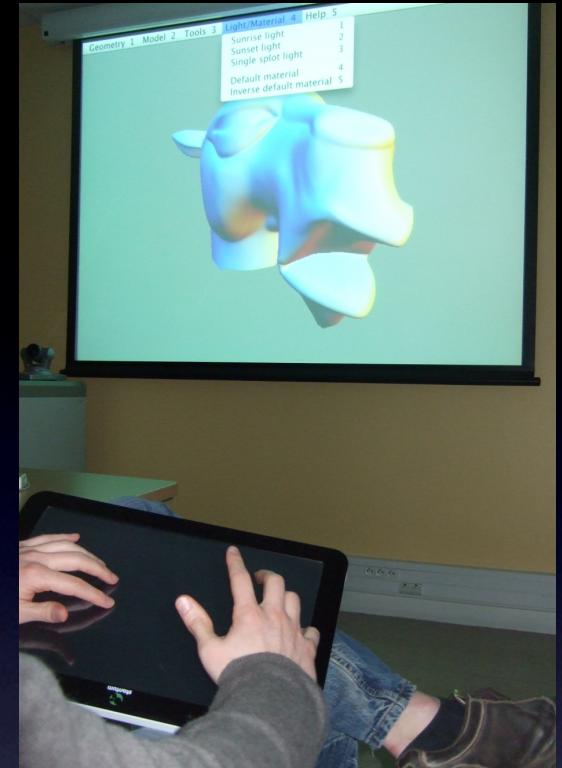
Experimental comparison

- Learning task
 - learn 6 commands in expert mode
 - 4 blocks * 18 trials
- Results
 - Finger-Count as easy to learn as Radial-Stroke
 - better for block 3
- More details in the paper



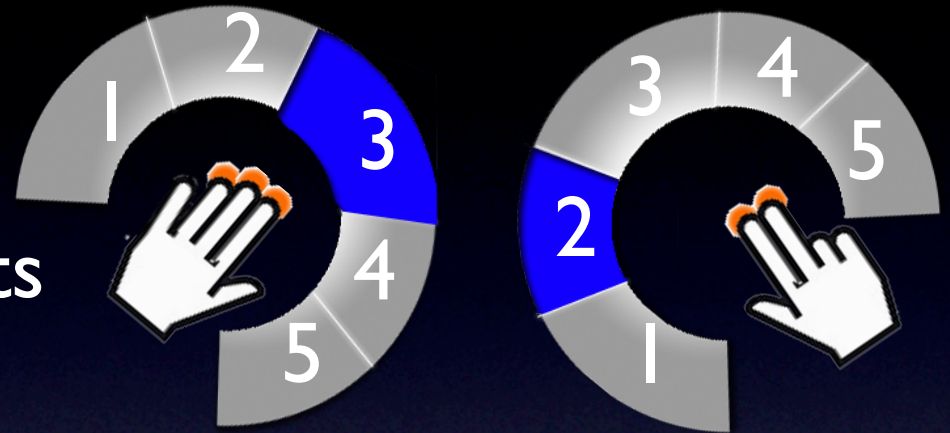
Conclusion

- Principles
 - Finger-counting
 - Radial-Stroke
- 2 menu techniques
 - Finger-count shortcuts
 - Radial-Stroke shortcuts
- Experimental evaluation
 - more details in the paper

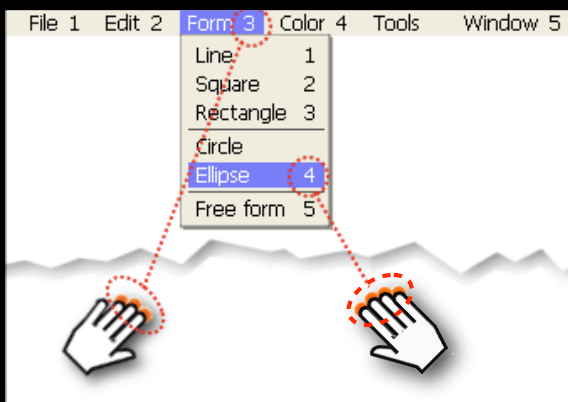


Alternatives

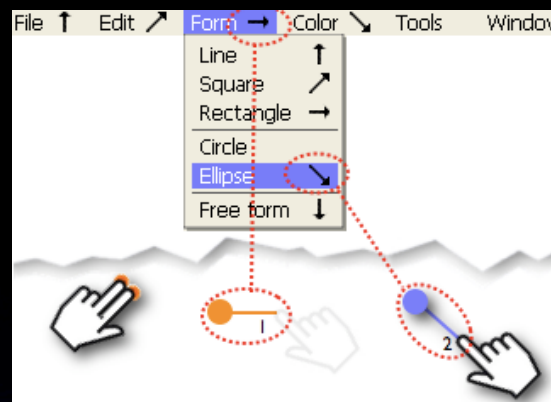
- Semi-circular display layouts



- Combining Finger-Count & Radial Stroke
 - chording gestures
 - Lepinski, Grossman, Fitzmaurice (CHI 2010)
- Future work
 - Learning and memorization
 - which items easier to learn ?



Finger-Count
Shortcuts



Radial-Stroke
Shortcuts

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Telecom ParisTech



Videos:

- www.gillesbailly.fr
- Youtube