Expressive Interaction

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If you can point, you can use a Macintosh.

You do it at baseball games. At the counter in grocery stores. And every time you let your fingers do the walking.

By now, you should be pretty good at pointing.

And having mastered the oldest known method of making yourself understood, you've also mastered using the most sophisticated personal computer yet developed.

Macintosh. Designed on the simple premise that a computer is a lot more useful if it's easy to use.

So, first of all, we made the screen layout resemble a desktop, displaying pictures of objects you'll have no trouble recognizing. File folders. Clipboards. Even a trash can.

Then, we developed a natural way for you to pick up, hold, and move these objects around.

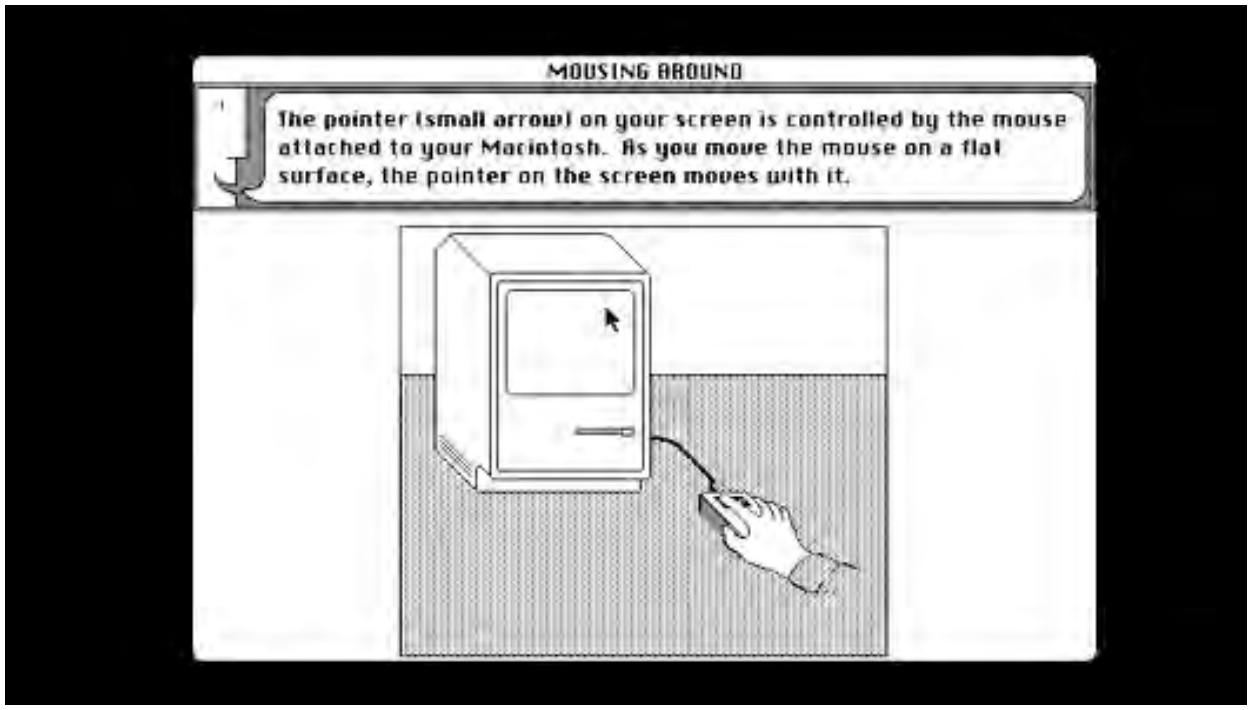
We put a pointer on the screen.

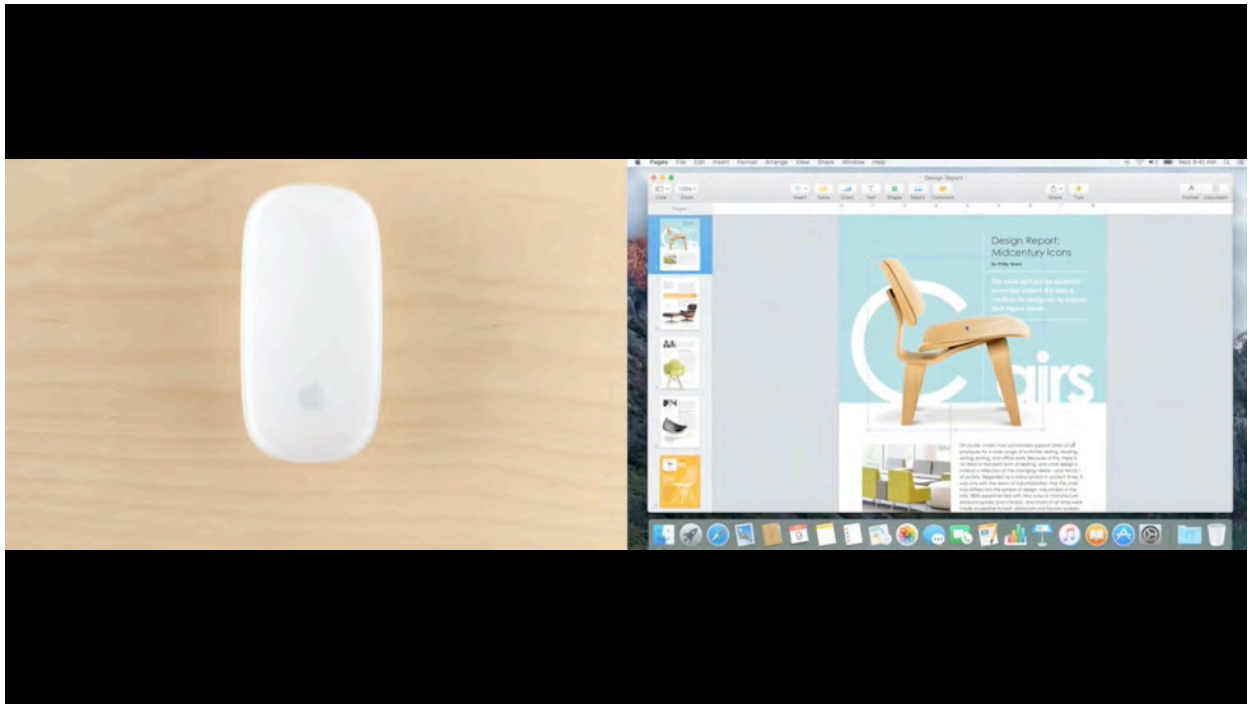
and attached the pointer to a small, rolling box called a "mouse." The mouse fits in your hand, and as you move the mouse around your desktop, you move the pointer on the screen.

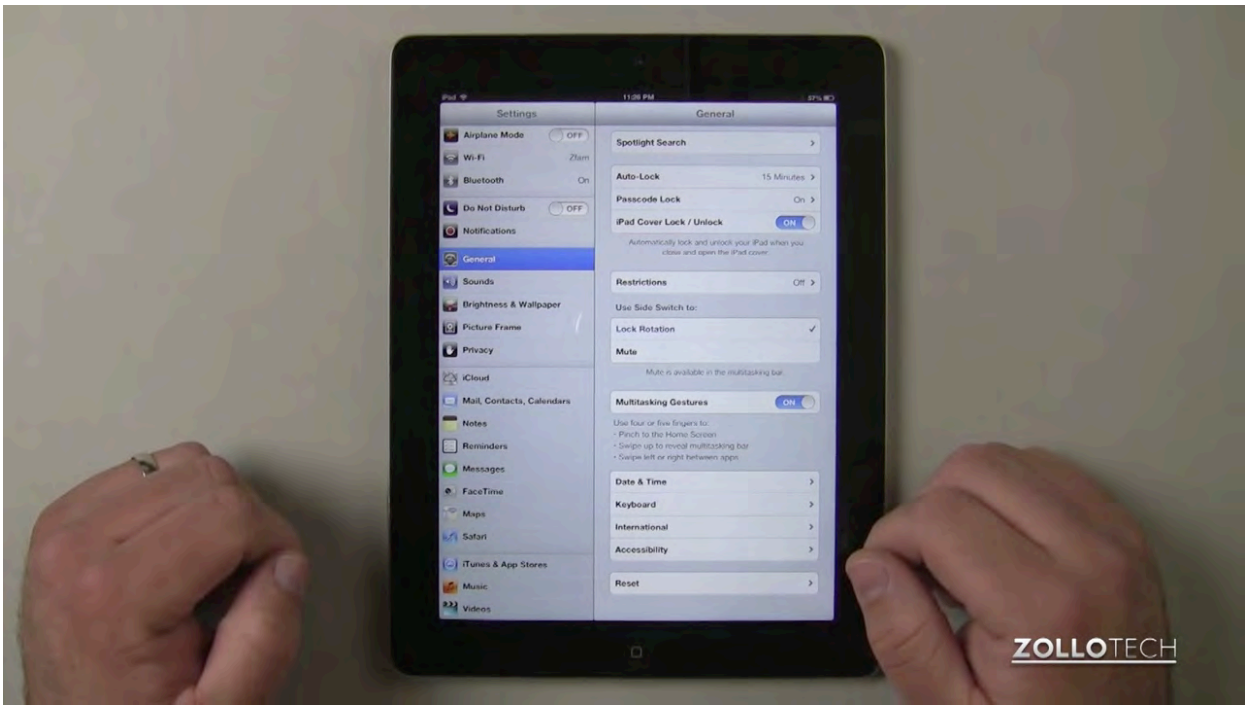
To tell a Macintosh Personal Computer what you want to do, you simply move the mouse until you're pointing to the object or function you want. Then click the button on top of the mouse, and you instantly begin working with that object. Open a file folder. Review the papers inside. Read a memo. Use a calculator. And so on.

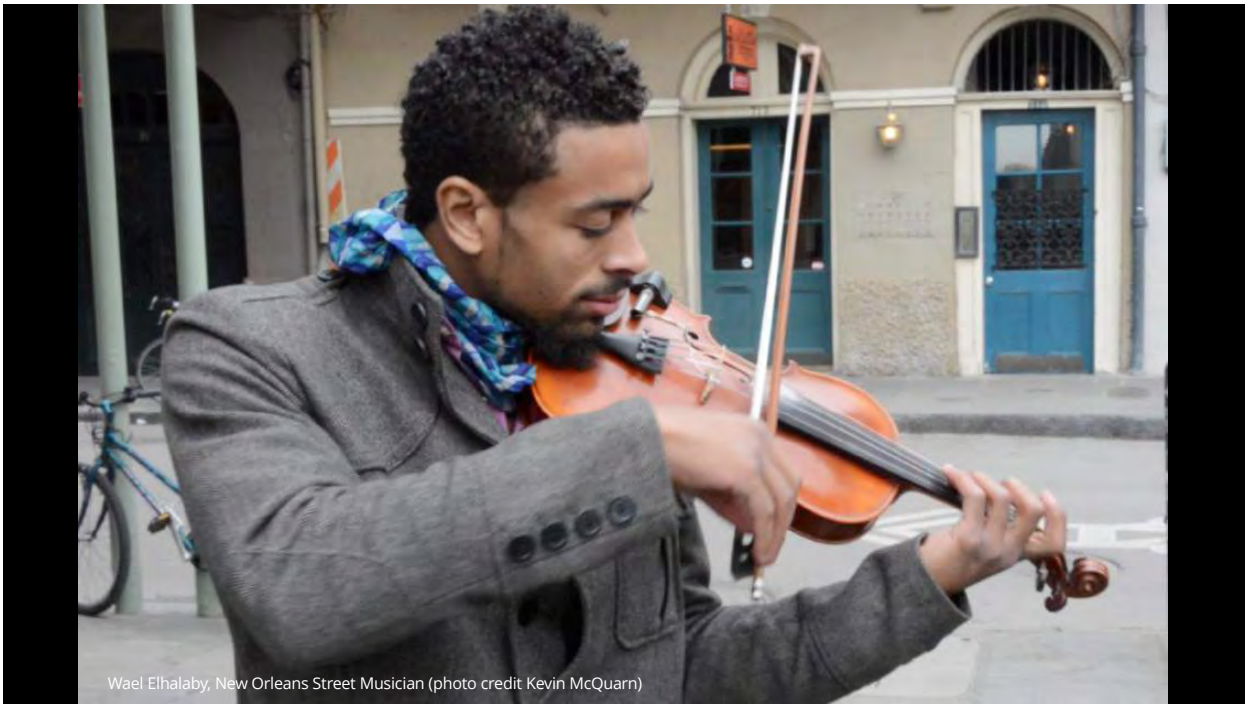
And whether you're working with numbers, words or even pictures, Macintosh works the same basic way. In other words, once you've learned to use one Macintosh program, you've learned to use them all.

If Macintosh seems extraordinarily simple, it's probably because conventional computers are extraordinarily

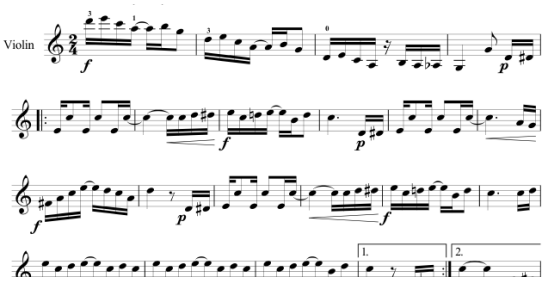

MOUSING AROUND
The pointer (small arrow) on your screen is controlled by the mouse attached to your Macintosh. As you move the mouse on a flat surface, the pointer on the screen moves with it.


Design Report:
Midcentury Icons




Wael Elhalaby, New Orleans Street Musician (photo credit Kevin McQuarn)

bow position,
bow velocity,
bow acceleration,
bow-bridge
distance,
bow force



bow skewness,
bow inclination,
bow tilt

moments of on/off
in bow-string
contact, string
played, and bowing
direction)

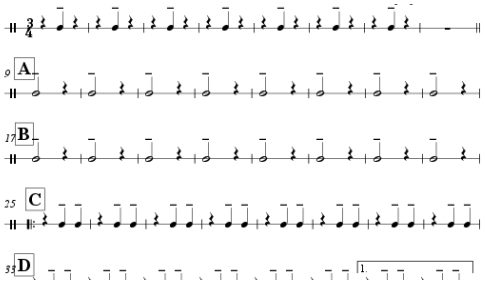
violin input space

human
capabilities

+

input device
capabilities

ding

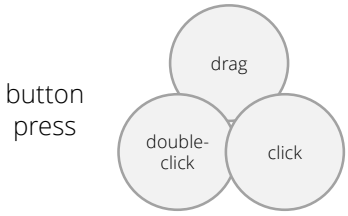


triangle input space

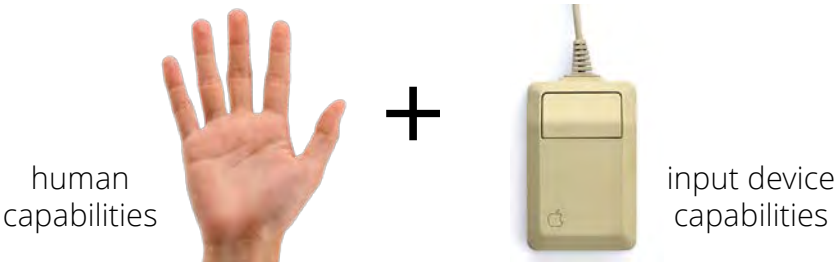
human
capabilities

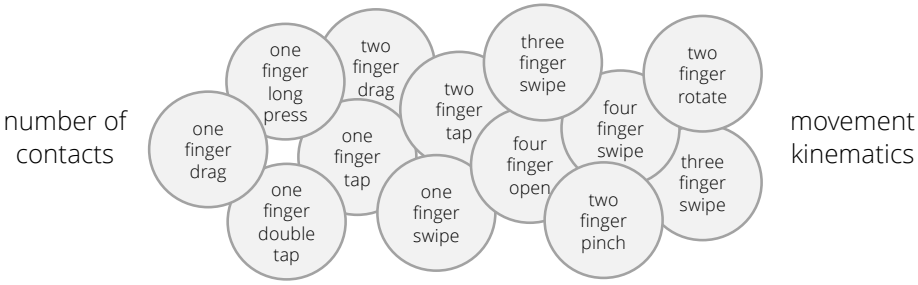
+

input device
capabilities



Macintosh mouse input space





multitouch input space

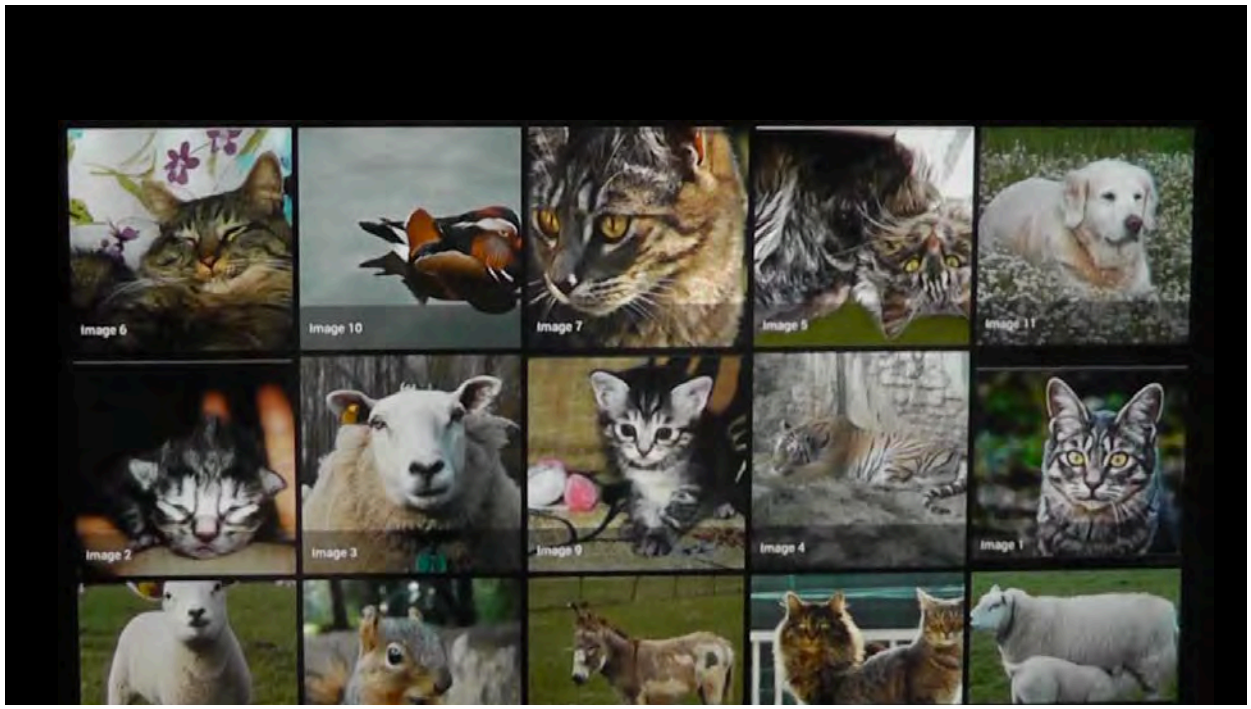
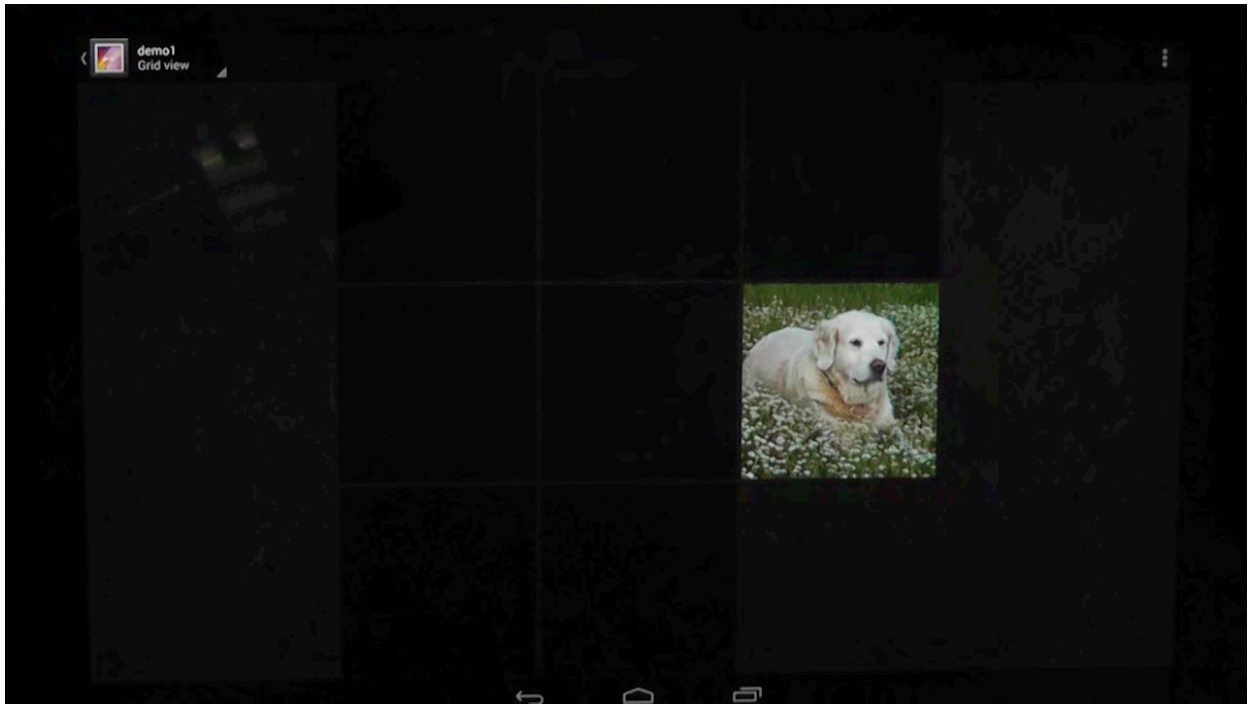
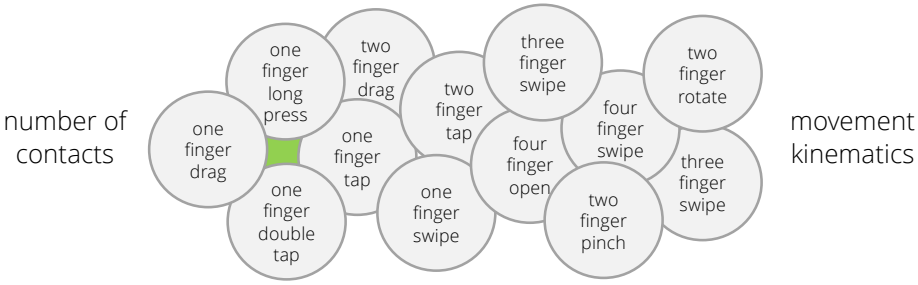
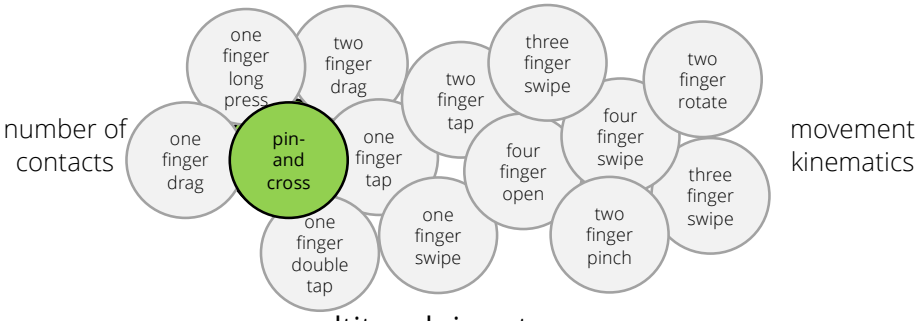


Image 6
Image 10
Image 7
Image 5
Image 11
Image 2
Image 3
Image 9
Image 4
Image 1


demo1
Grid view

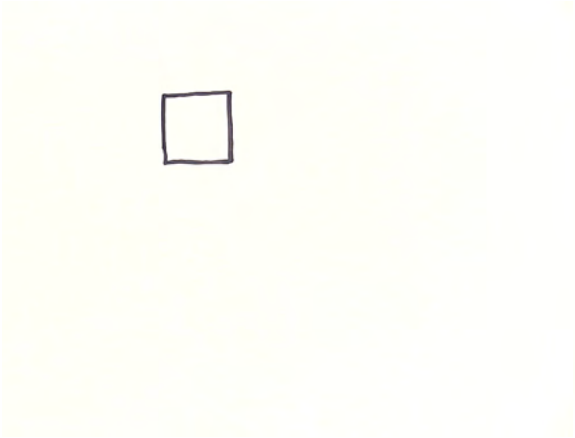


multitouch input space



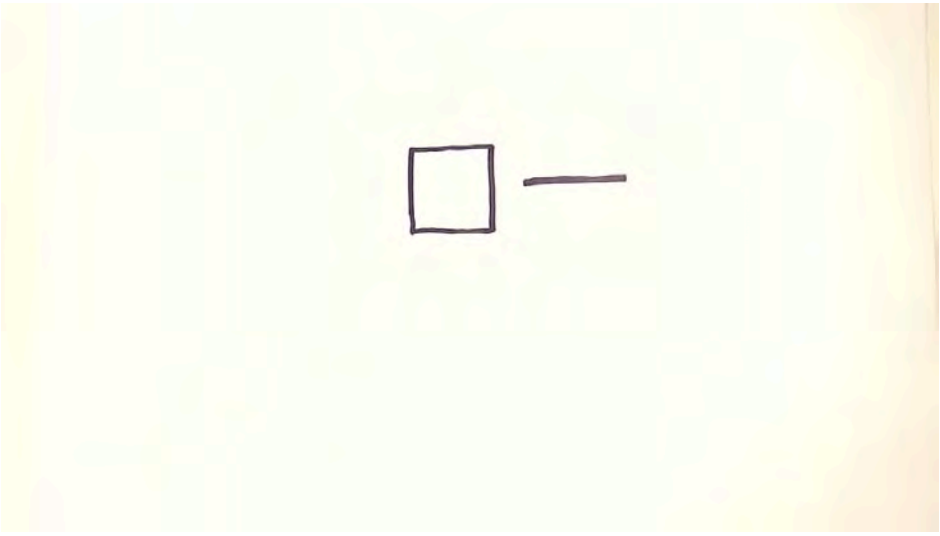
multitouch input space

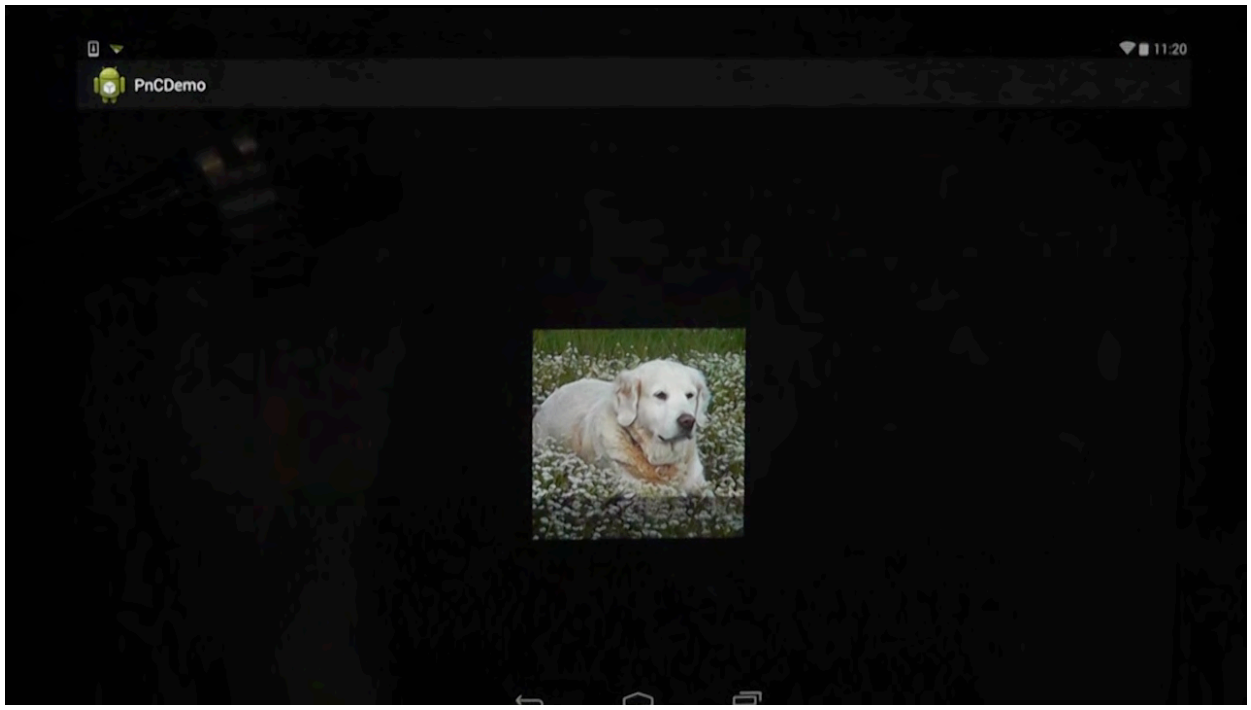
Tapping

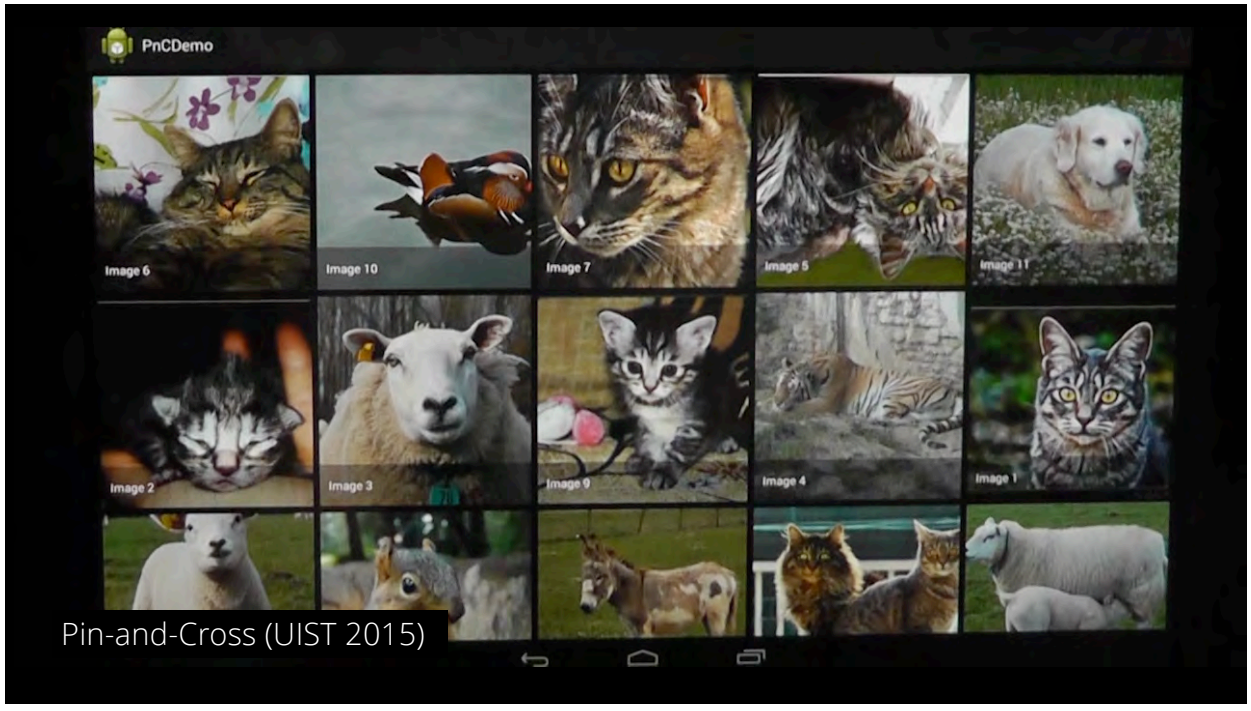


Crossing

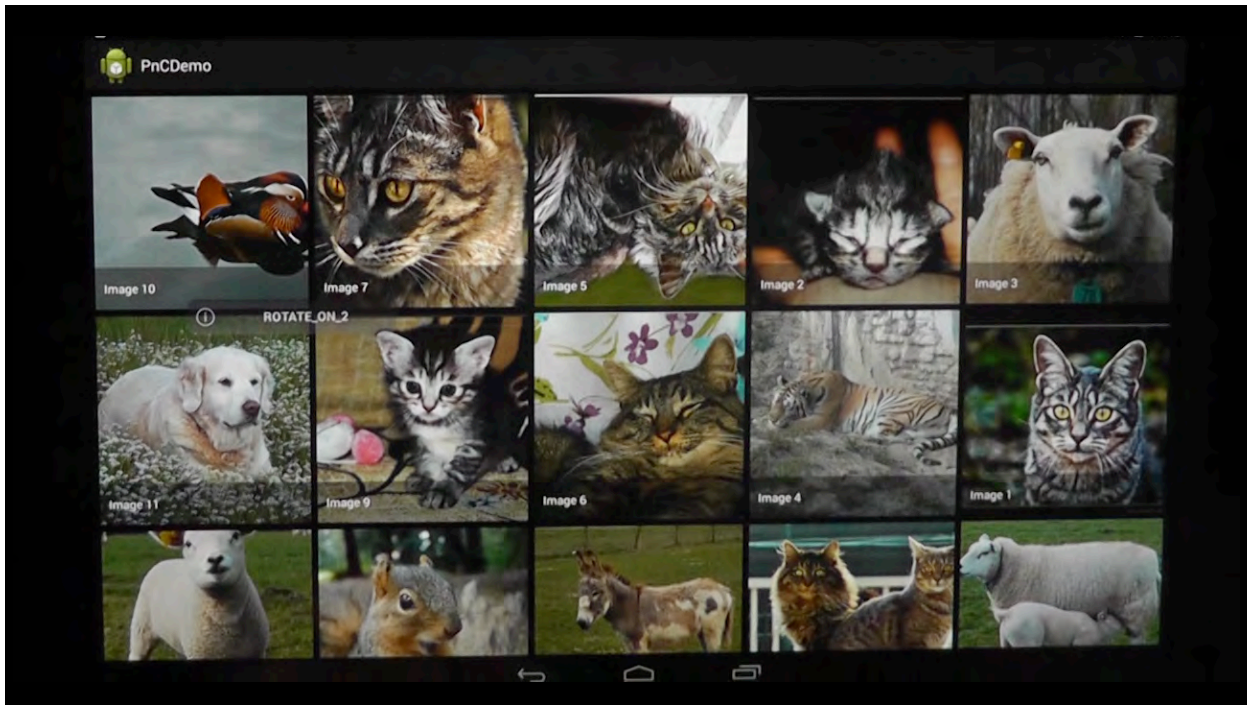
One finger “pins” the other “crosses”

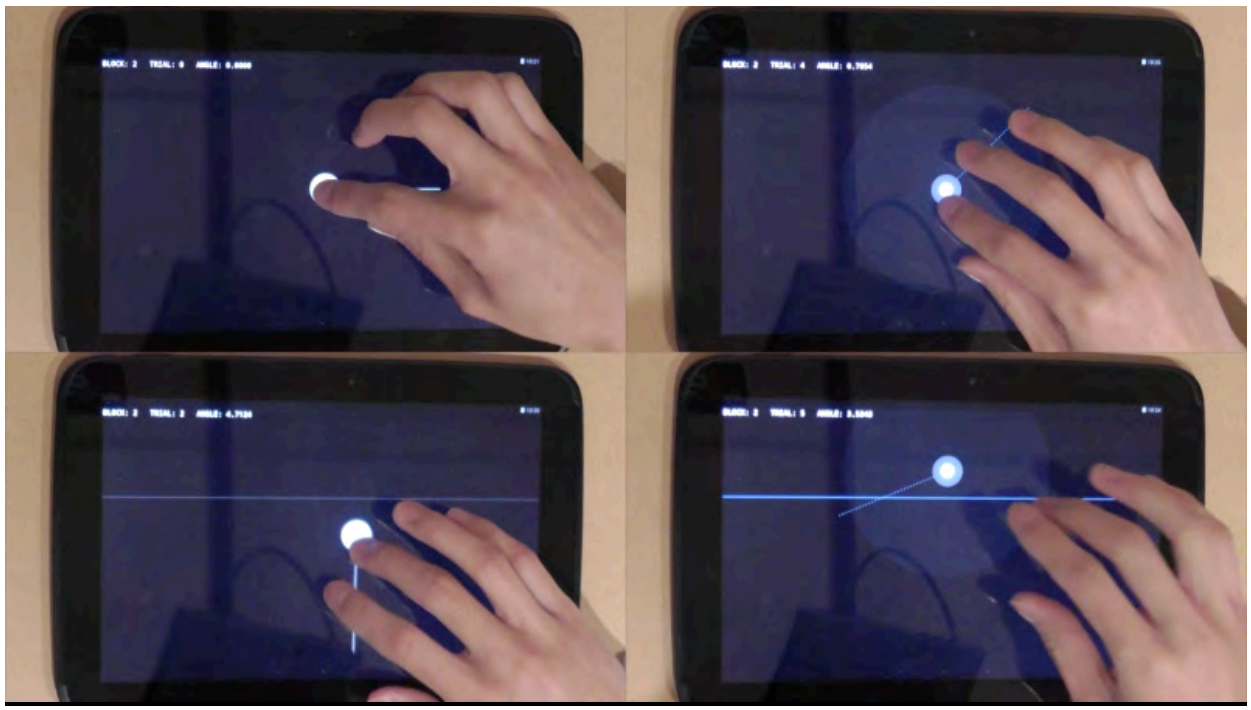


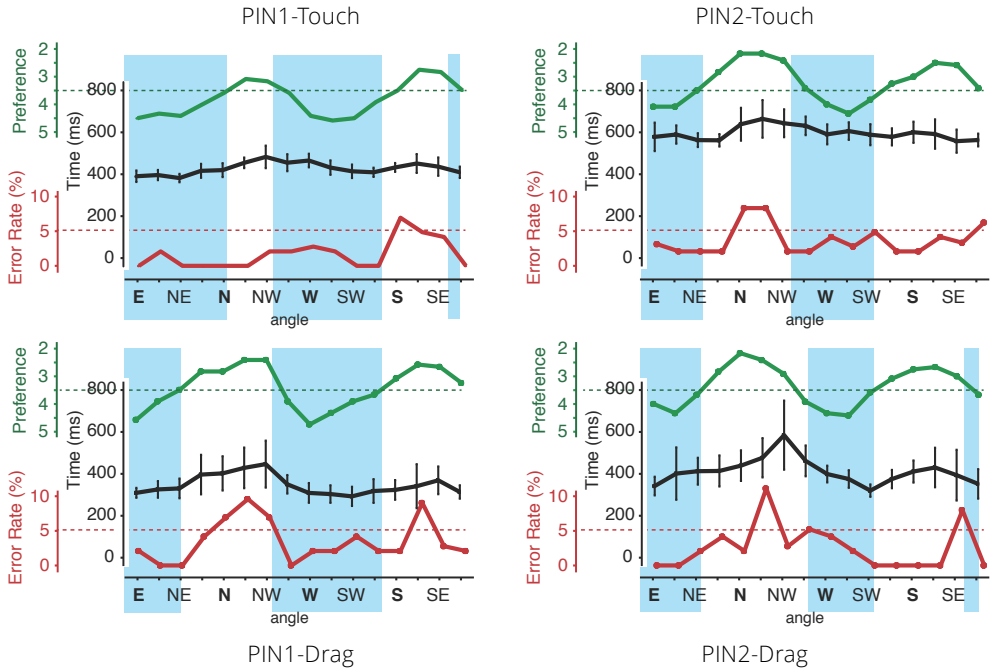




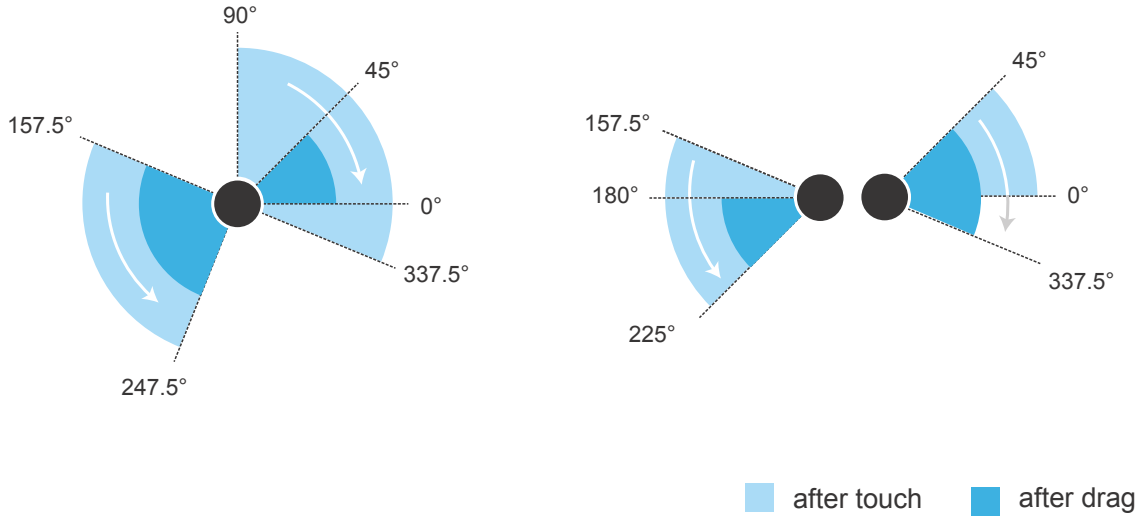
Pin-and-Cross (UIST 2015)

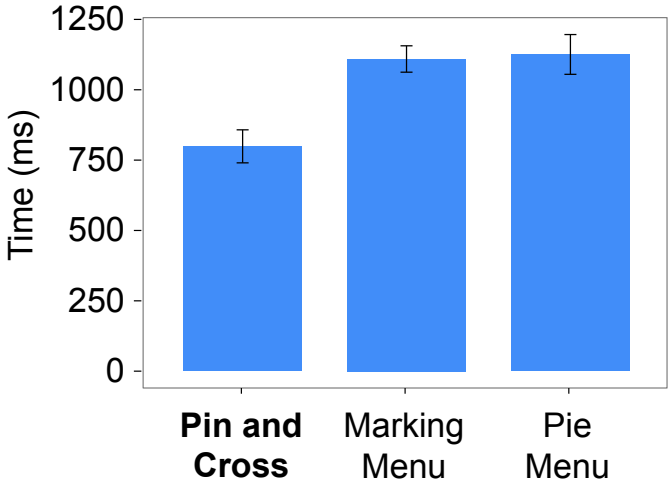

PnCDemo
Image 10
Image 7
Image 5
Image 2
Image 3
ROTATE_ON_2
Image 11
Image 9
Image 6
Image 4
Image 1

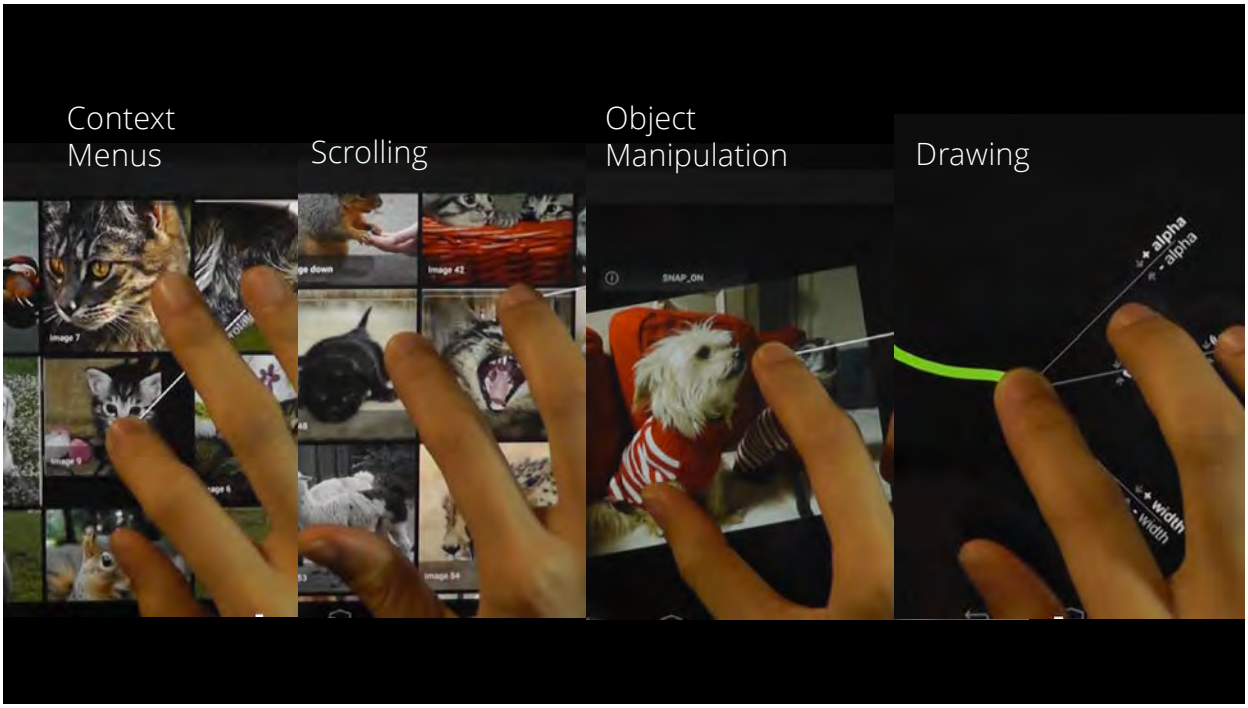


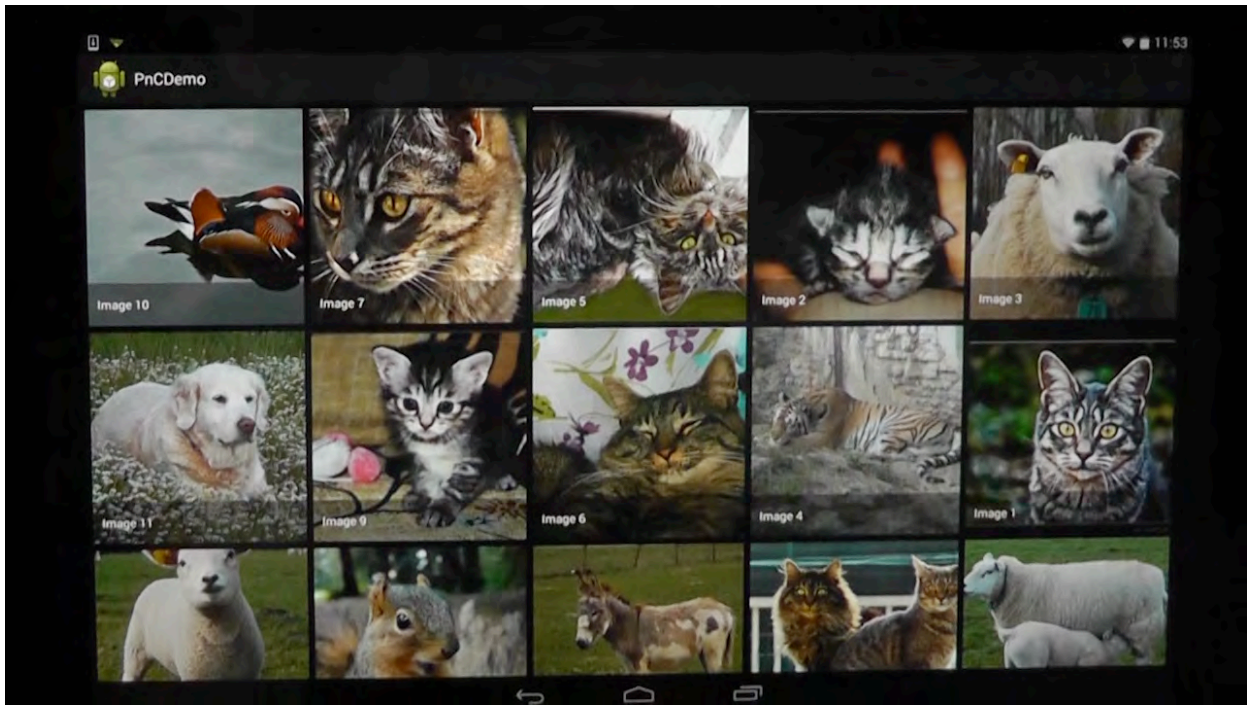


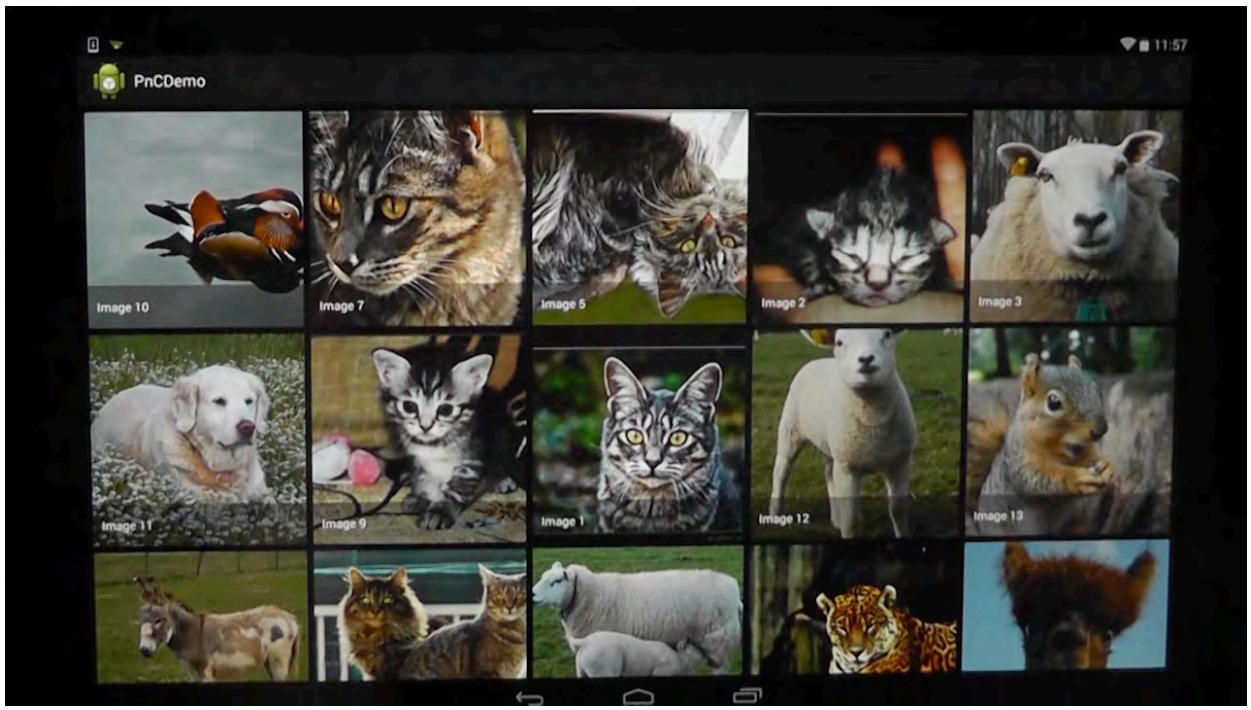
Design Implications for Target Placement



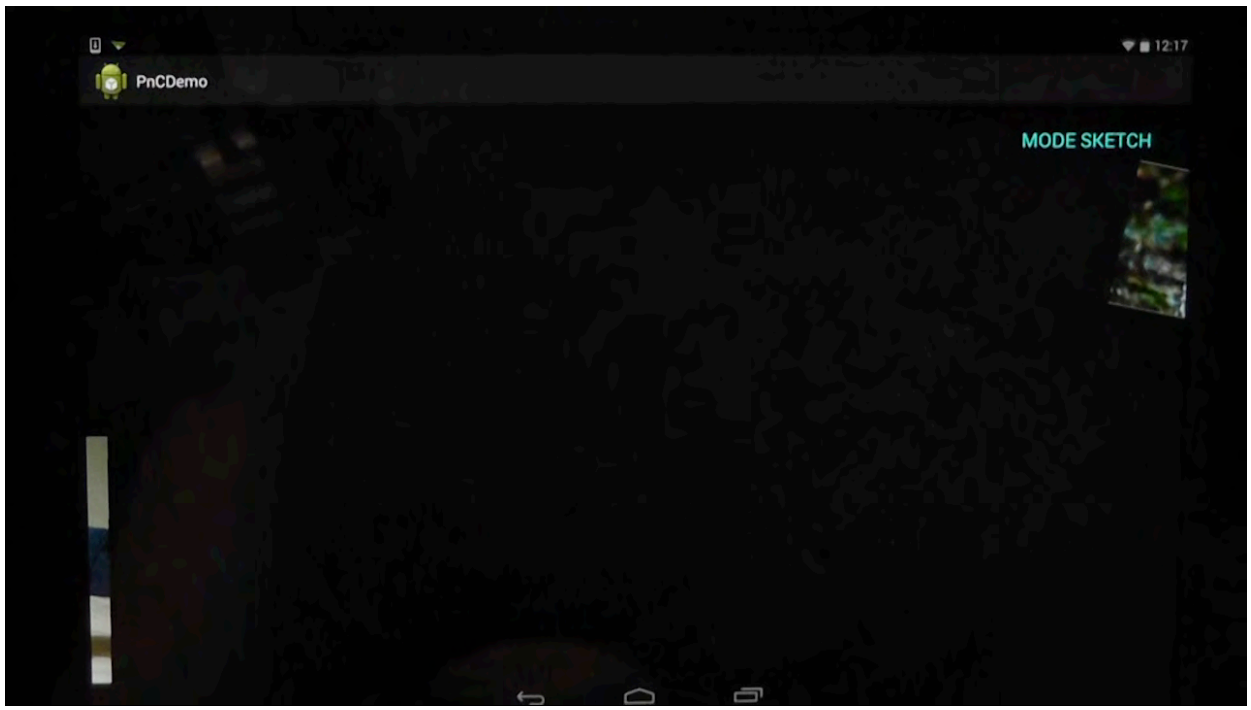

1250
1000
750
500
250
0
Time (ms)
Pin and Cross
Marking Menu
Pie Menu

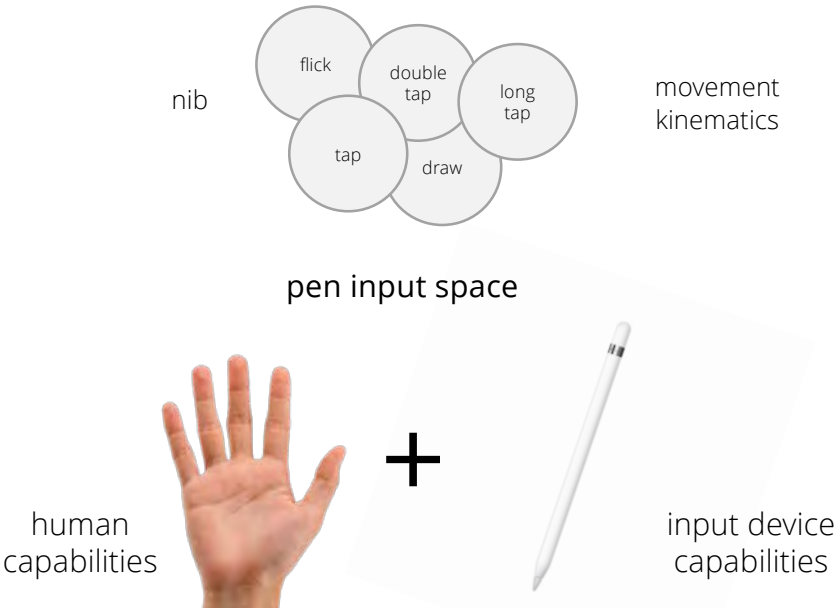

Context Menus
Scrolling
Object Manipulation
Drawing

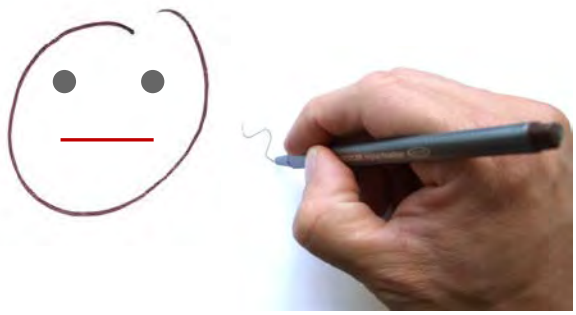

11:53
PnCDemo
Image 10
Image 7
Image 5
Image 2
Image 3
Image 11
Image 9
Image 6
Image 4
Image 1

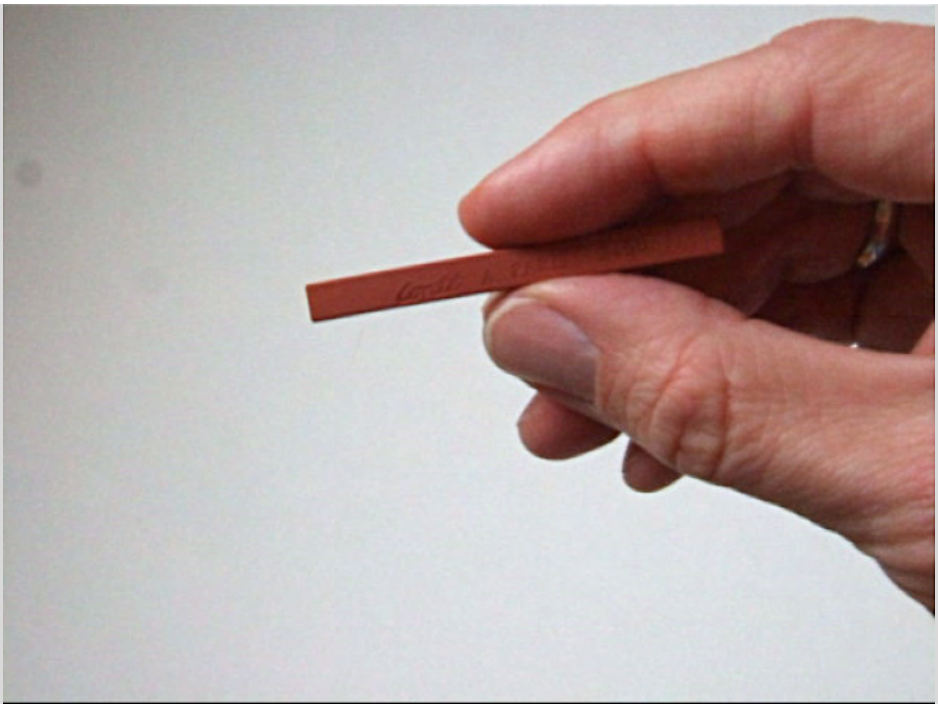

11:57
PnCDemo
Image 10
Image 7
Image 5
Image 2
Image 3
Image 11
Image 9
Image 1
Image 12
Image 13

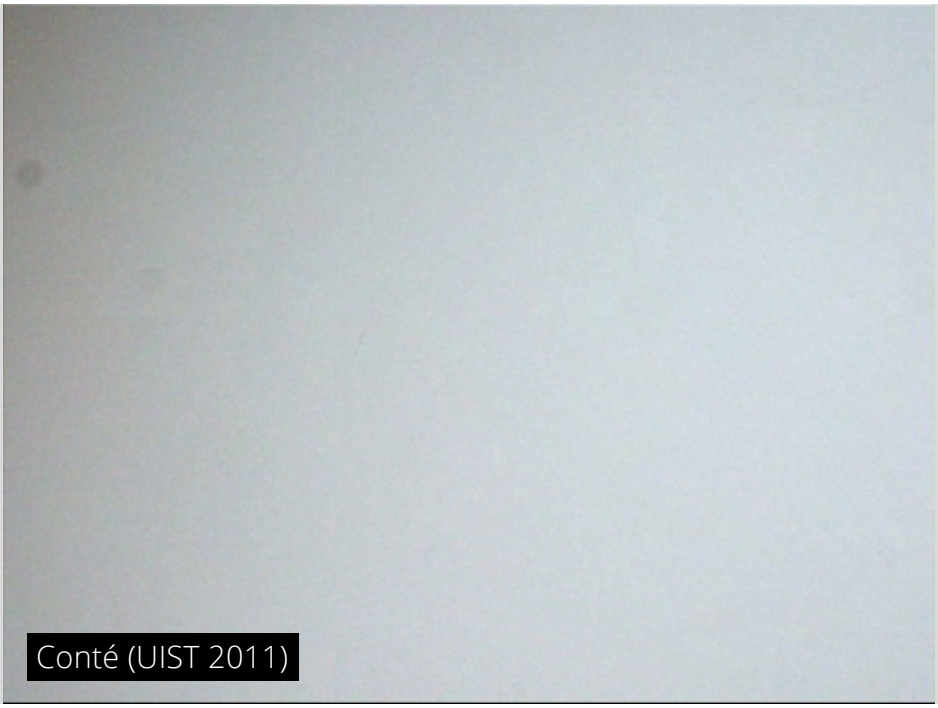

11:59
PnCDemo
MODE RST

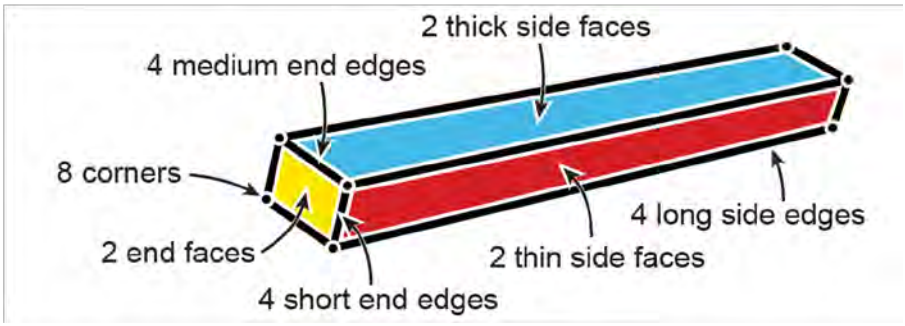

12:17
PnCDemo
MODE SKETCH

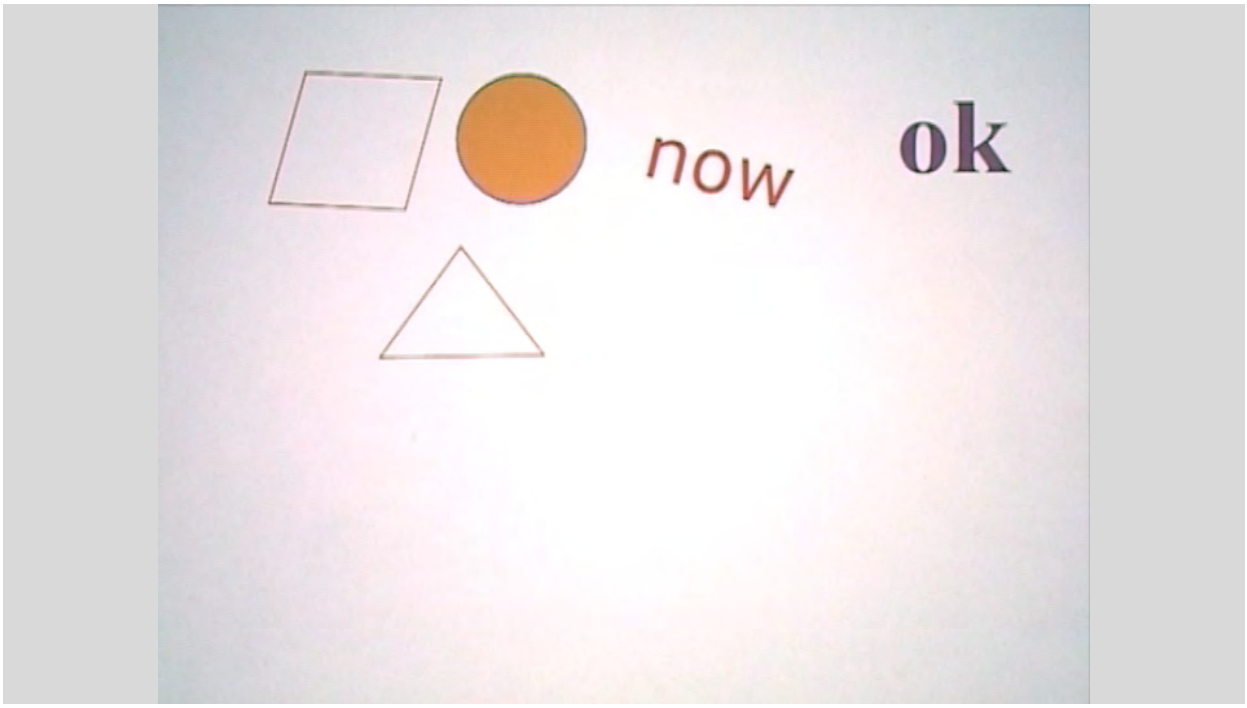

nib
flick
double tap
long tap
tap
draw
movement kinematics
pen input space
human capabilities
+
input device capabilities

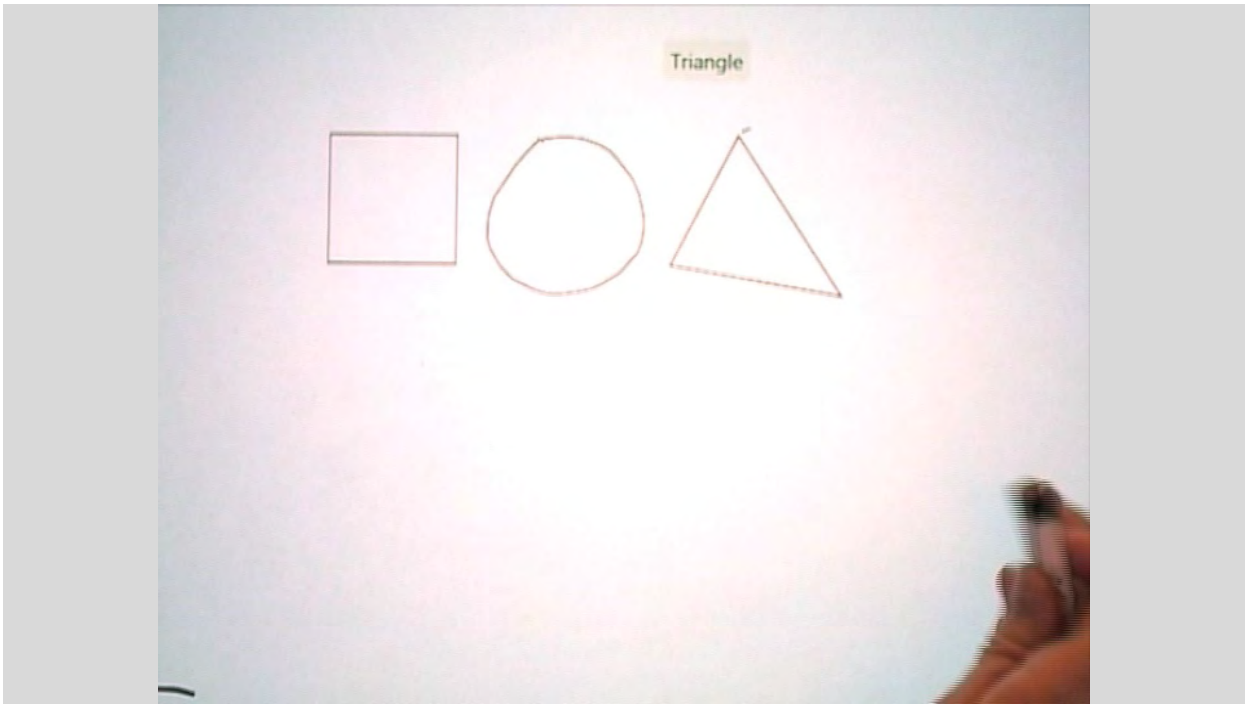


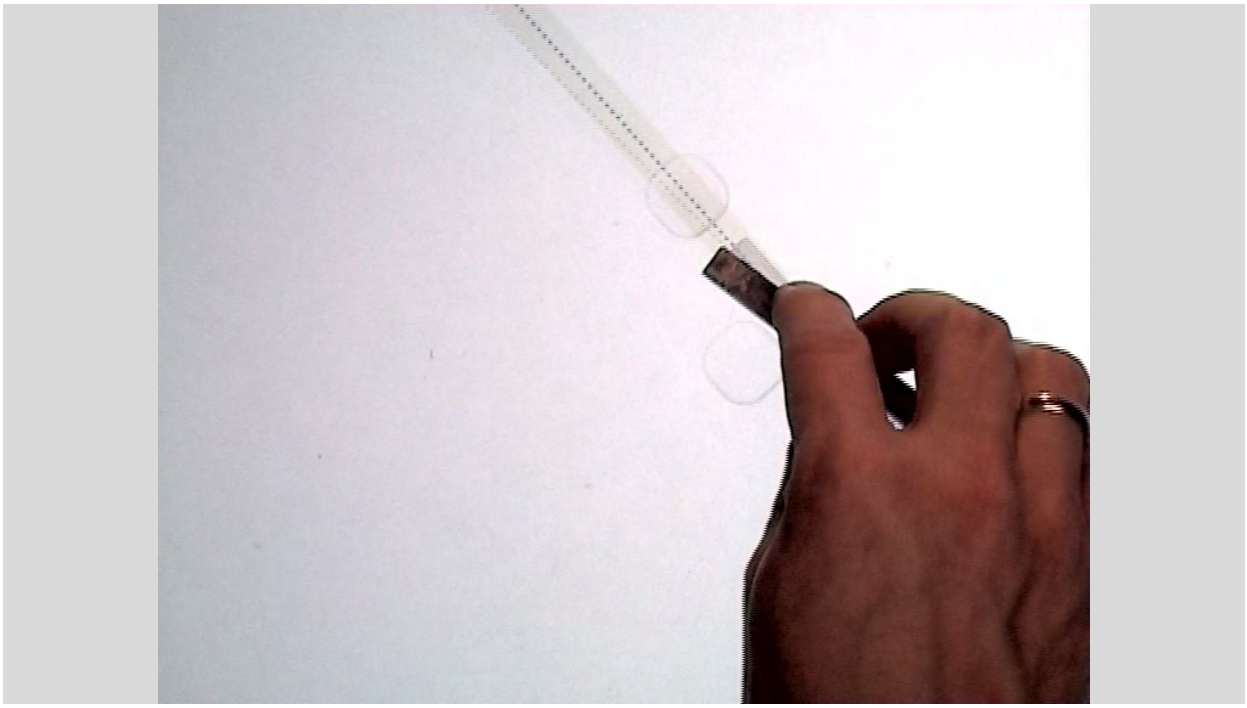



Conté (UIST 2011)

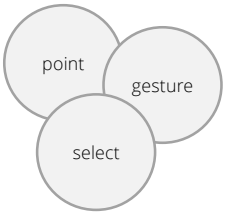

2 thick side faces
4 medium end edges
8 corners
4 long side edges
2 end faces
2 thin side faces
4 short end edges


now
ok


Triangle



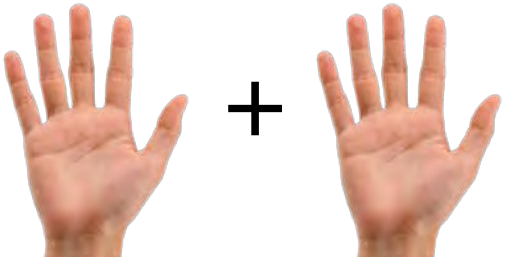
hand
movement



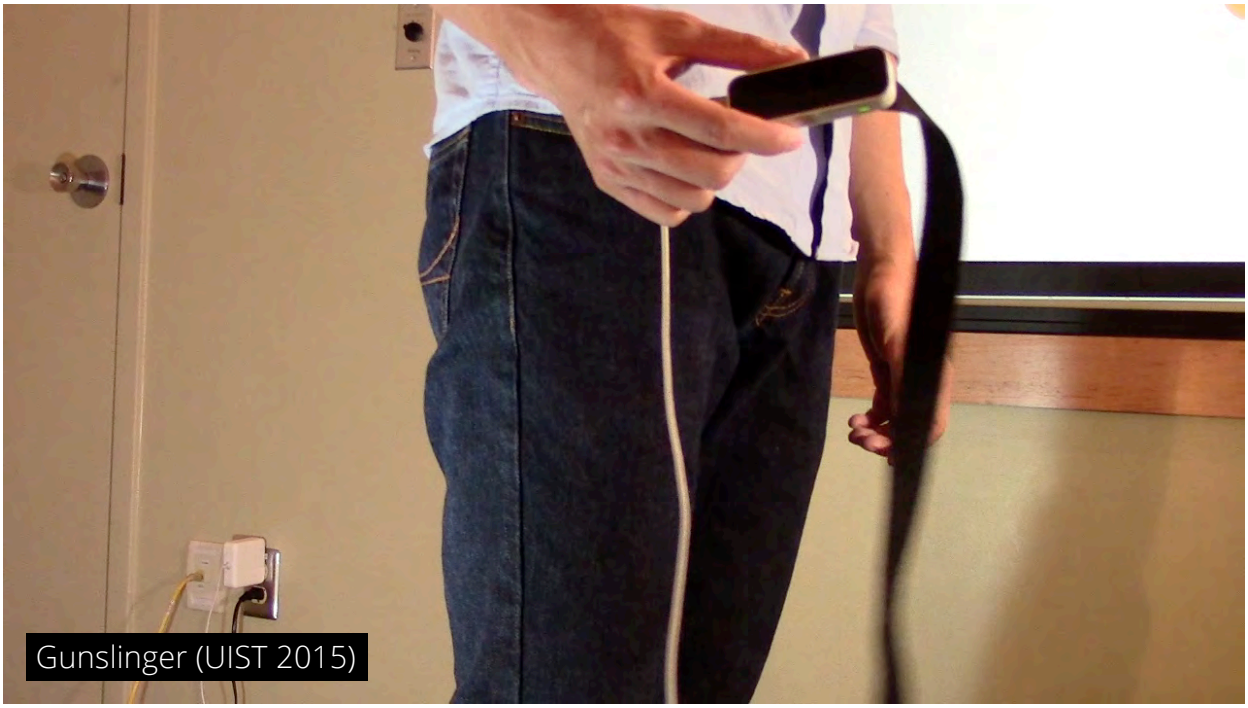
hand
pose

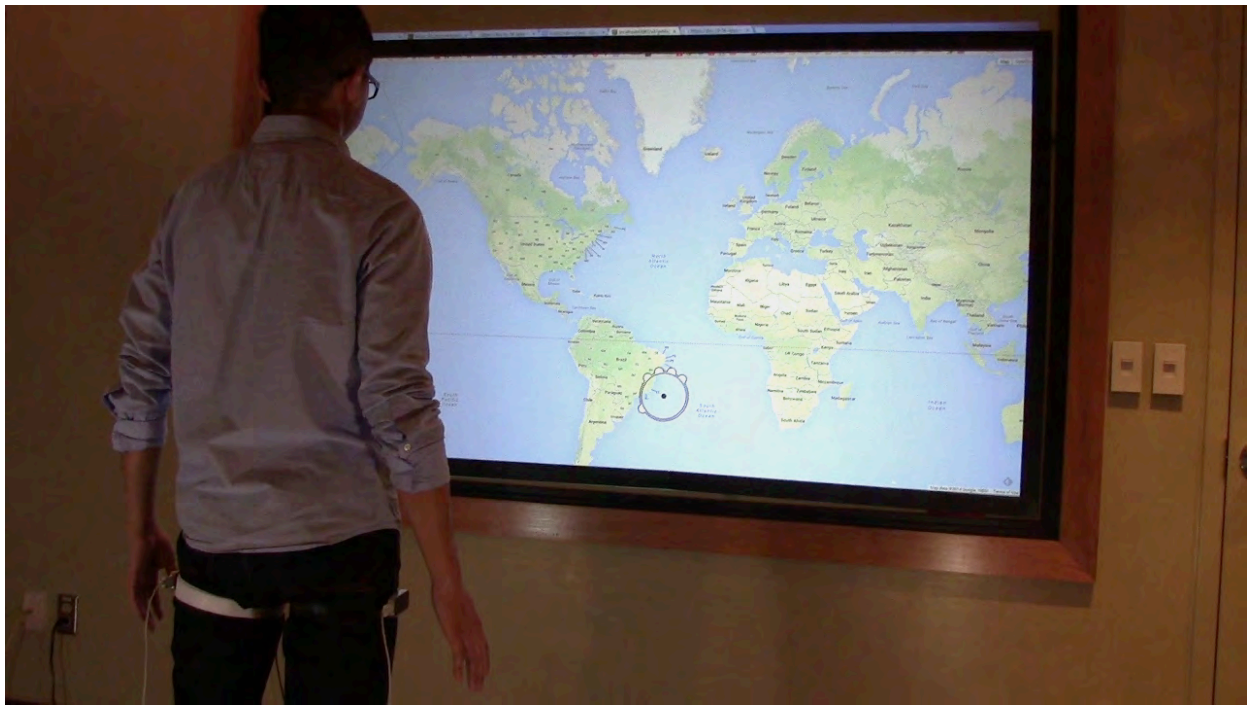
bare-hand mid-air input space

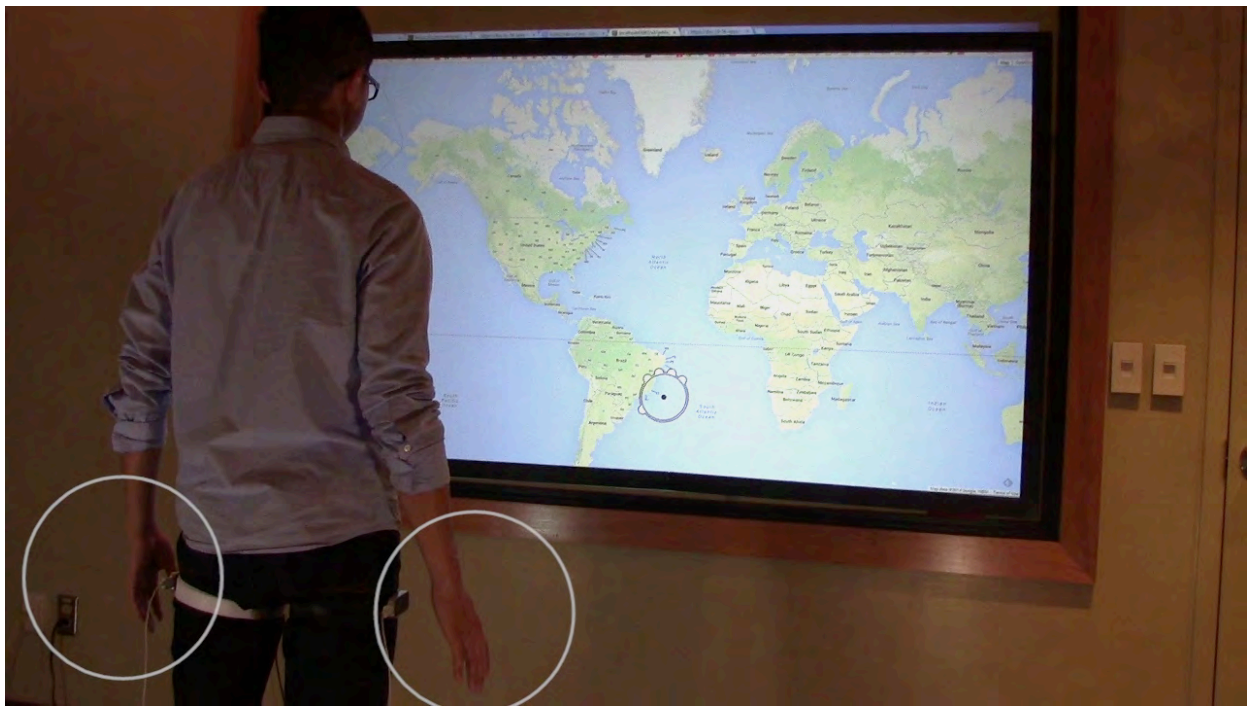
human
capabilities

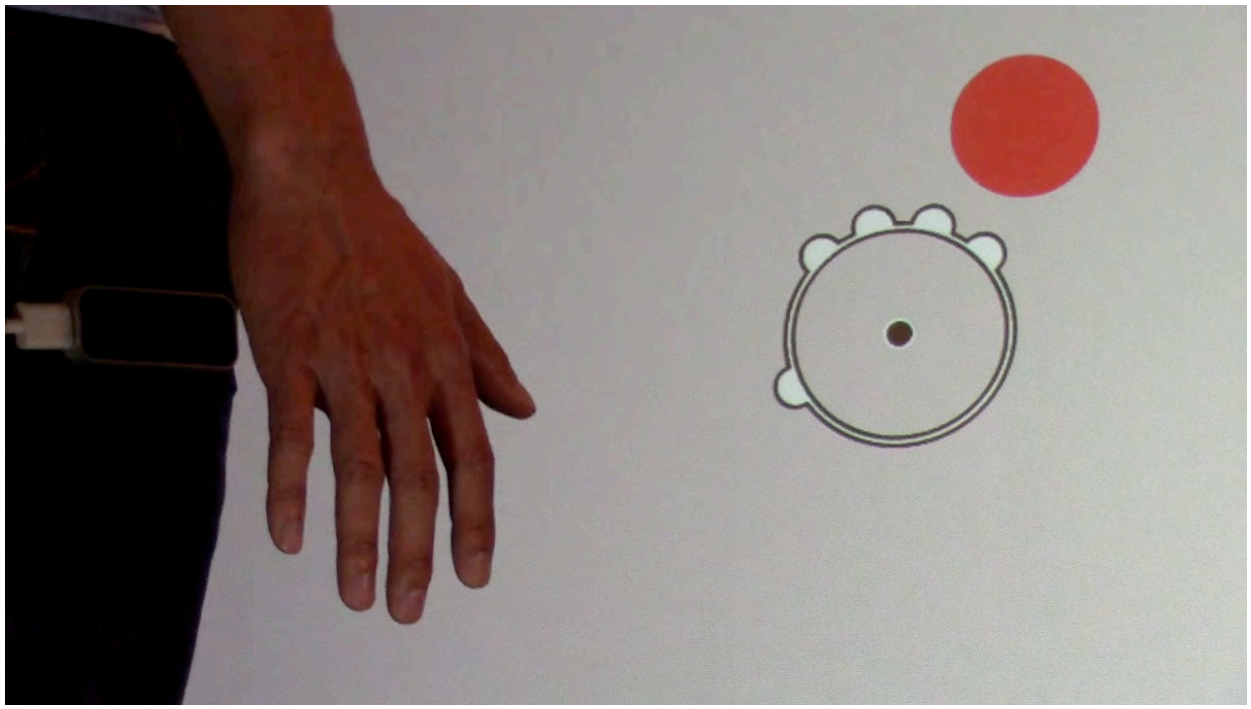


input device
capabilities



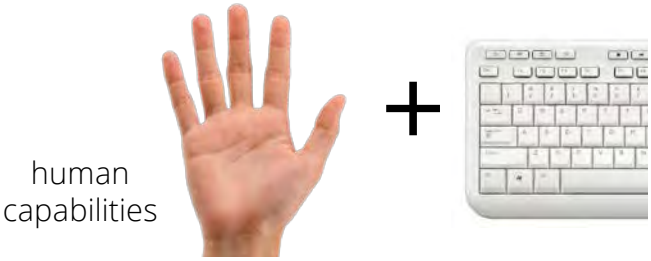




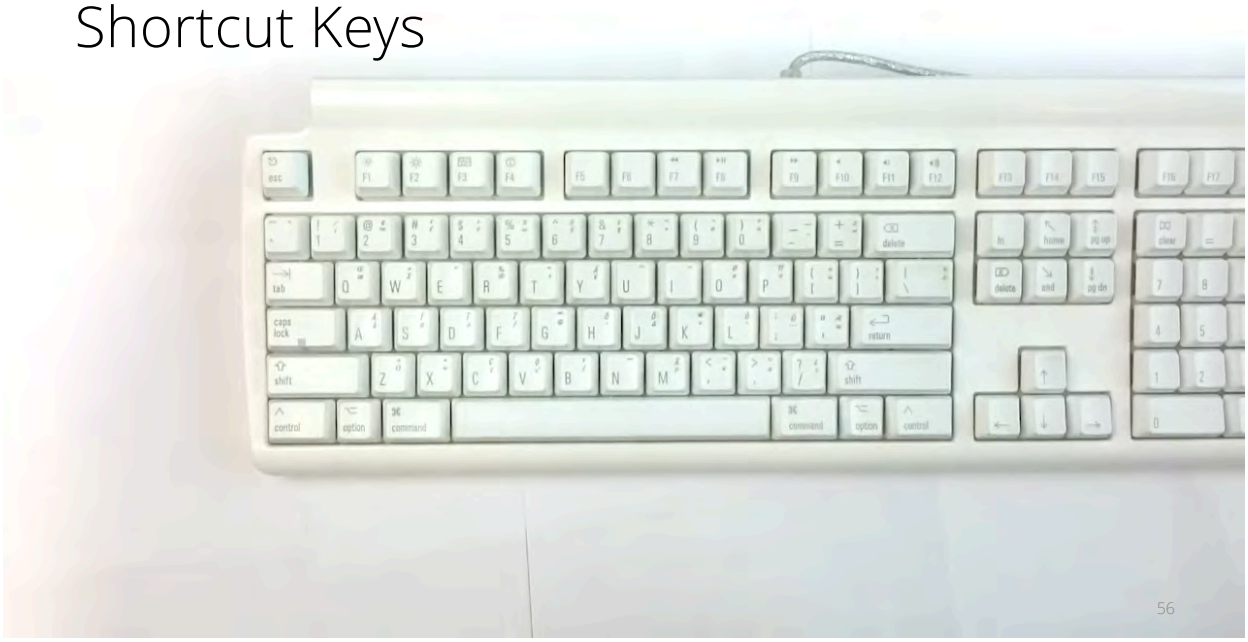


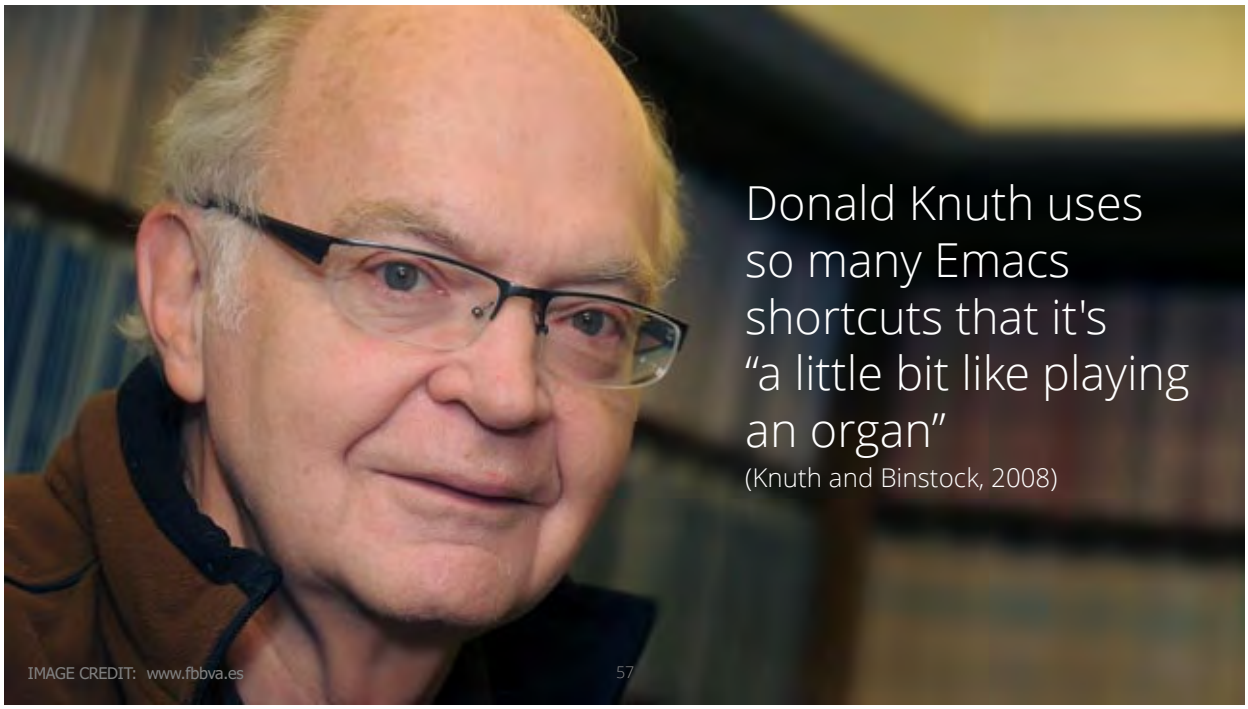

Nigeria
South Sudan
Ethiopia
Somalia
Kenya
DR Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
South Africa
Madagascar
Indian Ocean
South Atlantic Ocean

keyboard input space

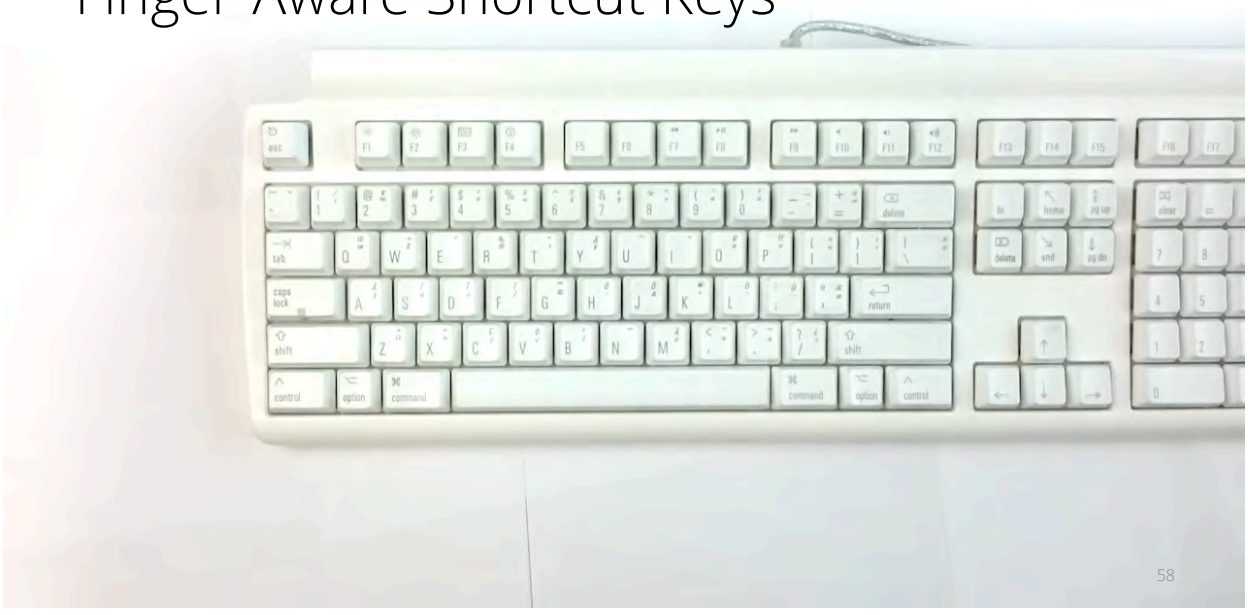


Shortcut Keys



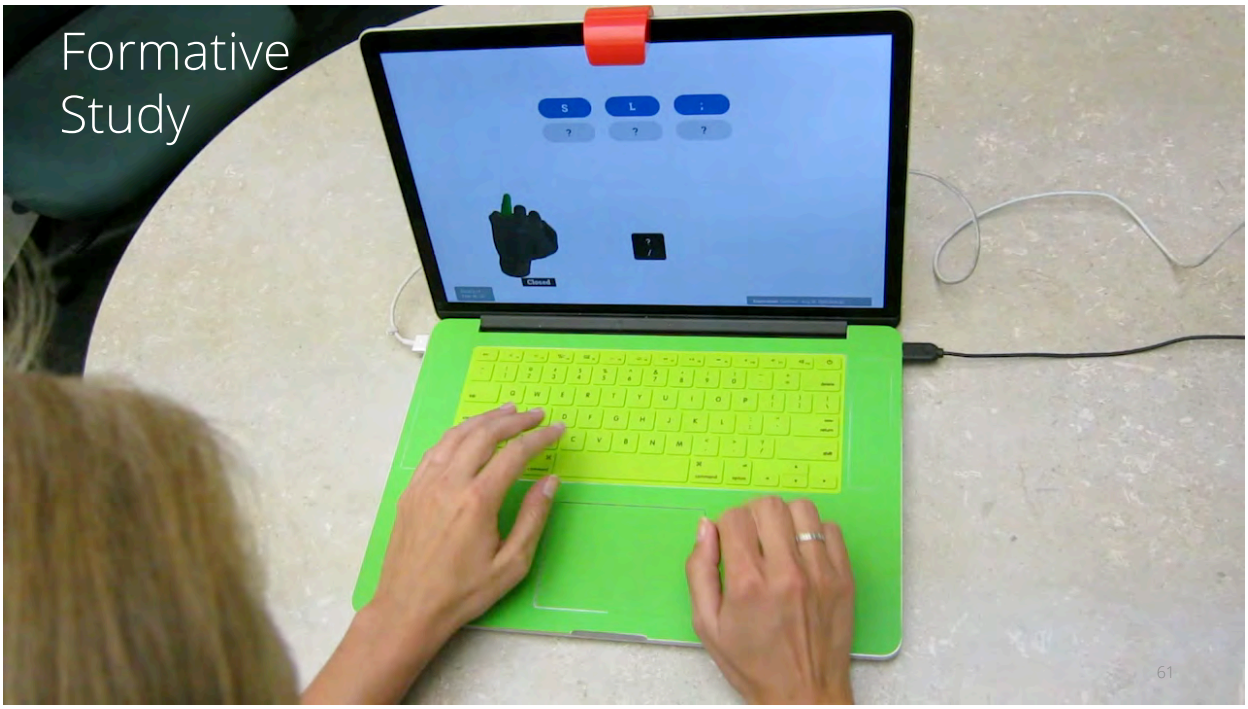


Finger-Aware Shortcut Keys

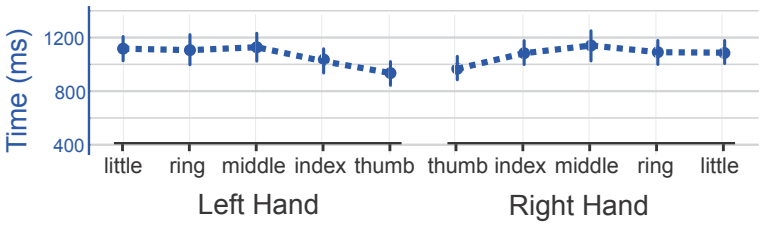


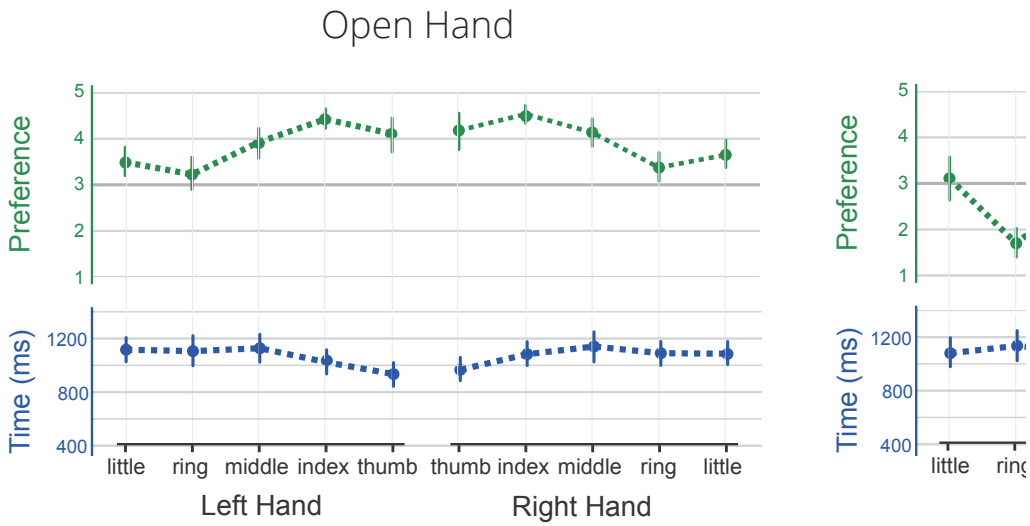
5 fingers
× 2 hands
× 2 hand poses (open or closed)
= 20 different “postures”

… up to 20 different actions *per* key press

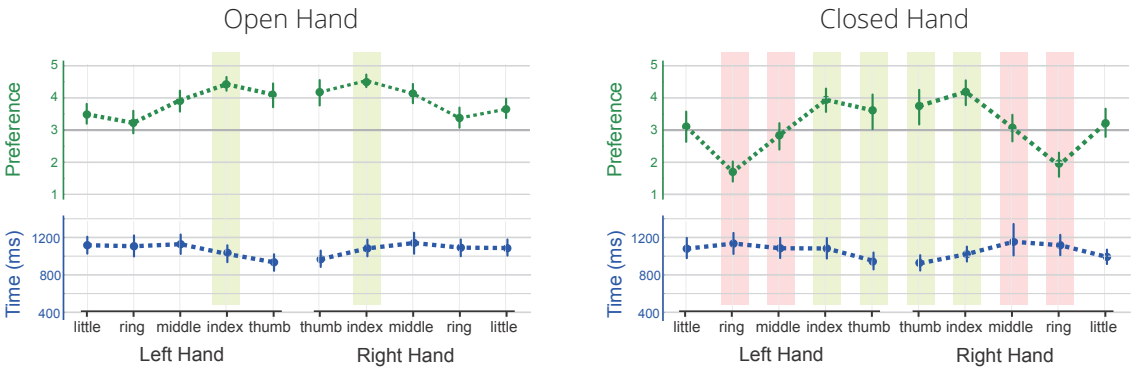

Formative
Study

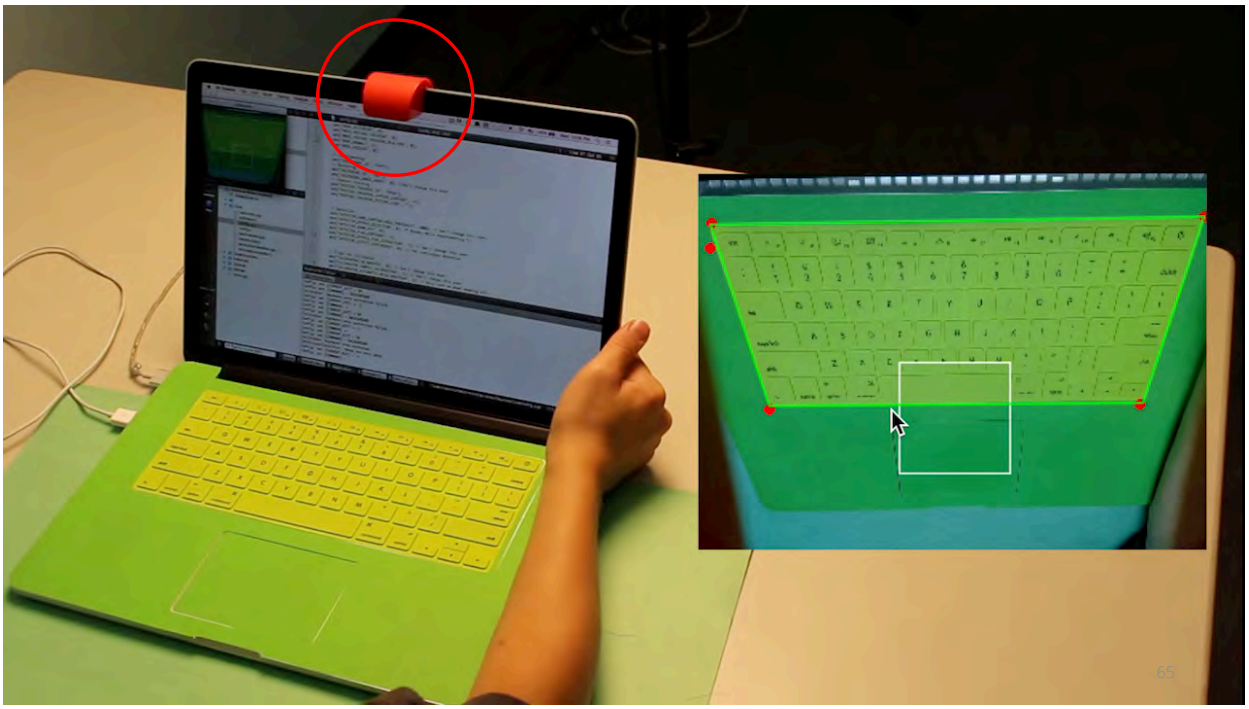
Open Hand

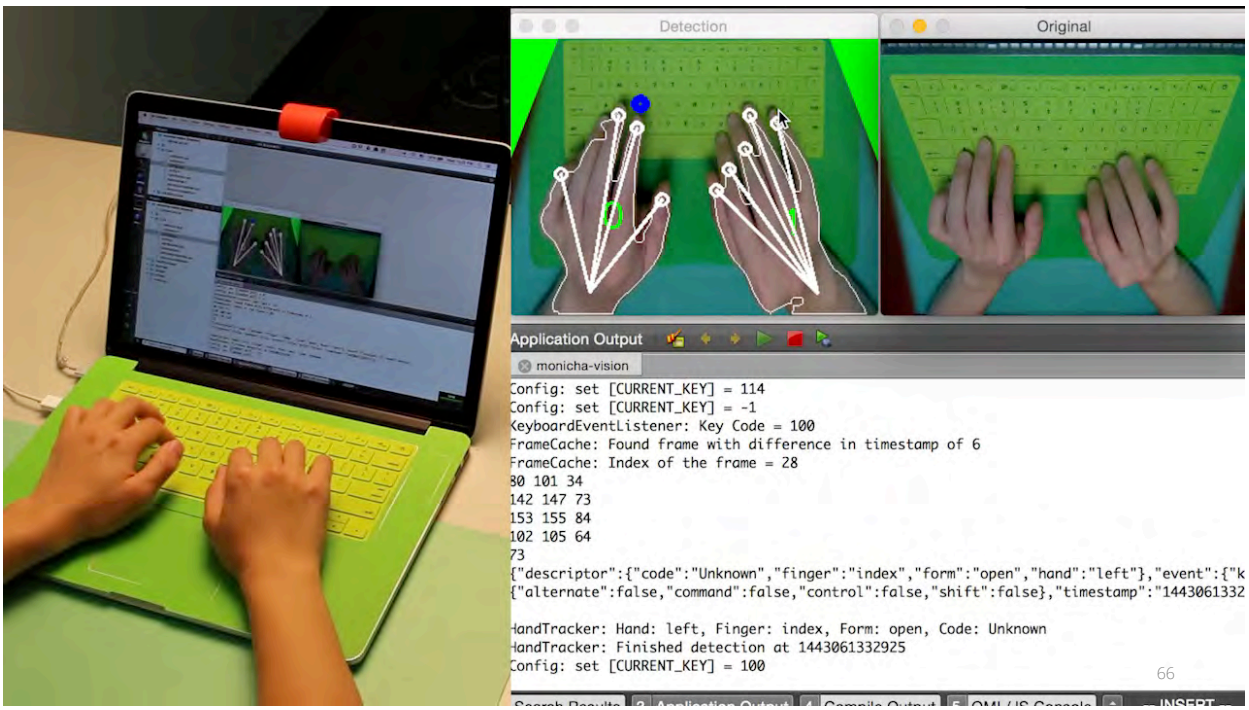

Time (ms)
1200
800
400
little
ring
middle
index
thumb
thumb
index
middle
ring
little
Left Hand
Right Hand

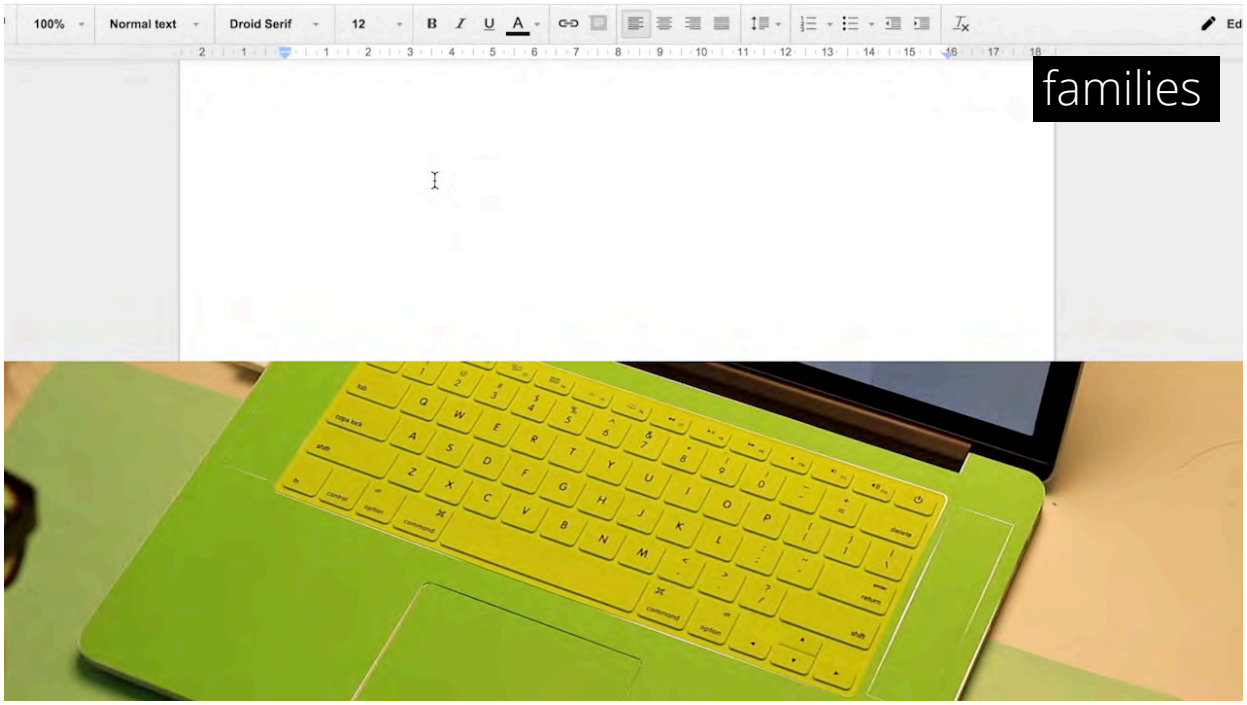


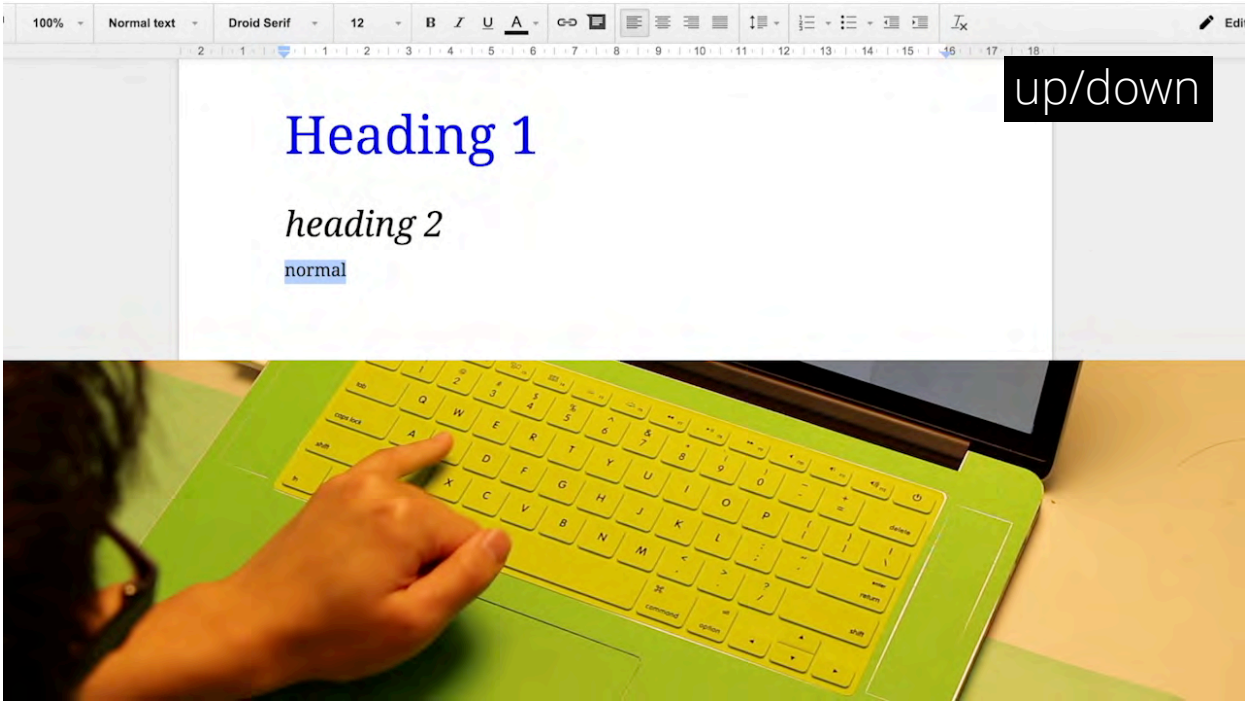
Postures to Recommend (and Avoid)

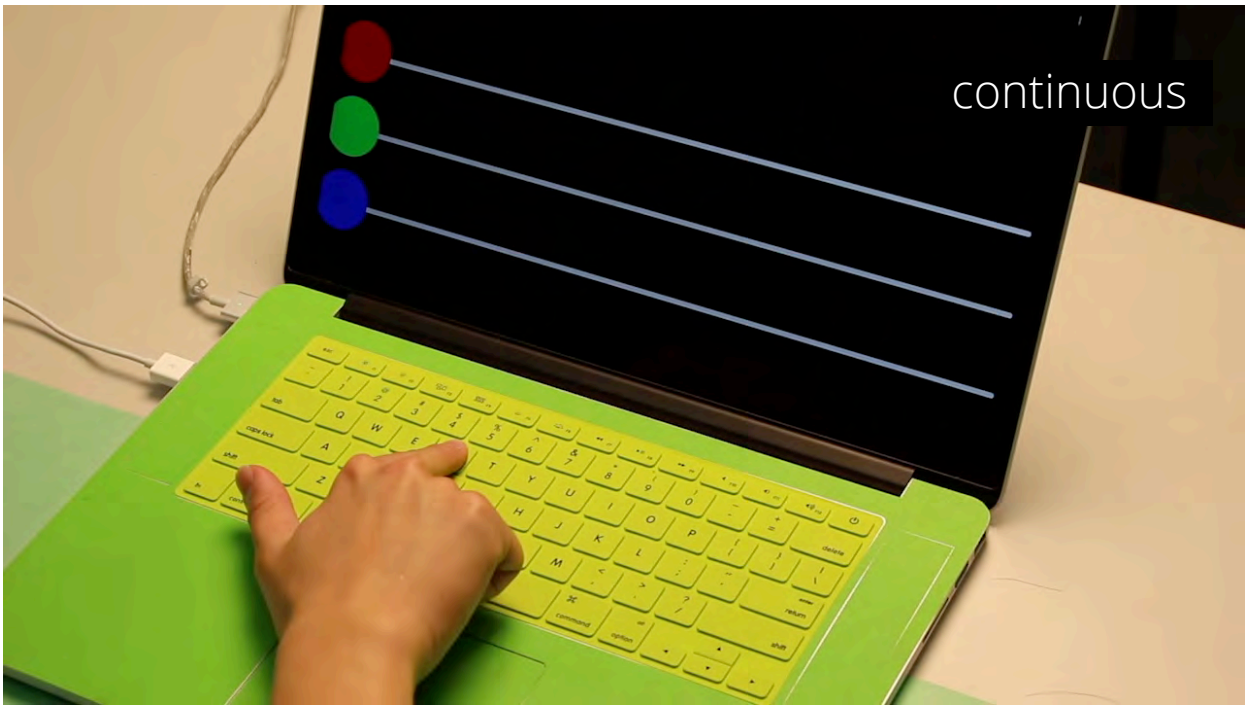





Detection
Original
Application Output
monicha-vision
Config: set [CURRENT_KEY] = 114
Config: set [CURRENT_KEY] = -1
KeyboardEventListener: Key Code = 100
FrameCache: Found frame with difference in timestamp of 6
FrameCache: Index of the frame = 28
80 101 34
142 147 73
153 155 84
102 105 64
73
{"descriptor":{"code":"Unknown","finger":"index","form":"open","hand":"left"},"event":{"k
{"alternate":false,"command":false,"control":false,"shift":false},"timestamp":"1443061332
HandTracker: Hand: left, Finger: index, Form: open, Code: Unknown
HandTracker: Finished detection at 1443061332925
Config: set [CURRENT_KEY] = 100


100%
Normal text
Droid Serif
12
families


100%
Normal text
Droid Serif
12
up/down
Heading 1
heading 2
normal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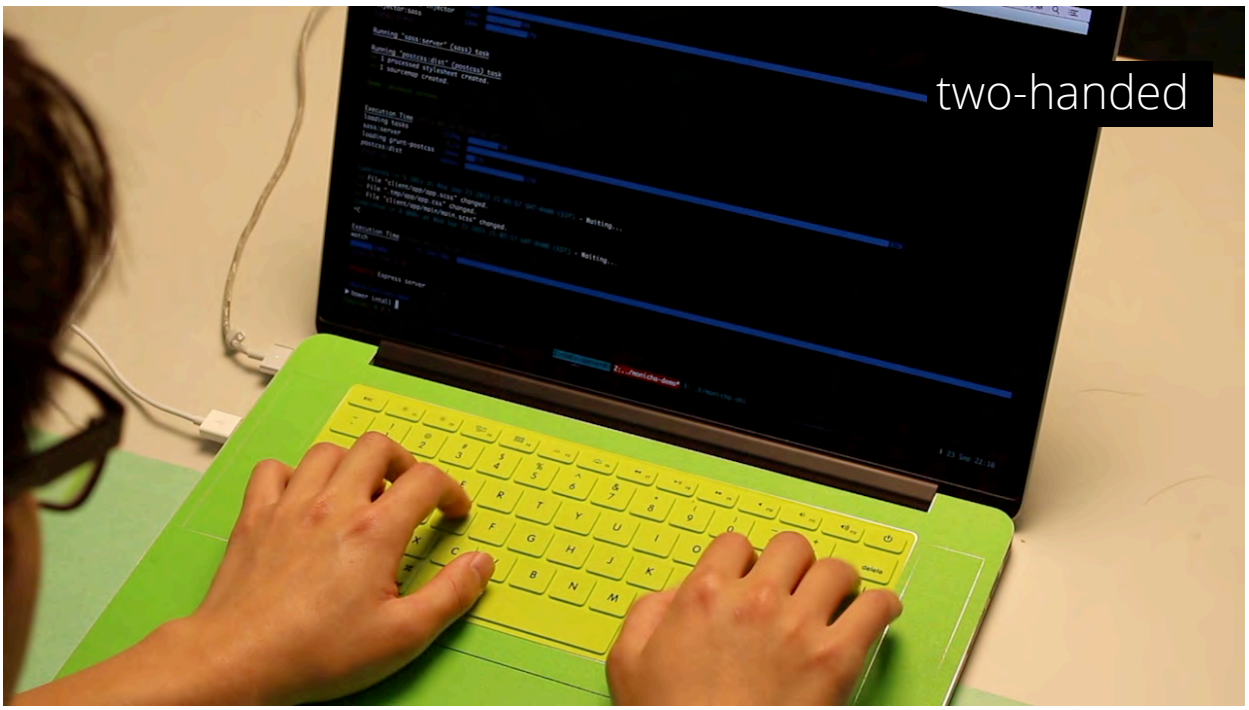
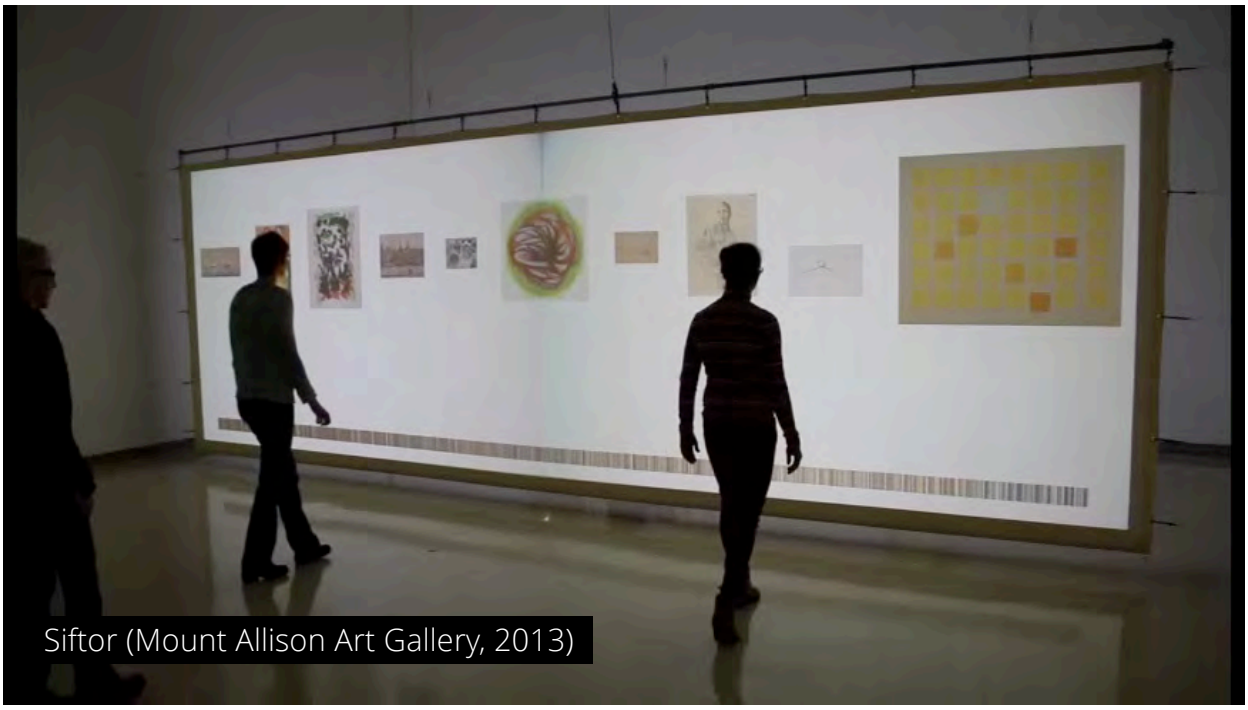
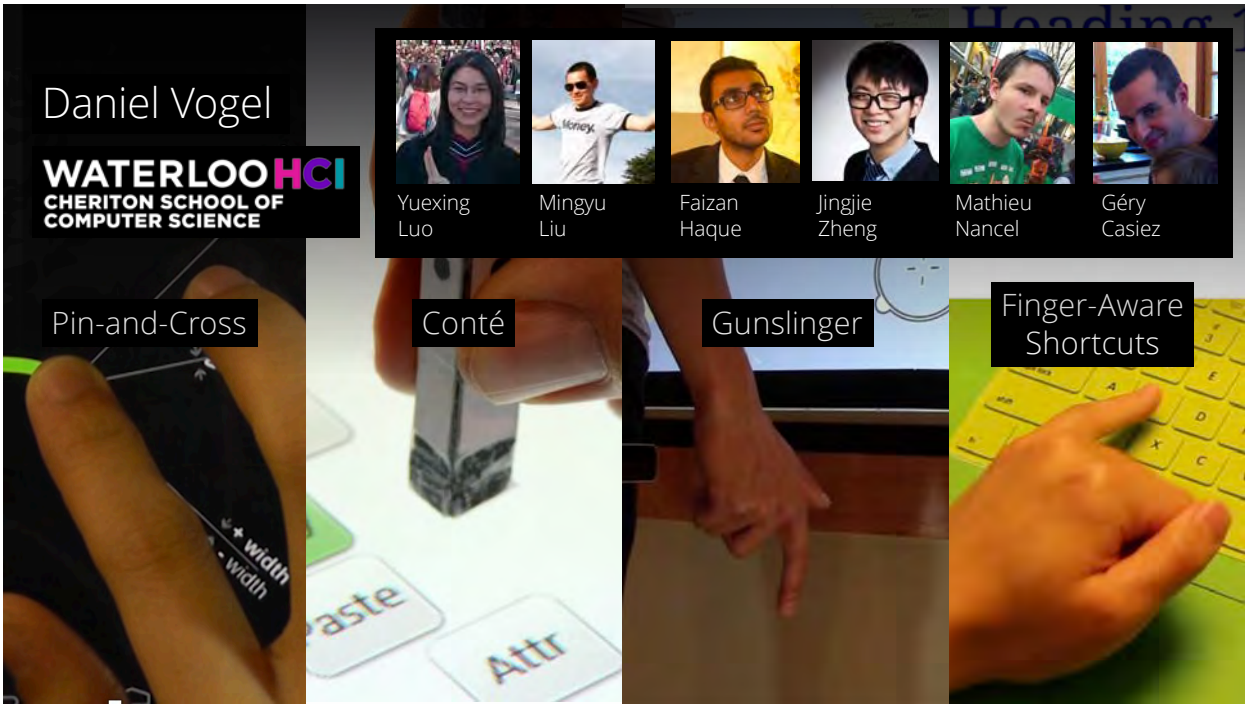

two-handed

human
capabilities


Siftor (Mount Allison Art Gallery, 2013)


Daniel Vogel
WATERLOO HCI
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Mingyu Liu
Faizan Haque
Jingjie Zheng
Mathieu Nancel
Géry Casiez
Pin-and-Cross
Conté
Gunslinger
Finger-Aware Shortcuts

For more information ...

Yuexing Luo and Daniel Vogel. 2015. **Pin-and-Cross**: A Unimanual Multitouch Technique Combining Static Touches with Crossing Selection. In *Proceedings of the 28th Annual ACM Symposium on User Interface Software & Technology* (UIST '15). ACM, New York, NY, USA, 323-332. DOI: http://dx.doi.org/10.1145/2807442.2807444

video: https://youtu.be/hrMkPq4uxJs

Daniel Vogel and Géry Casiez. 2011. **Conté**: multimodal input inspired by an artist's crayon. In *Proceedings of the 24th annual ACM symposium on User interface software and technology* (UIST '11). ACM, New York, NY, USA, 357-366. DOI=http://dx.doi.org/10.1145/2047196.2047242

video: https://youtu.be/HDqT_oKM7j8

Mingyu Liu, Mathieu Nancel, and Daniel Vogel. 2015. **Gunslinger**: Subtle Arms-down Mid-air Interaction. In Proceedings of the 28th Annual ACM Symposium on User Interface Software & Technology (UIST '15). ACM, New York, NY, USA, 63-71. DOI: http://dx.doi.org/10.1145/2807442.2807489

video: https://youtu.be/lebeVS0oXtc

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video: https://youtu.be/HWp0JBrl8rQ