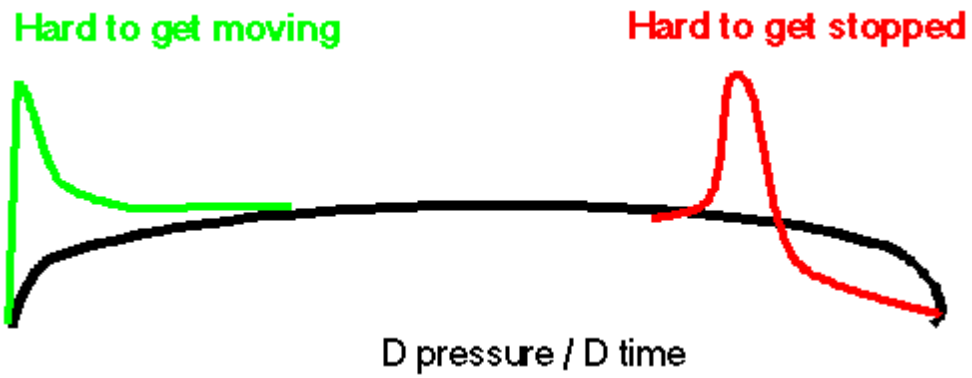
Joe Rutledge
Ted Selker
IBM
T.J. Watson
Research

Trackpoint: Knee bars and race cars

- Stewart Card / Tom Moran Human Computer Interaction 1983
- Knee bar better than mouse for novices ? Mouse takes 1.7 seconds to grab
- Joysticks have always had over-shoot problems people want to drive a Ferrari .. but they crash it
- TrackPoint ; 10 years of human factors work
  ergonomic, ambidextrous device
- Matching human visual and motor abilities

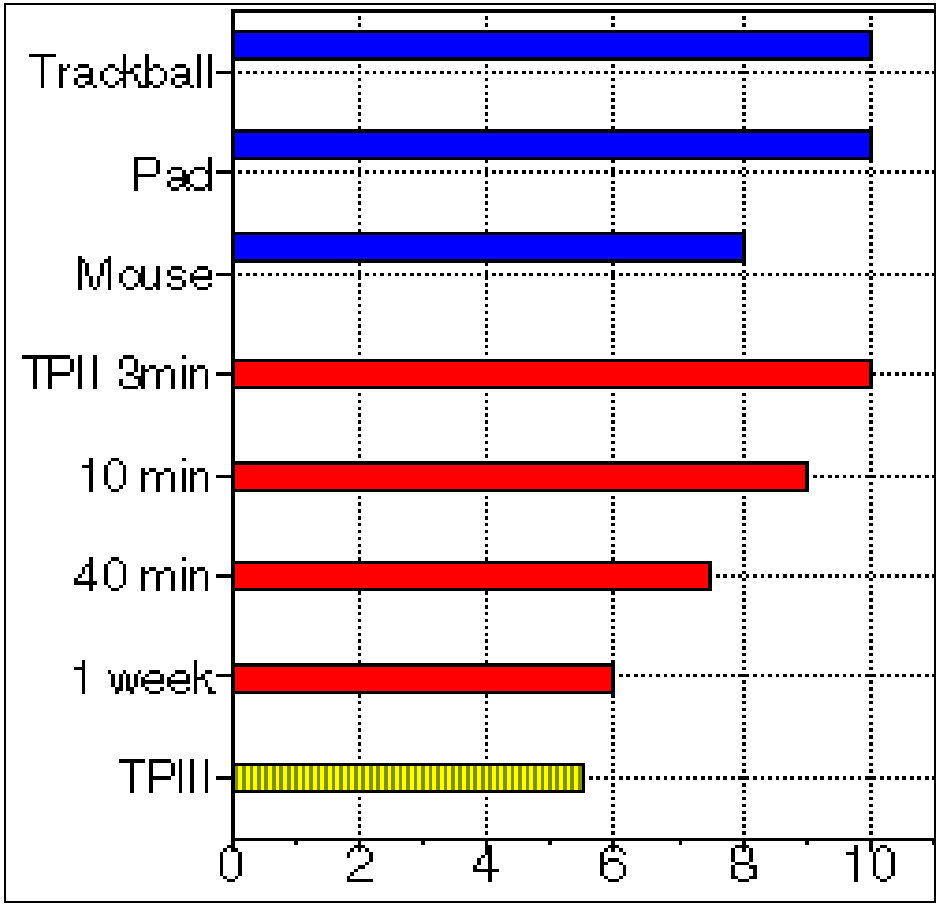
TrackPointIII

- Grippy Top
  - Consistent grippiness
- Drag Buttons
  - Aids to fine pixel manipulation
  - Aid to people with Special needs
- Negative Inertia
  - more precise
  - faster getting to object



Towards a Behavioral Motor Match

- Placement
- Eye Tracking
- Wiggly Fingers
- Going Fast
- Movement Feedback
- Grippiness
- Mouse Lockout

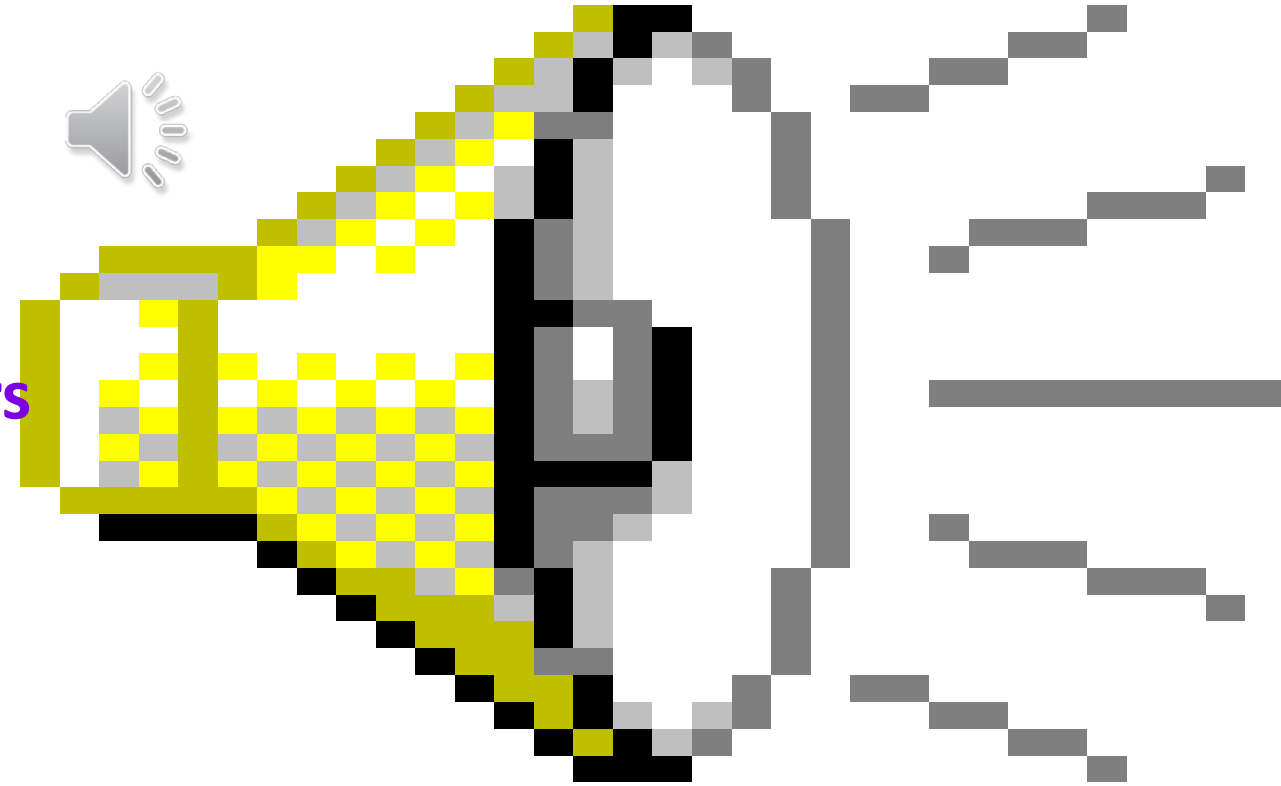


Select and Type

Finger Control Everywhere!

- In Keyboard Pointing
- Remote Controls
- Air Traffic Control
- Surgical Instruments
- Sightless Pointing
- Prosthetics pointing
- Steering
- Two Handed
- Industrial Controllers
- Arcade Games
- In Mouse Scrolled

TrackPoint



Pointing everywhere

いい部屋」の画面。アイコン・メタファーに比べ
ーザーの学習カーブの上昇は速い。
ith a View" screen. User learning curve is supe-
pared with the icon metaphor.

technology to input text, check e-mail arrival as well as all other computer functions with ease in any situation. They are thinking of putting the TrackPoint on a microphone to move the cursor during presentations. They've also thought of ways to use the keyboard TrackPoint as a sensor to detect breath or weight and directly analyze and process the data.

"Room with a View" is meant to replace icon interfaces, and seeks to operate the computer by clicking the objects in the room on the monitor. On the desk done in 3D graphics one finds documents, software, manuals, a calendar, a telephone, and a hardware, and a globe of the world. According to a user test in Selker's lab, the more physical and spatial 3D metaphor resulted in fewer errors as time went on when compared to the 2D icons. Possible reasons are that the physical and spatial metaphor is a better aid to remembering where things are located and that the nature of the relationships between such objects on the monitor are better understood.

Ted Selker conducts two types of analysis. The first concerns the work. "On the scientific level, we test ideas and record results so that other people can refer to and utilize them. As an individual, I try to make the things people have to do a little easier. For the company, I try to realize what is necessary, and create impact." The second type of analysis involves art, science, and design. "Art is an aesthetic statement that remains in people's memories. Science is inspiring

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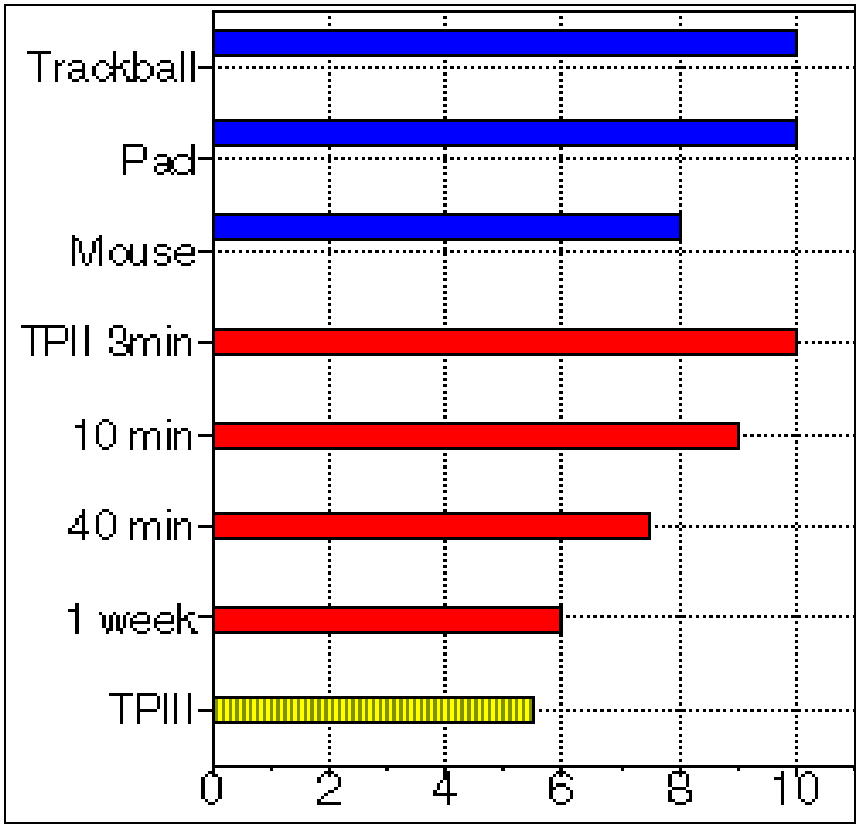
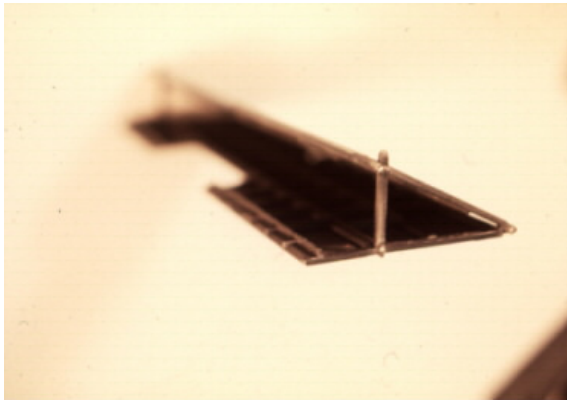


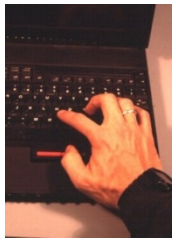
Select and Type

Sensors:2d 3d, linear, eye motion…

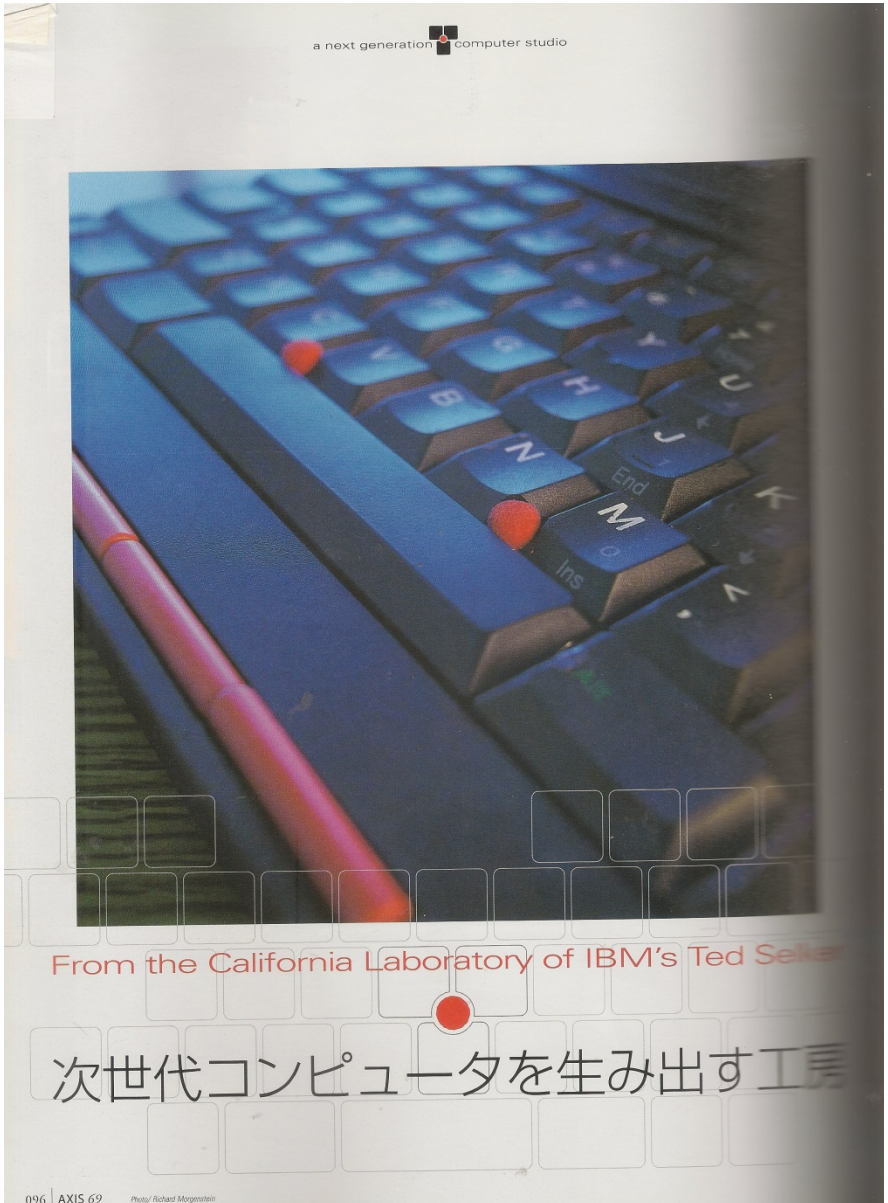
Stable hands point better



Buttons mater too.



Why one?


a next generation computer studio
From the California Laboratory of IBM's Ted Sel
次世代コンピュータを生み出す工
096 AXIS 62

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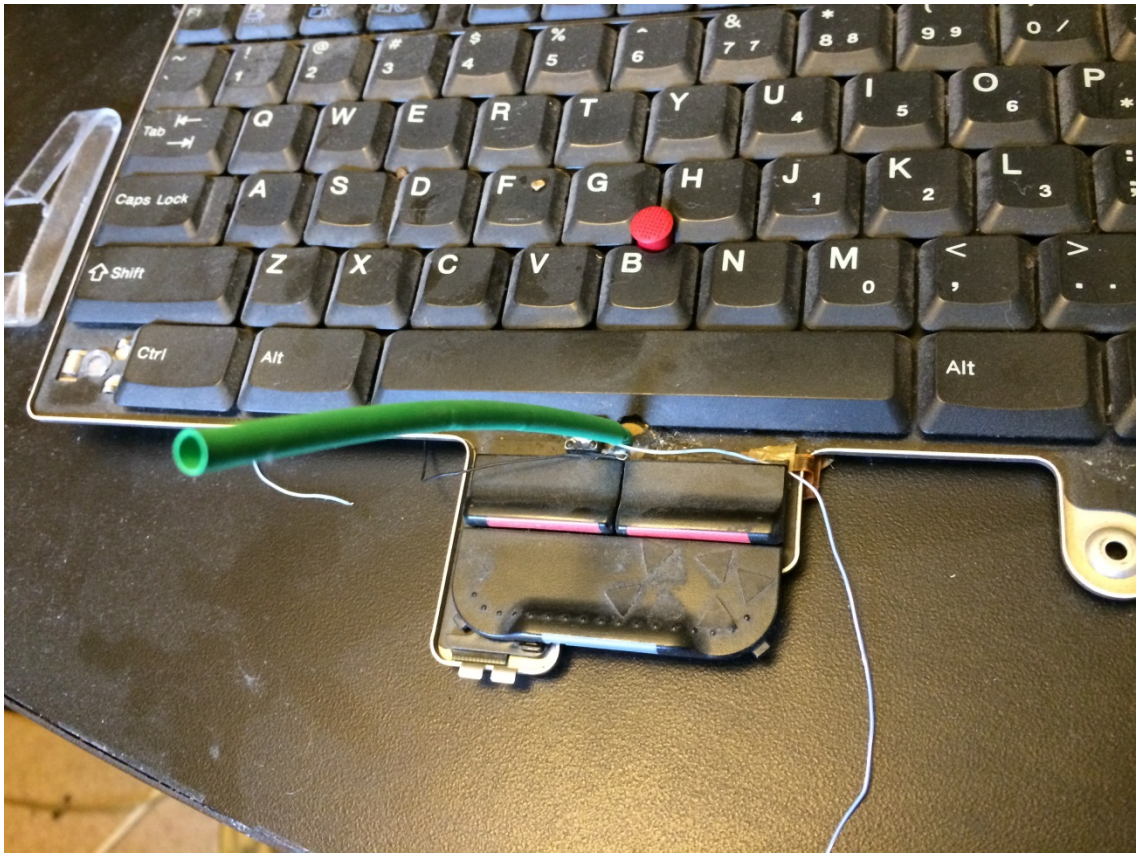
Tab
Caps Lock
Shift
Ctrl
Alt
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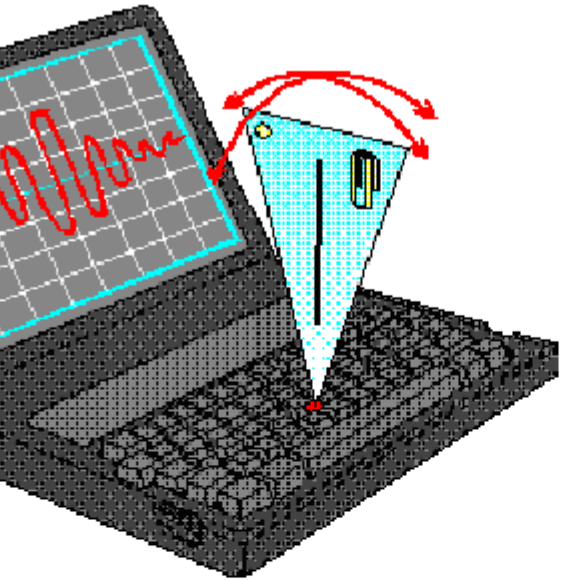
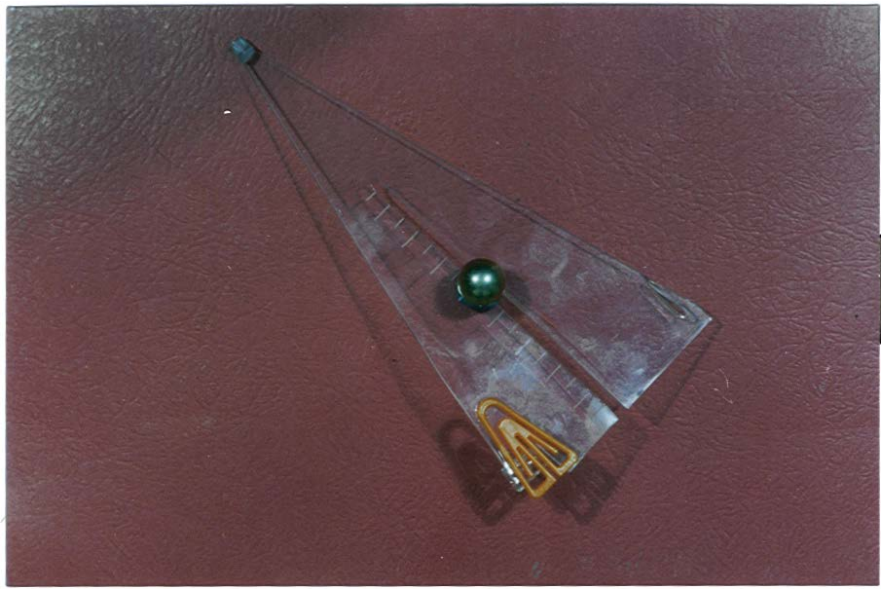
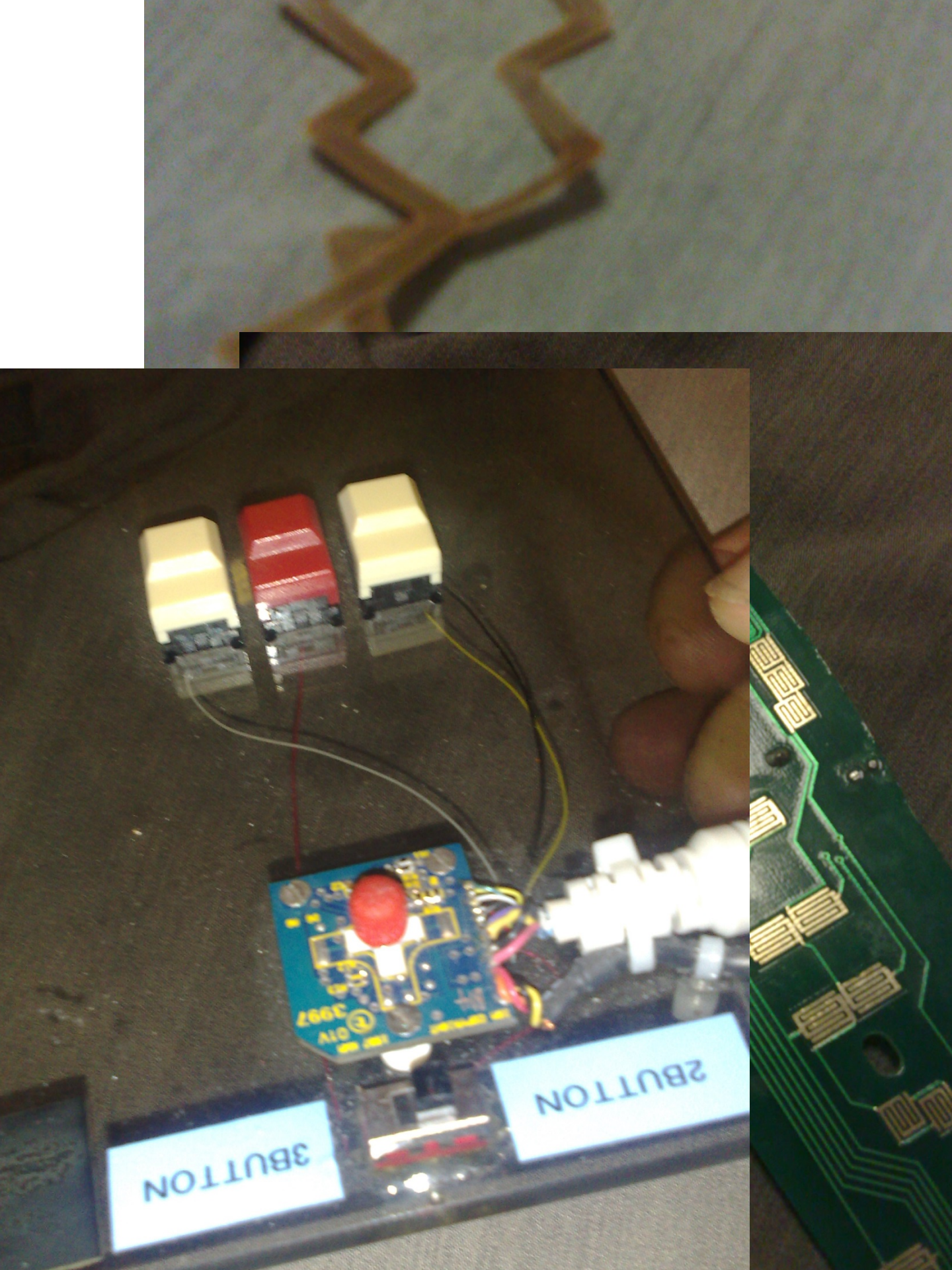




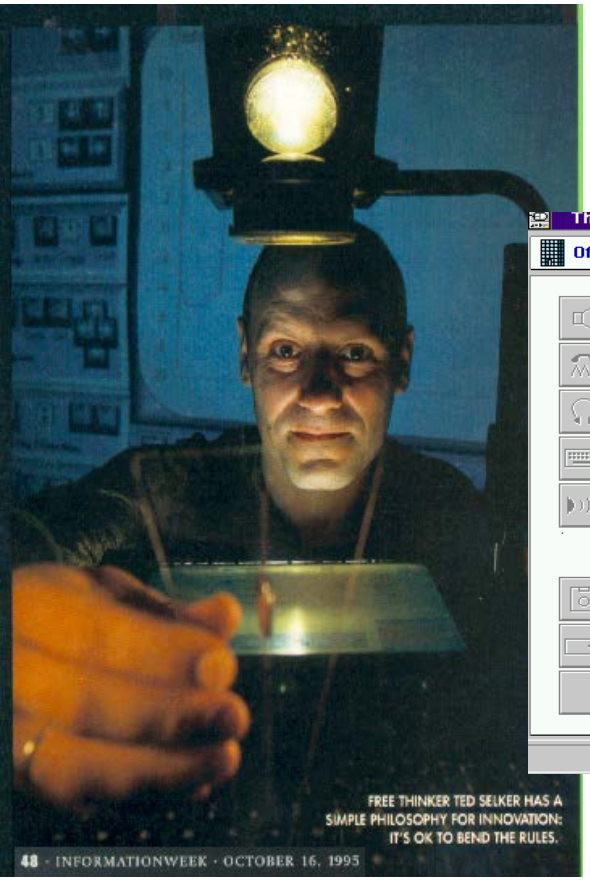

3BUTTON
2BUTTON

User System Ergonomic Research

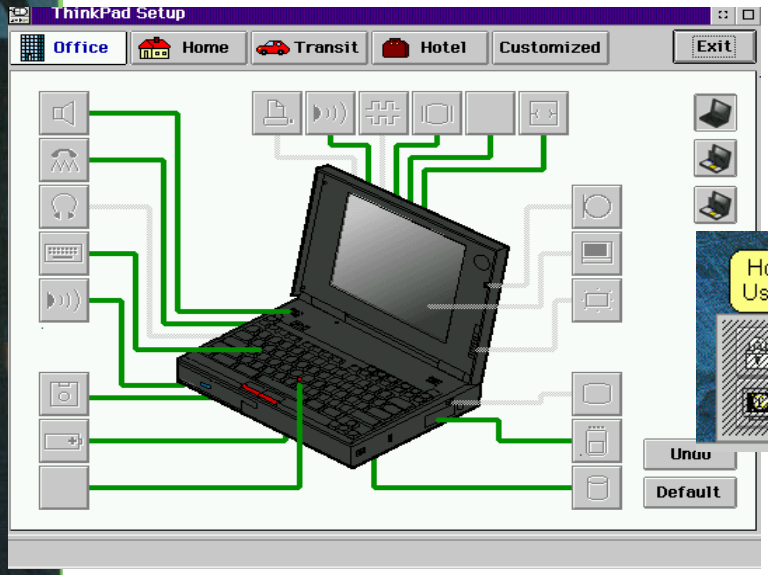
IBM Almaden Research Center

San Jose California

Physical,



Graphical,



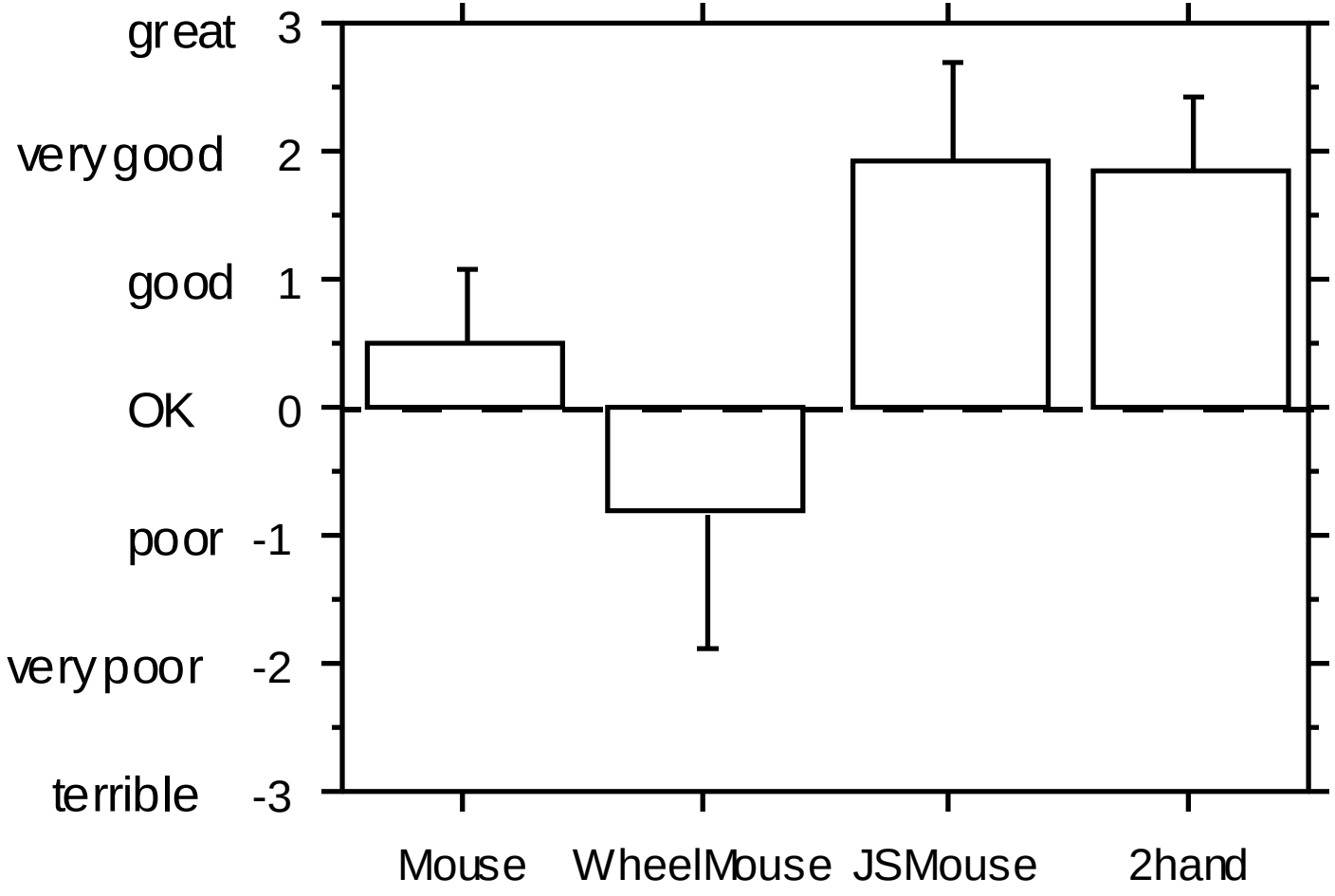
&

Cognitive

Human Computer Interface

So many thing

Scrolling....
Does another input help?



HCI: Who Does What

- **Invention**
- **Design**
- **White papers**
- **Moch ups**
- **User testing**
- **Users**
- **Prototyping**
- **Manufacturing**
- **Splash**
- **Differentiability**
- **Sales**
- **Returns**
- **Market acceptance**
- **Market size**
- **Warranty problems**
- **Recall problems**
- **Profitability**
- **Extensibility**
- **Follow ons**

- We must do enough...
  - technologies and methods
  - meet,know and be thy user

Desktop: was a place to concentrate

- Organize
- Bring Things Together
- Communication is Relationship

Placement, pressure, ergonomics, …

THE WALL STREET JOURNAL.

MARKETPLACE

MONDAY, MARCH 6, 1995 B1

Health: *Immune Response's stock falls after venture partner withdraws* **Page B5.**

Health: *Kaiser Permanente gets high ratings in survey of HMO members* **Page B6.**

Abstractionist Practically Reinvents the Keyboard

By Laurie Hays
Staff Reporter of The Wall Street Journal

Surrounded by an alarming amount of clutter in his research lab, Ted Selker thrives on juggling ideas in his head. When he talks, he jumps from one notion to another, trading concepts and free-associating. After months and even years of this refining and revisiting, he's ready to prove they can come to life.

This is how the 38-year-old inventor, rock climber, bicyclist, sculptor and scientist at **International Business Machines** Corp.'s research center in San Jose, Calif., came up with a remarkable innovation for the computer keyboard. Dr. Selker created the TrackPoint, a tiny pointing device

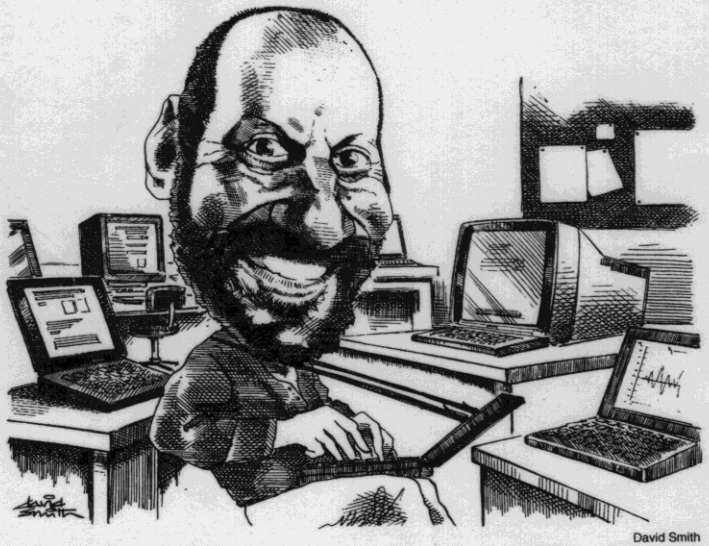
IN THE LAB

that looks like a pencil eraser, supplants the computer mouse and became a key selling feature of IBM's ThinkPad line because of its compactness and ease of use.

His invention, a fingertip device in the middle of the keyboard, was inspired after he read that it takes a person almost a full second to move a hand from the keyboard to the mouse, and almost a full second to move it back. He began thinking about dexterity and realized that after the tongue, the forefinger and thumb have the greatest sensory and motor control.

The idea culminated 10 years later at IBM Research when somebody looking for a project asked if he had any ideas. "After the TrackPoint was done, I realized it was the first change to the keyboard layout in 100 years," Dr. Selker says.

"Creativity happens by having this expanding thing



David Smith

head projector. That required slicing off the back of the screen in an experiment, but his bosses balked. So he bought his own ThinkPad and did it himself. A model featuring that

ular one. Tabled, too, is an electrical plug with retractable prongs that can fit into any outlet in any country; only 2% of ThinkPads are taken overseas, he says.

Dr. Selker says it sometimes feels like IBM is telling him something won't work, even when he's showing that it can. But it's his job to contemplate the impossible. That's the only way, he says, to help people regain the control over parts of their lives that technology is starting to take away.

"How do you make the world less confusing?" he asks. The flashing "12:00" on the VCR will be the least of people's worries, he says, unless he makes some progress. "It's really scary if you don't watch out. It's a horrific future if we're surrounded by technology that we don't understand."

So what does he have in mind? "Maybe a keyboard that is malleable, like clay, and you can feel everything you're doing," he says. "Maybe a keyboard that's a mil-