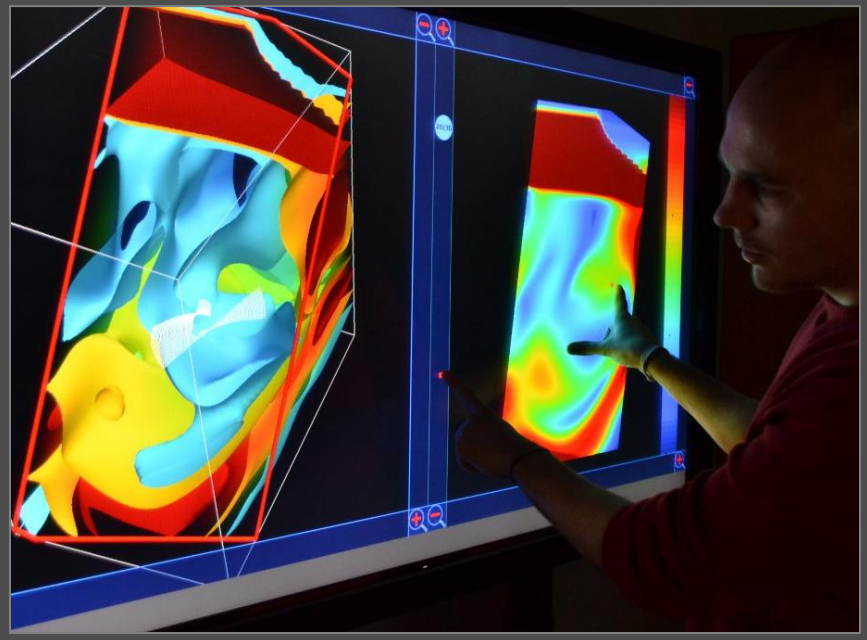
Touch Interaction with 3D Scientific Visualization and the Question of *Gestures* vs. Postures



Tobias Isenberg

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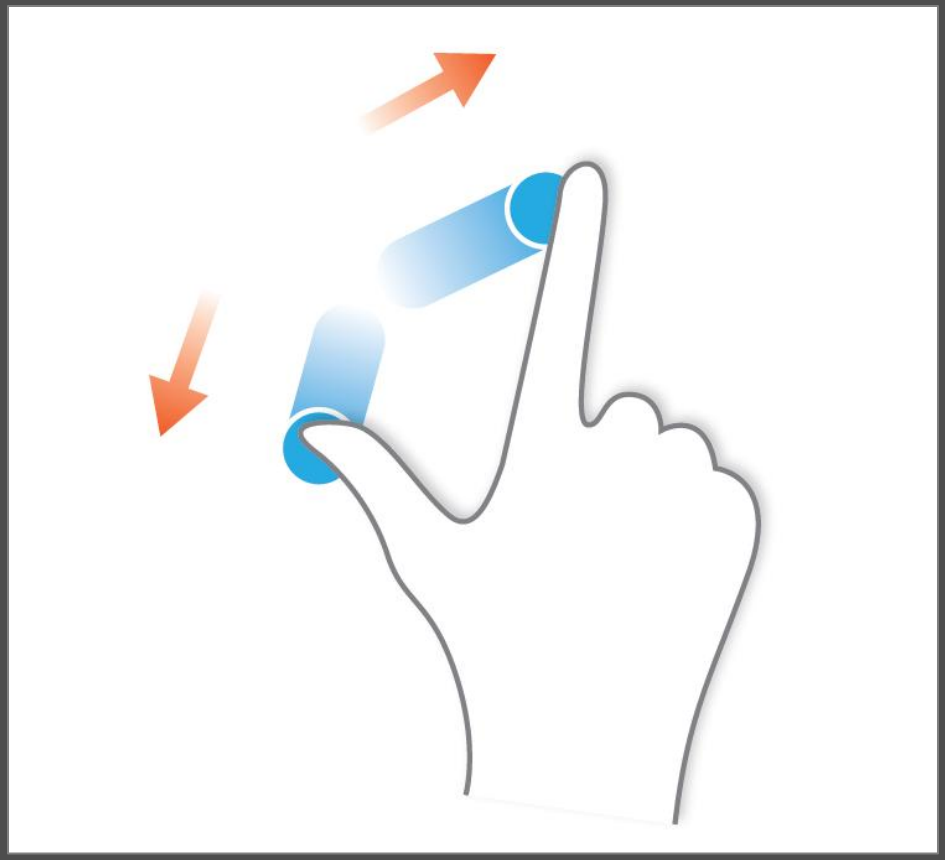
What do you call this?



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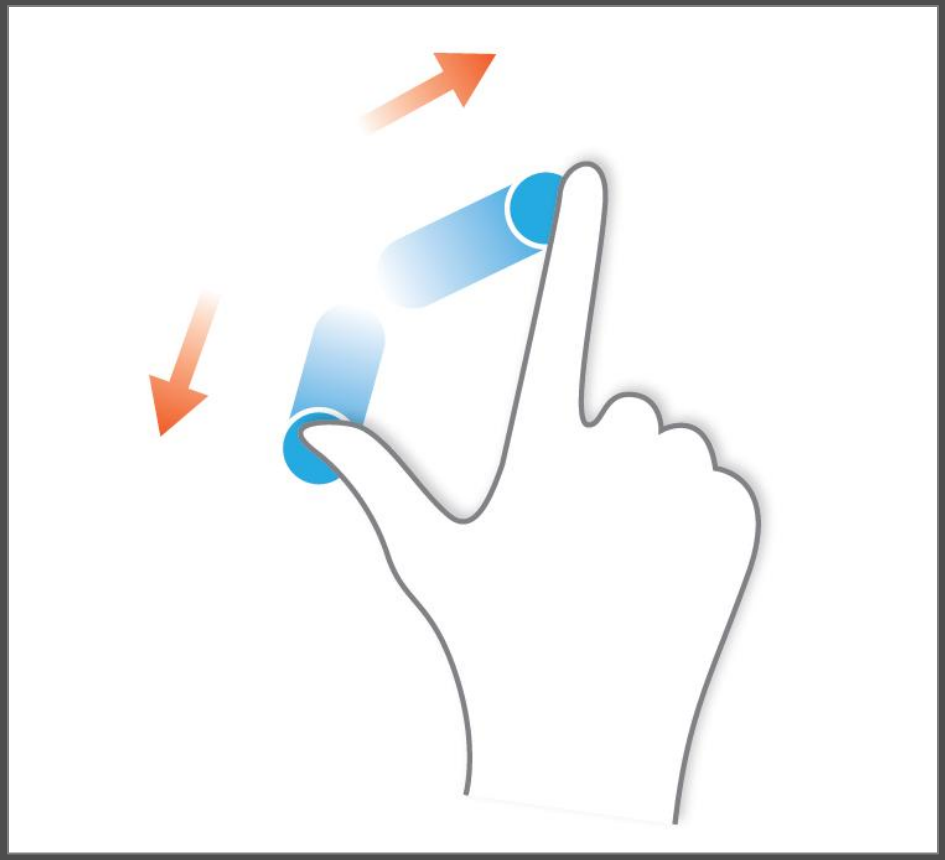

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the pinching **'gesture'**

I disagree.

I disagree.

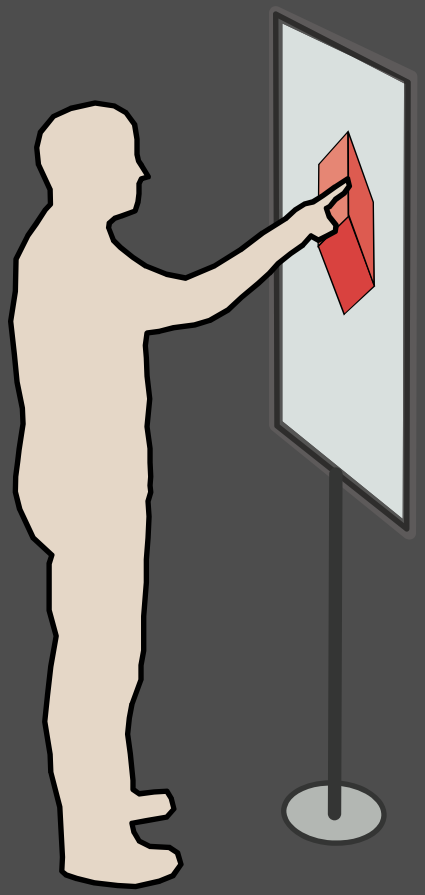
And I would like to talk about why.

Specifically in the context of SciVis.

I disagree.

And I would like to talk about why.

“Touching” the Third Dimension



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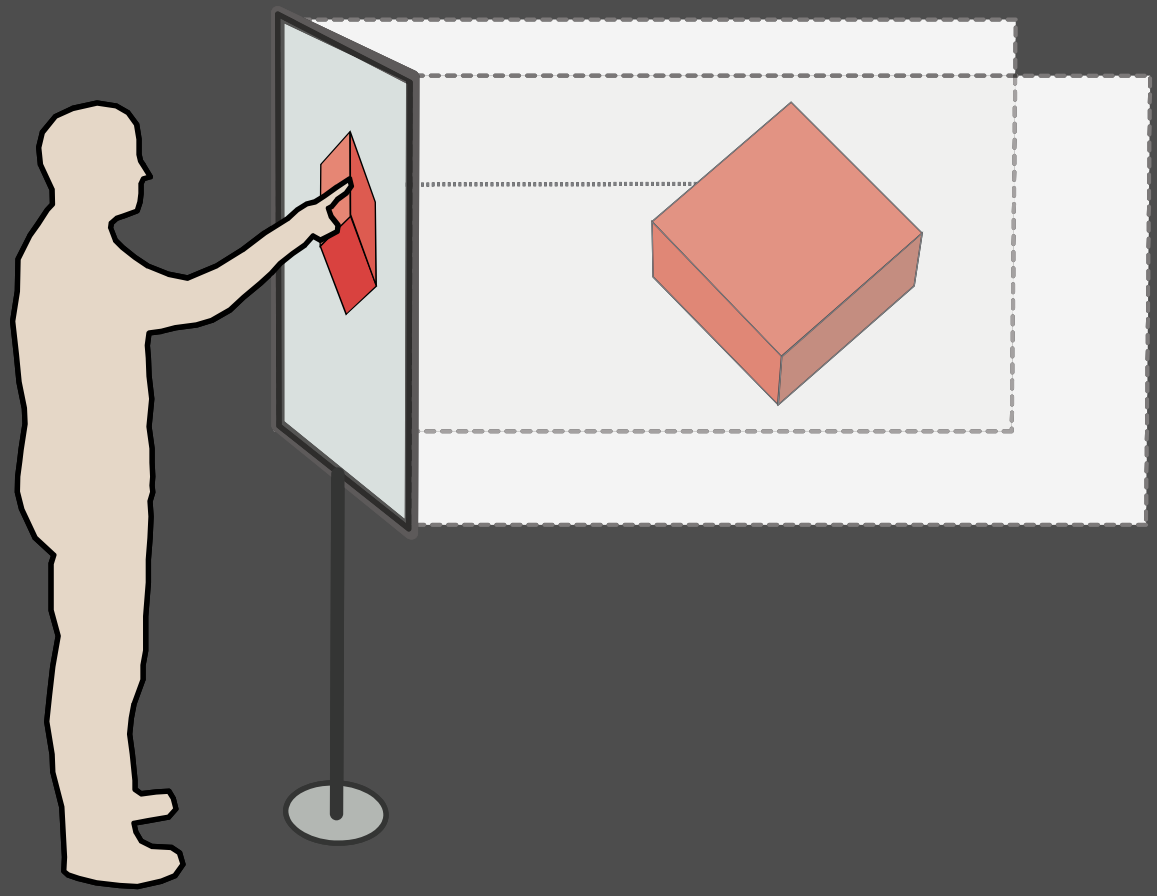


Touch-based Interaction with SciVis

- interaction vocabulary limited: *gestural interaction*
- specific constraints for scientific visualization:
  - multiple different exploration techniques such as data navigation, data manipulation, data selection, cutting plane placement and manipulation, data probing, seed particle placement, etc.
  - techniques integrated within the same input space
- most techniques: not only switching statuses but **parameterizing** the data exploration as a part of the intuitive interaction

A definition of a touch *gesture*

A touch ***gesture*** is:

- a way to invoke **manipulations** in a direct-touch environment
- that is **started** by touching the surface in a **well-defined initial configuration**
- and that is **continued** for some time in a **well-defined motion pattern** (incl. the null motion)
- during which the configuration may change.

A definition of a touch posture

A touch **posture** is:

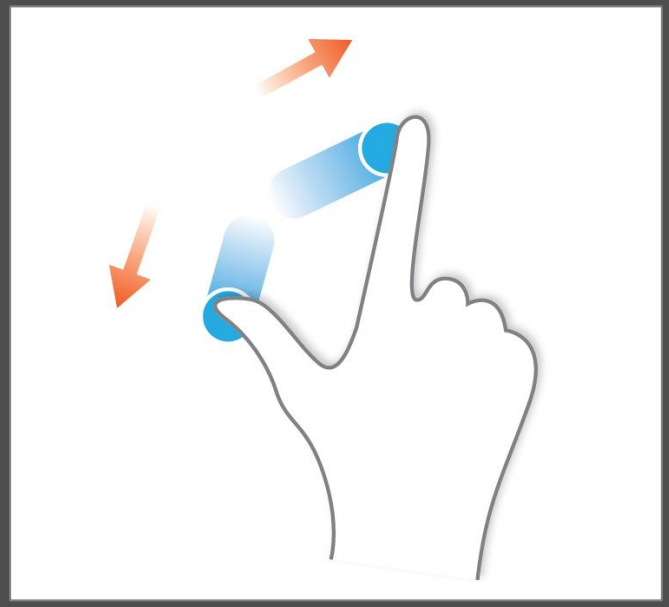
- a way to invoke **manipulations** in a direct-touch environment
- that is **characterized** by touching the surface in a **well-defined initial configuration**
- whose effect can be **parameterized** by a **subsequent dynamic action**.

A definition of a touch quasi-posture

A touch **quasi-posture** is:

- a touch **posture**
- whose initial configuration is augmented with a **brief initial dynamic action**
- but where this action's continuation is also used to **parameterize** the effect.

Why do I care? Let's look at examples …



images by authors as cited in the table;
first image by Wikipedia user GRPH3B18

technique	*gesture*	posture	quasi-posture
2D pinching		✓	
3D RST (Reisman et al., 2009)			
shallow-depth (Hancock et al., 2007)			
sticky tools (Hancock et al., 2009)			
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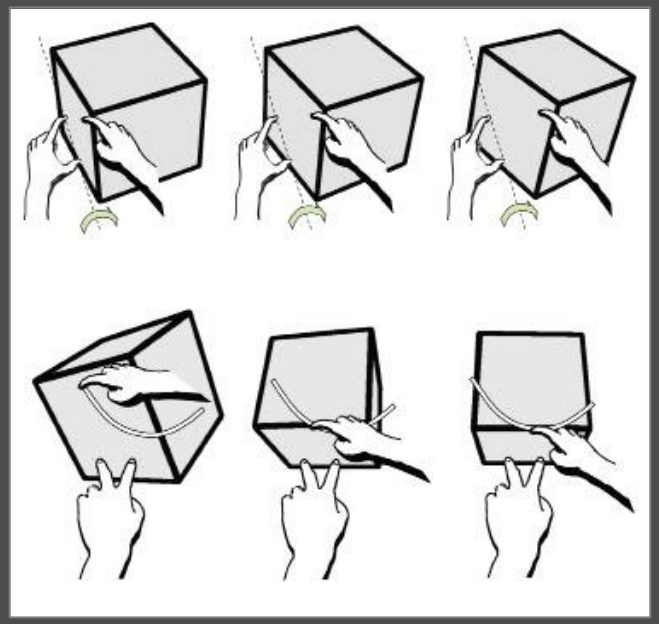

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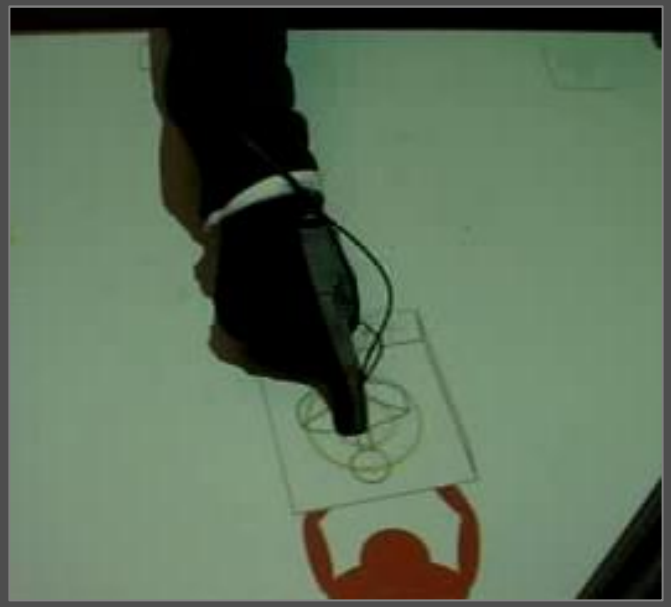

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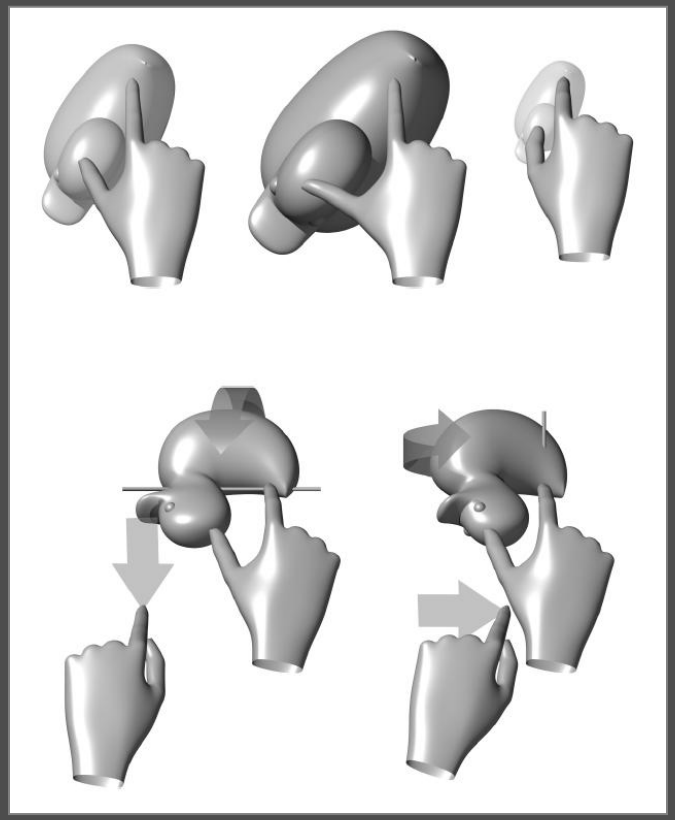

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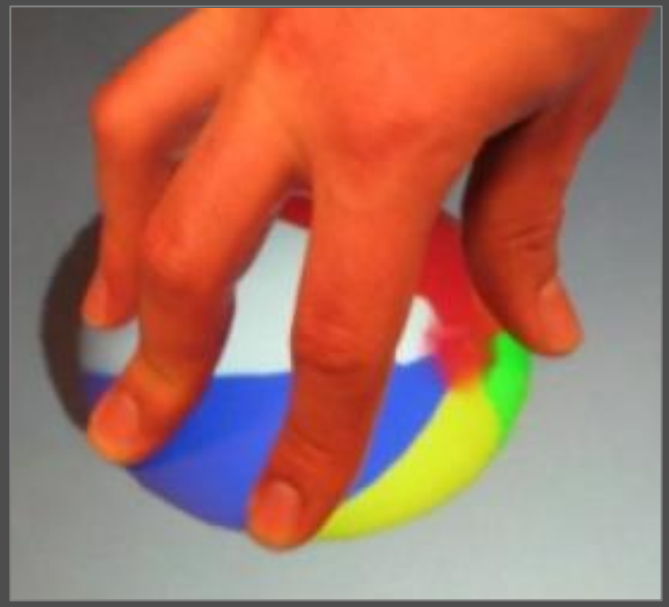

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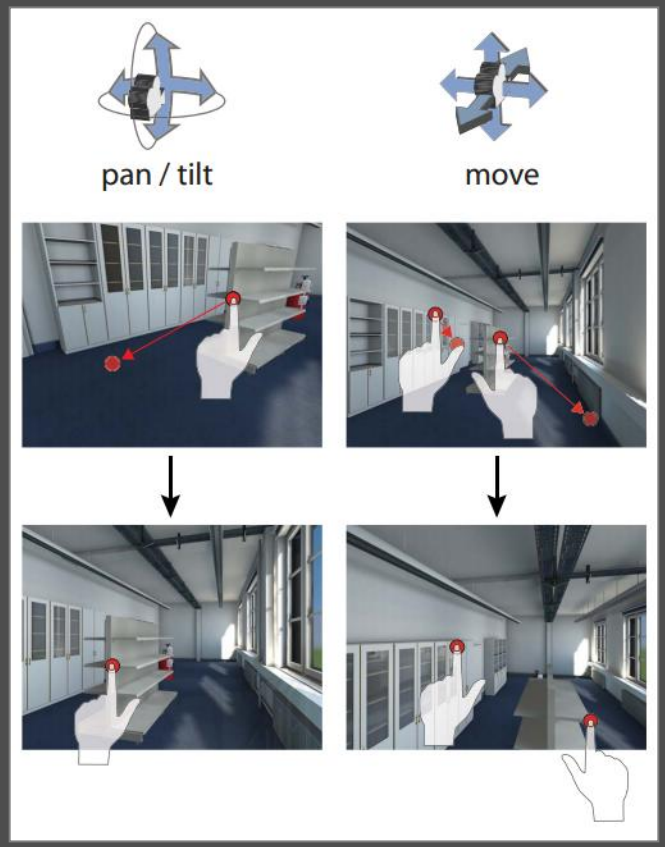

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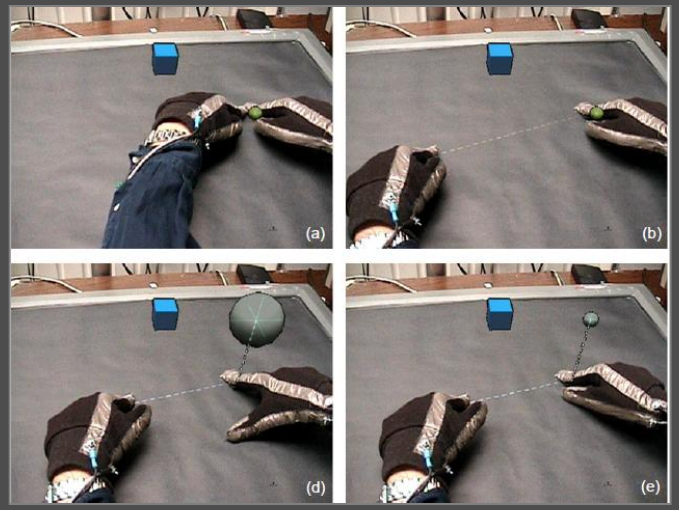

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* tapping *gesture*			

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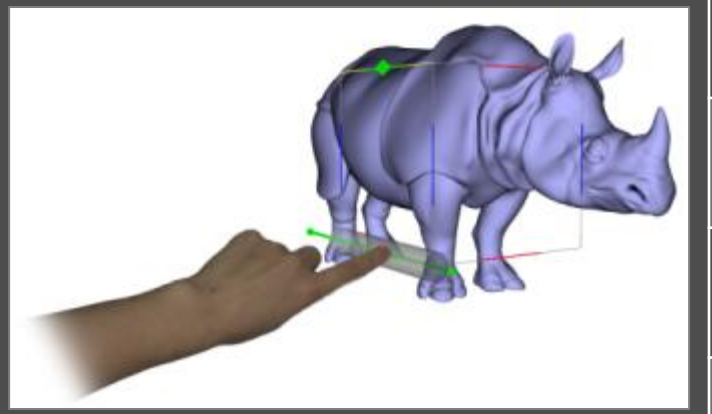

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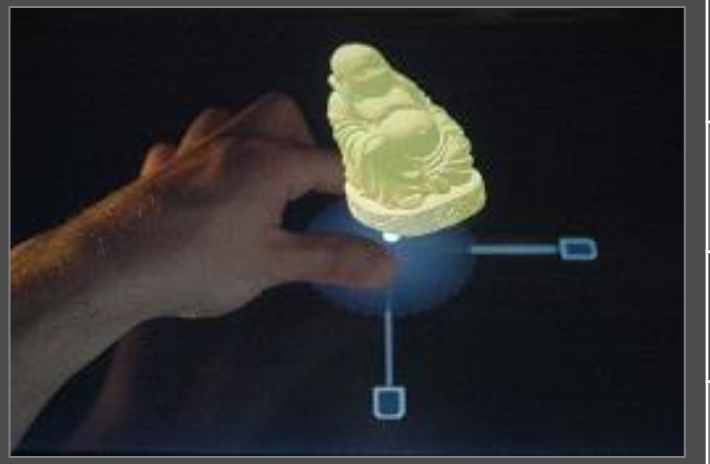

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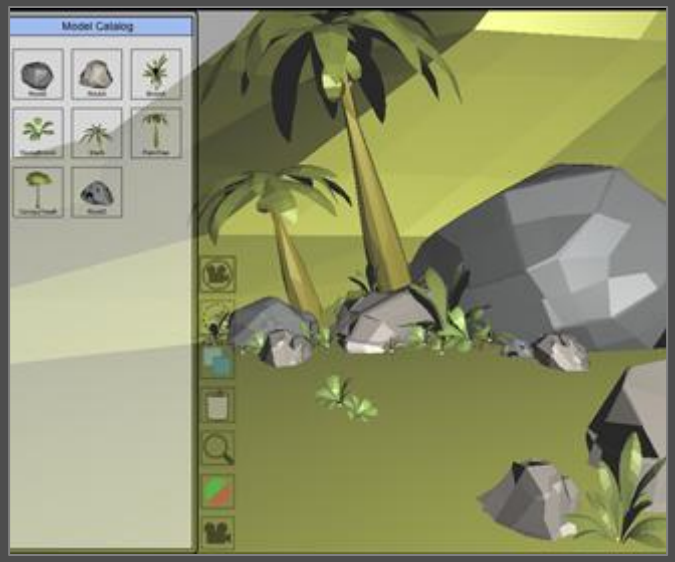

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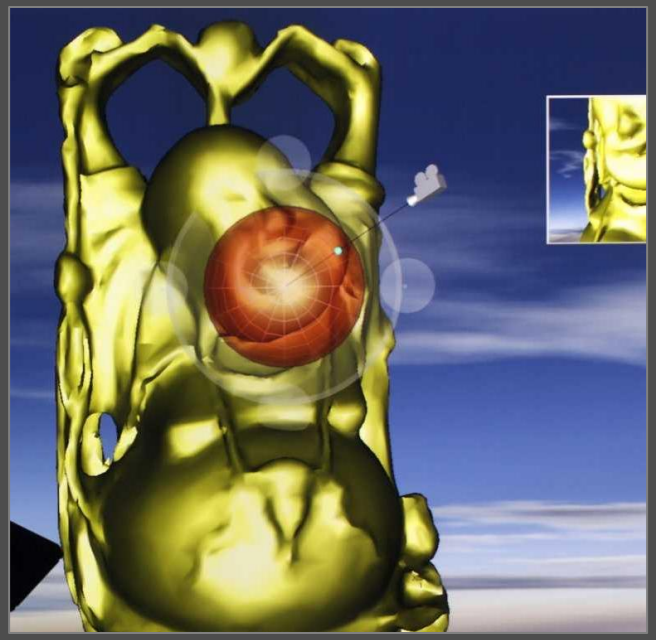

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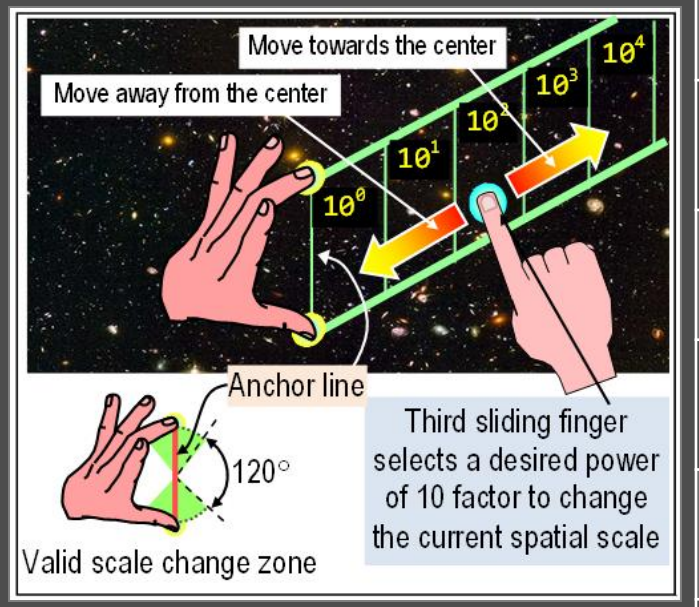
Scientific visualization examples



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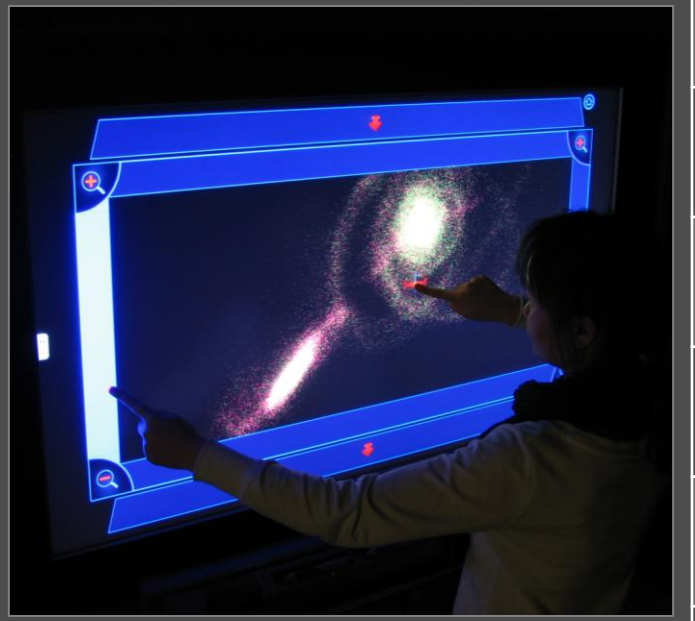

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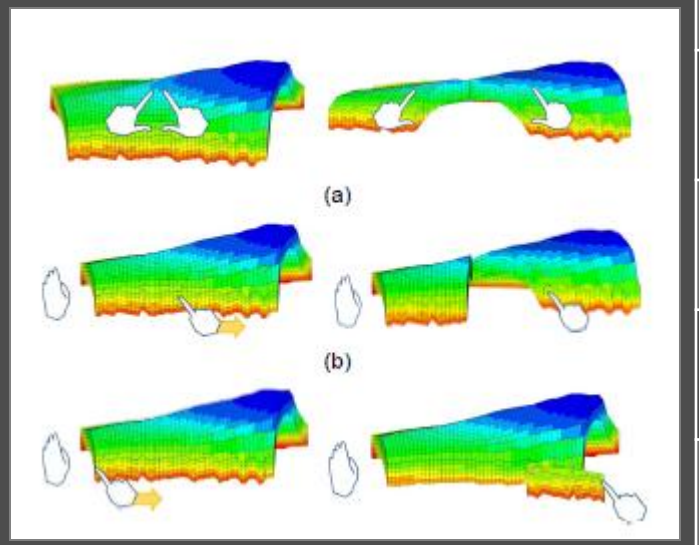

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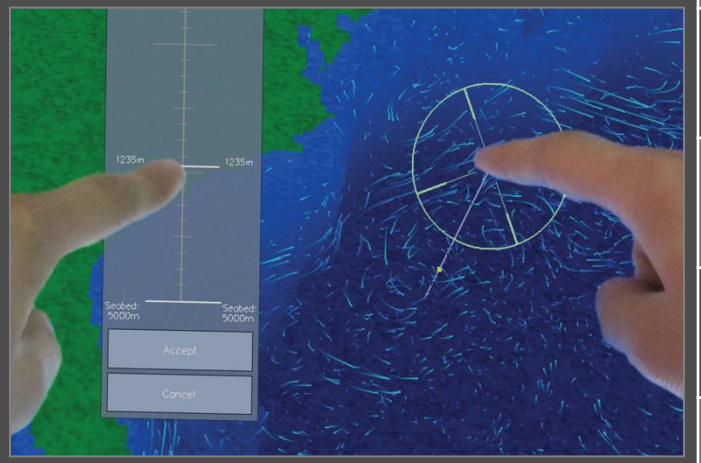

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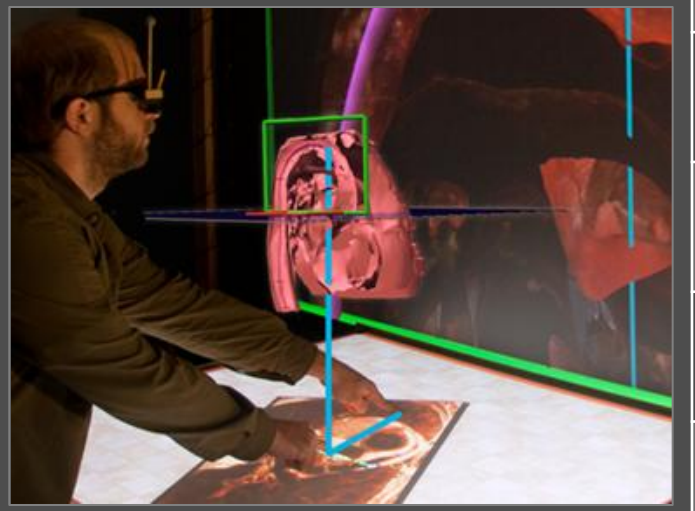

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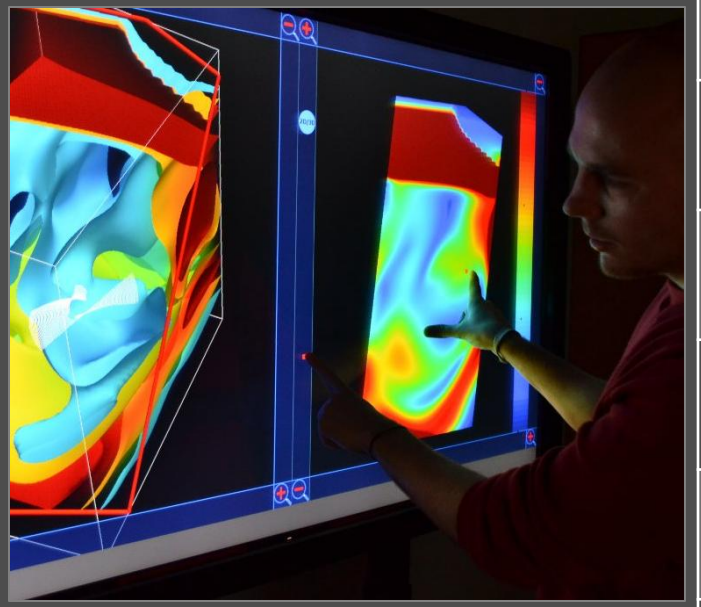

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* tapping *gesture*			

Why I think it is important to distinguish

- *gestures*: good for setting statuses (e.g., selections) or for initiating system-controlled modes

- (quasi-)postures: good for specifying user-controlled modes with a parameterization that follows, i.e., for ***directly-manipulative tasks***

- these directly-manipulative tasks are essential in scientific visualization and interactive exploration

Implications and challenges

- conflicts in the definition of postures
- but need for integration of interaction techniques
- need for precise interaction techniques

possible future directions:

- quasi-postures as potential vocabulary extension
- visual feedback/widget-based postures

question:

- tapping always a *gesture*? (Eden vs., e.g., balloon)
- correct terminology? common use of 'gesture' ...