



# SpikeNav: Using Stylus Tilt in 3D Navigation

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Public domain source  
code available

<http://www.cs.ubc.ca/~rbridson/spikenav>

## Motivation

Designing and debugging 3D visual effects (smoke surface shown here) needs good 3D navigation:

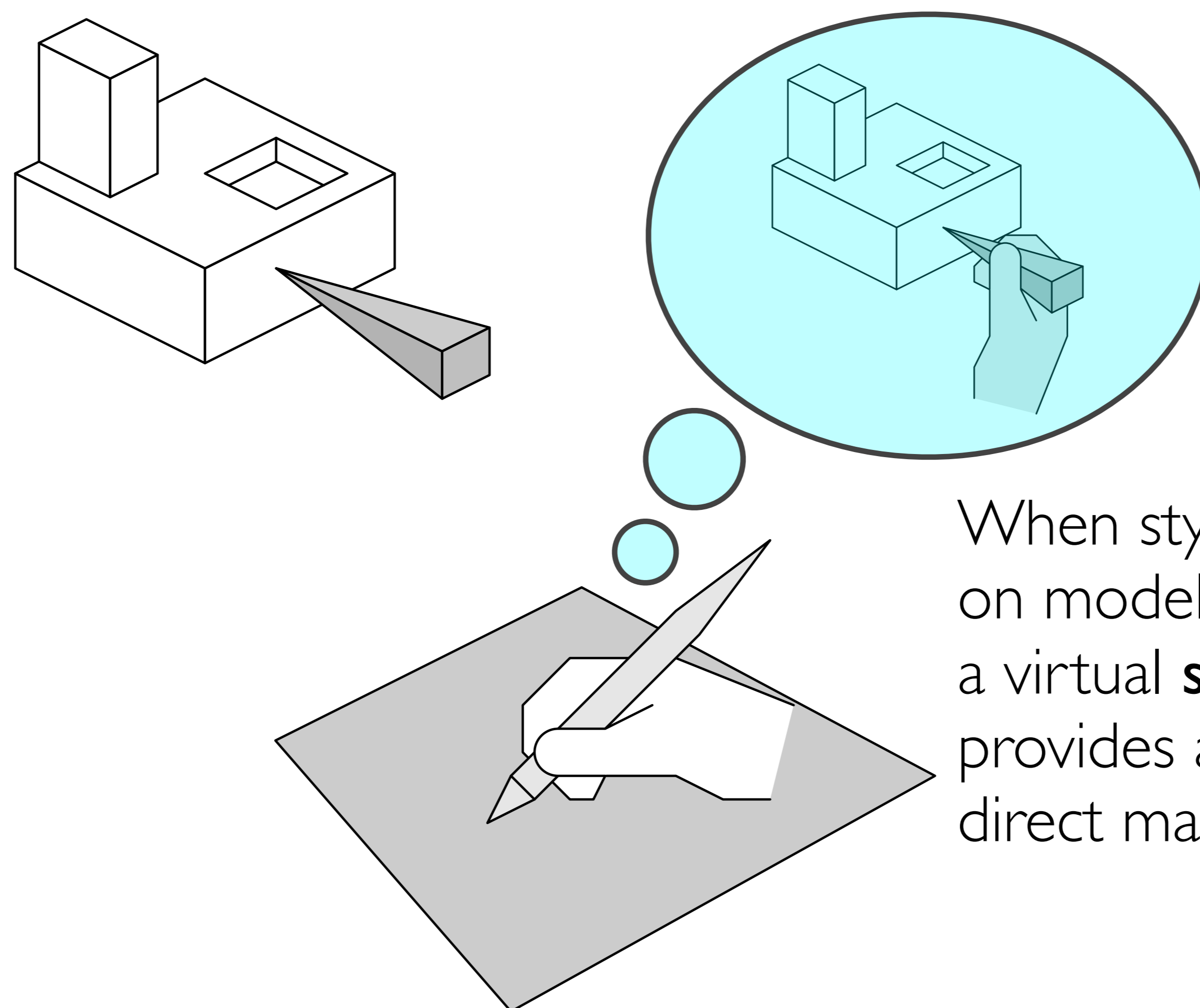


- easily view from all angles
- fluidly track over surfaces
- quickly zoom in and out



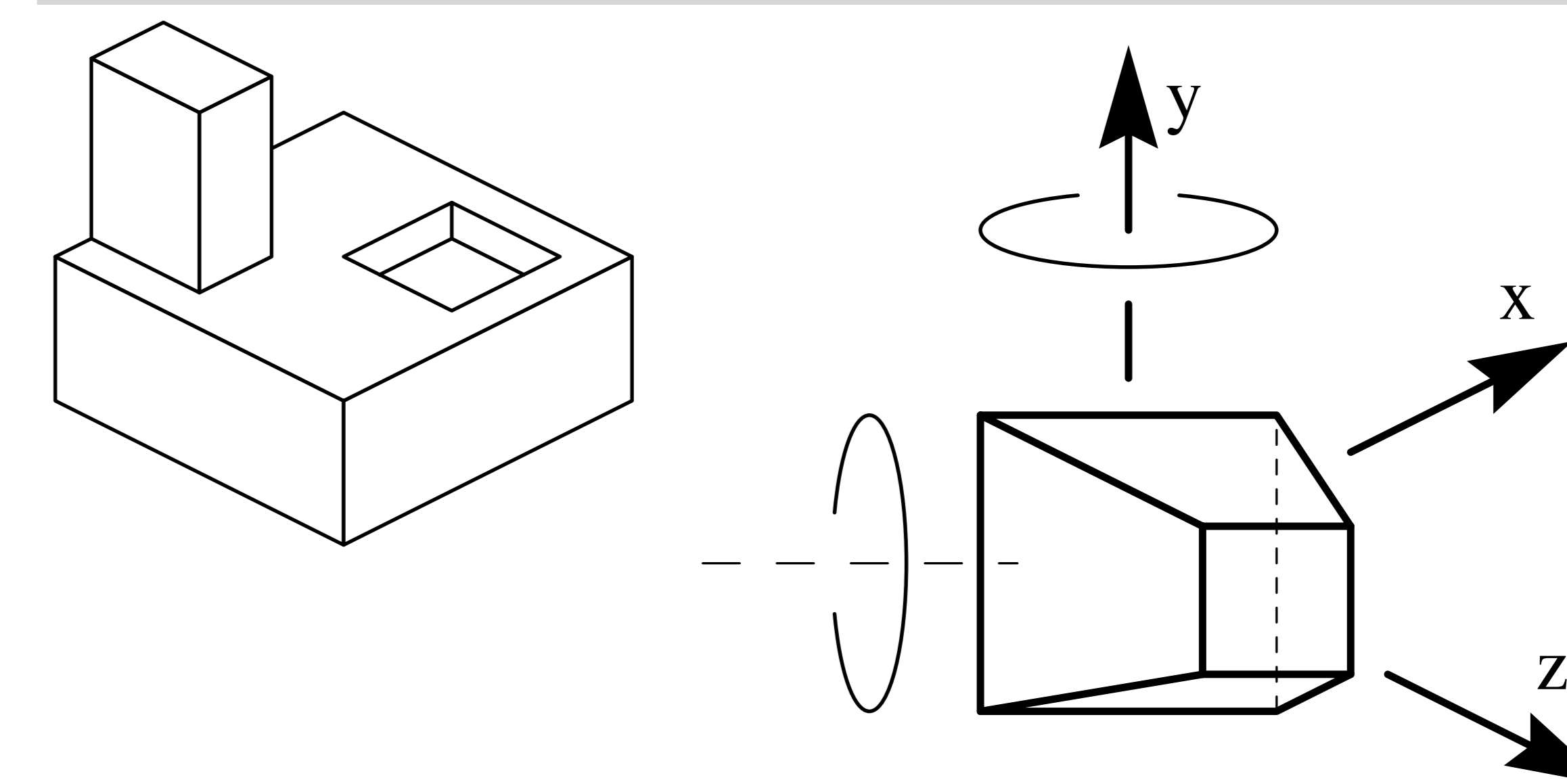
Hardware: 3D artists often already have a tablet/stylus that provides **tilt** and **pressure** channels that are ignored for most tasks — let's exploit them!

## Spike Metaphor



When stylus clicks on model, becomes a virtual **spike**: provides a handle for direct manipulation

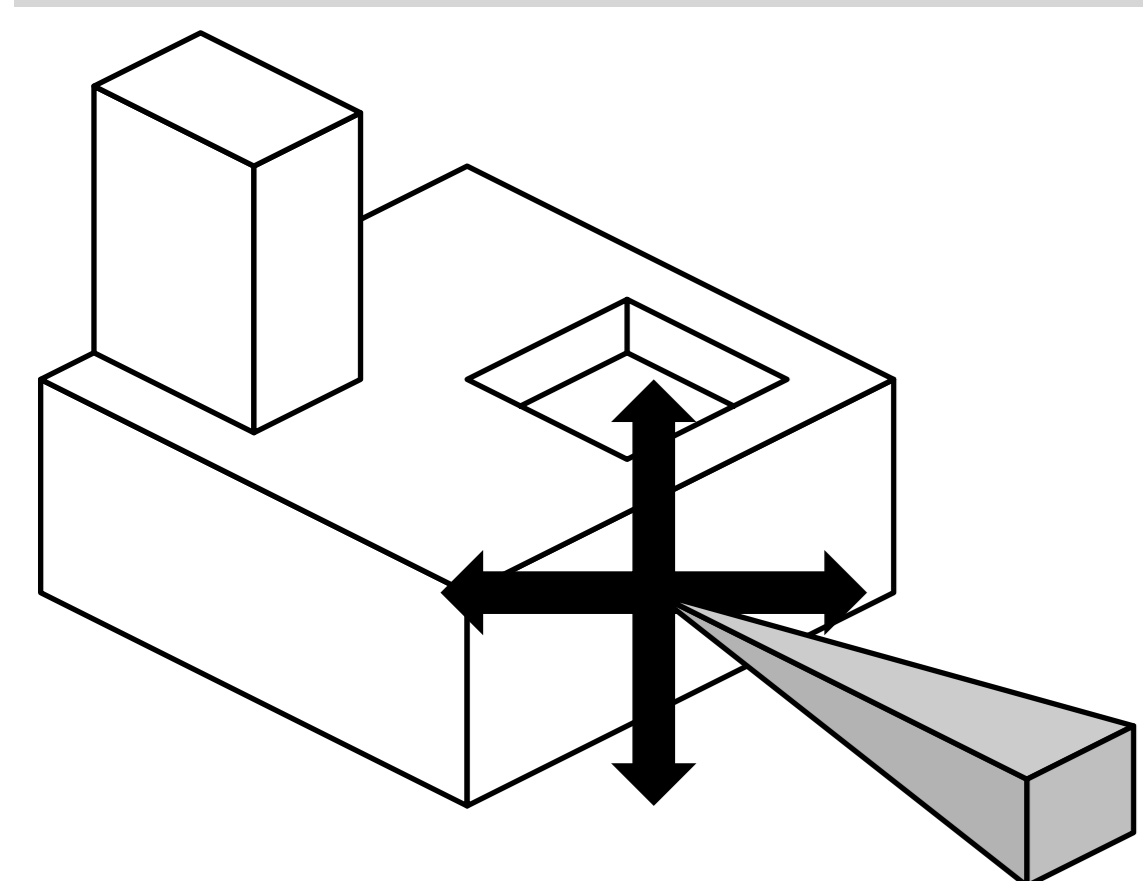
## Camera Model



5D camera: 3D translation, 2D rotation

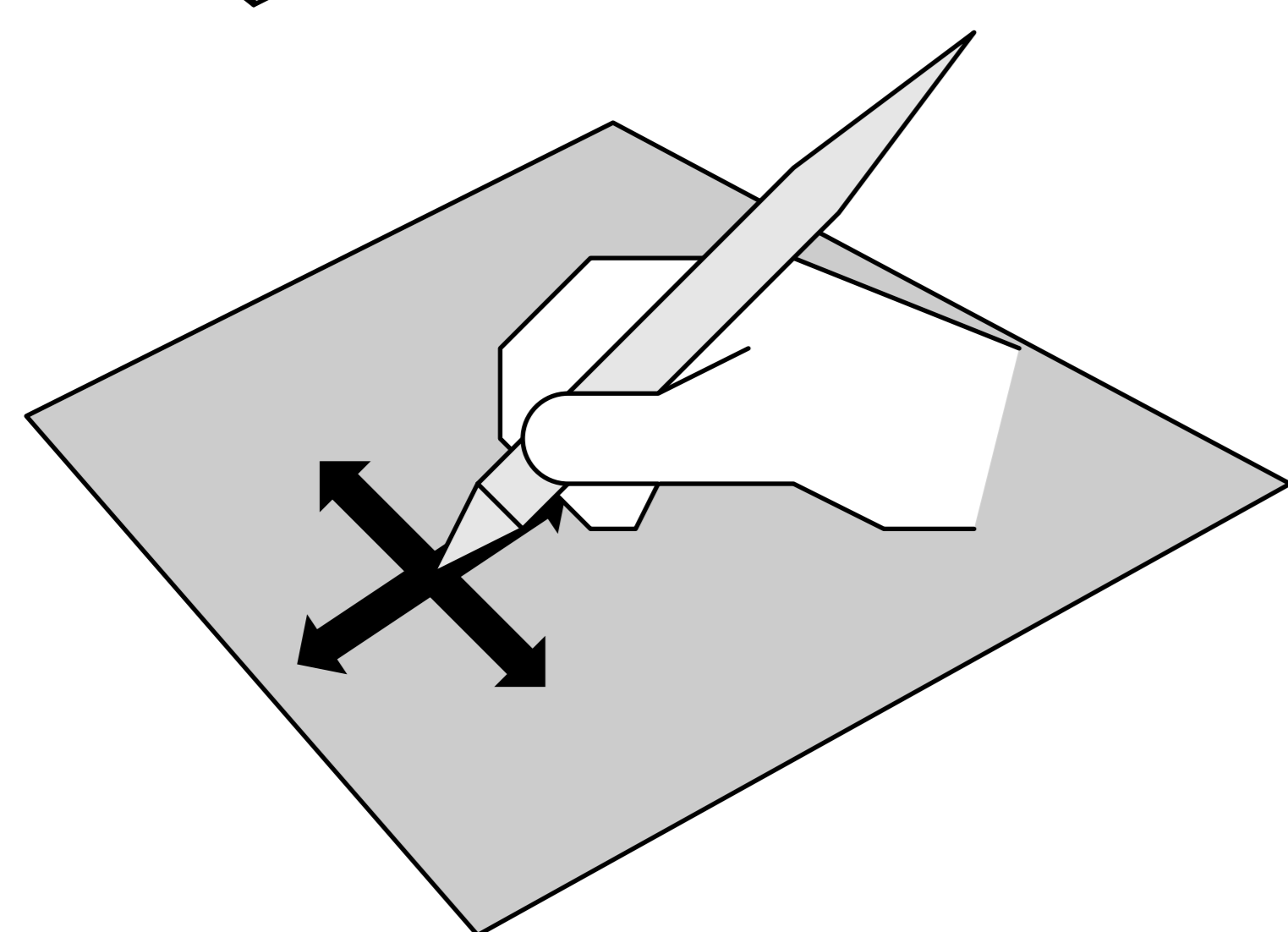
- preserves "up"
- makes rotation commutative
- industry standard in Autodesk Maya

## Translating

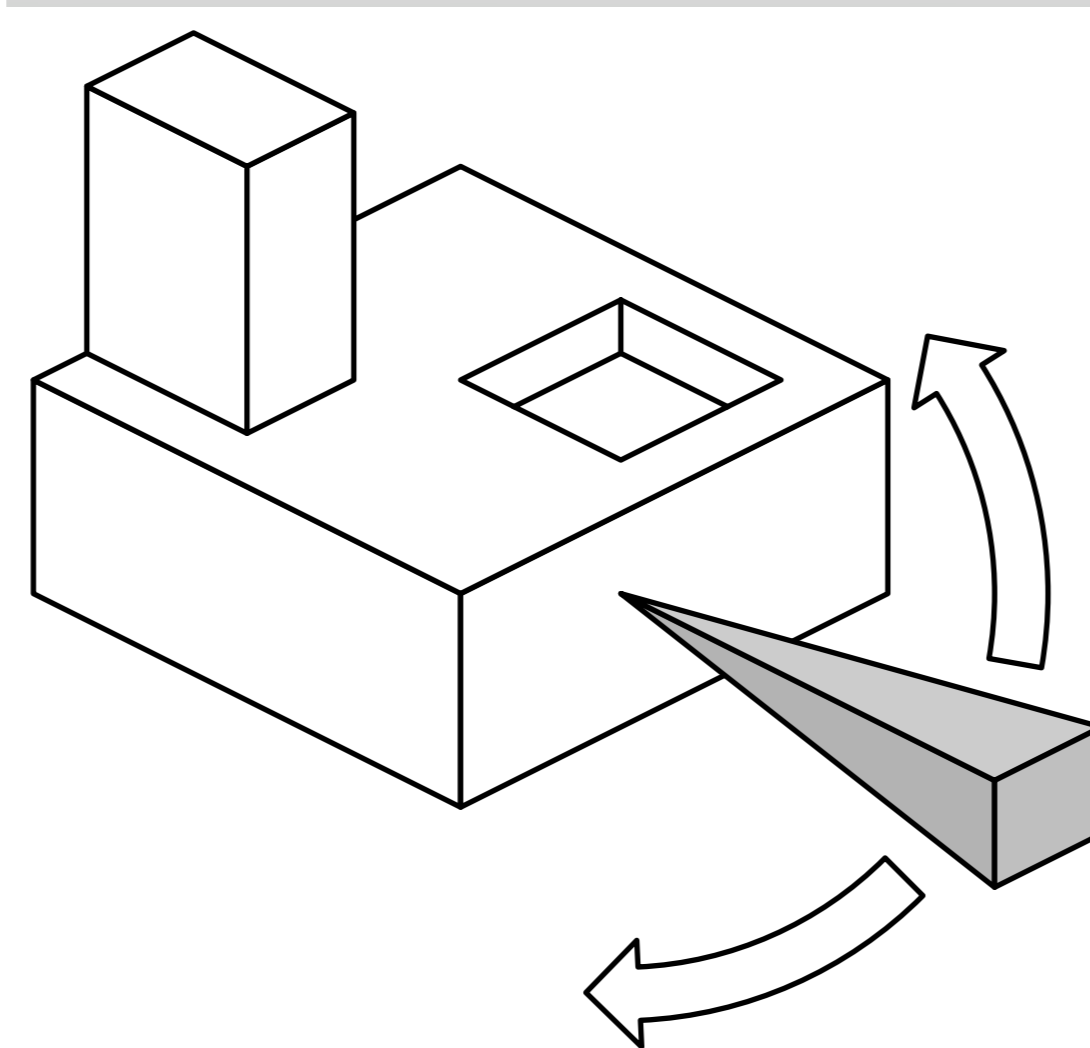


Map stylus movement to translation in camera plane.

3D anchor remains under cursor; depth remains constant.

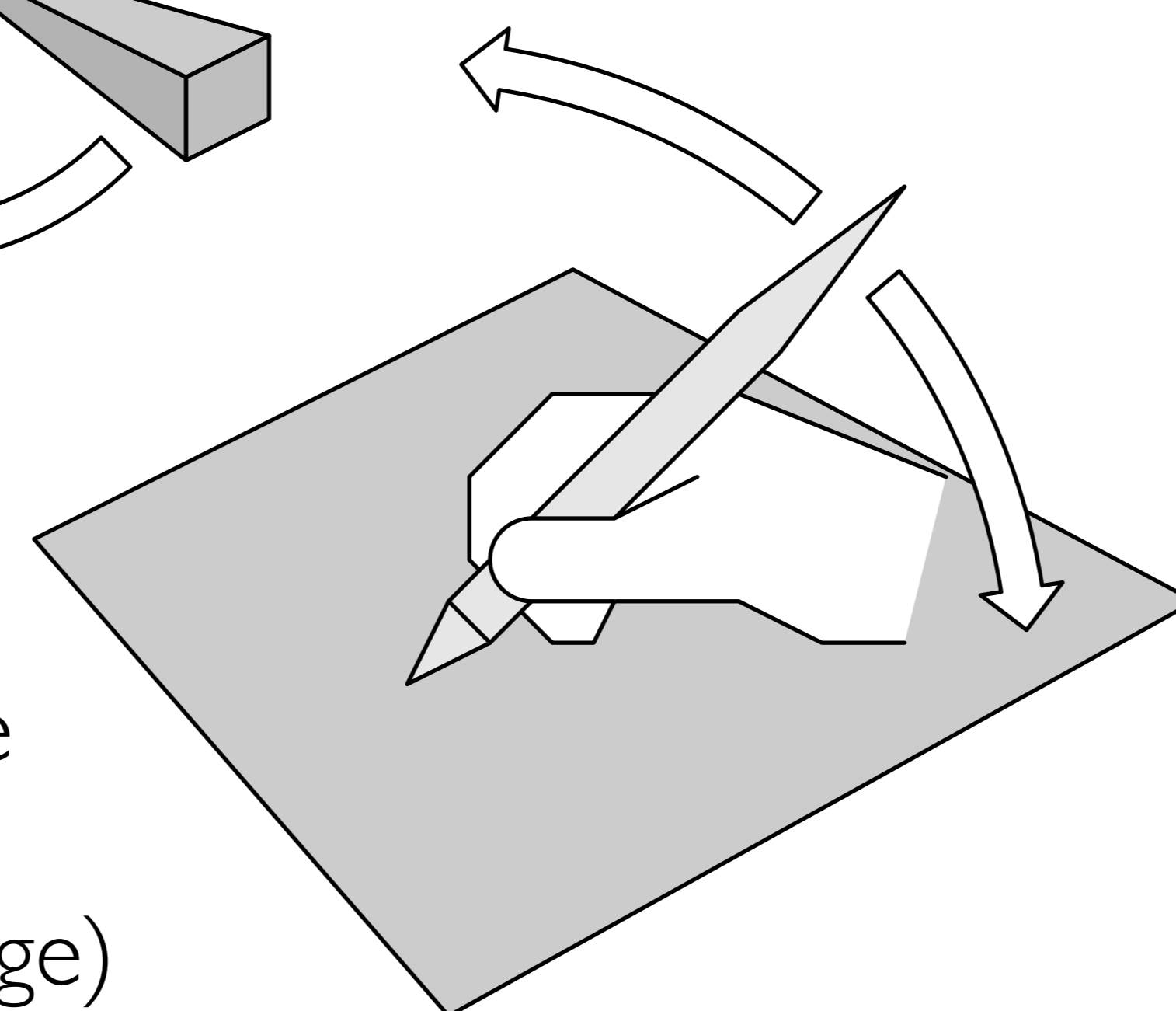


## Rotating



Directly map 2D tilt to 2D rotation

Probably need acceleration to avoid excessive clutching (limited tilt range)

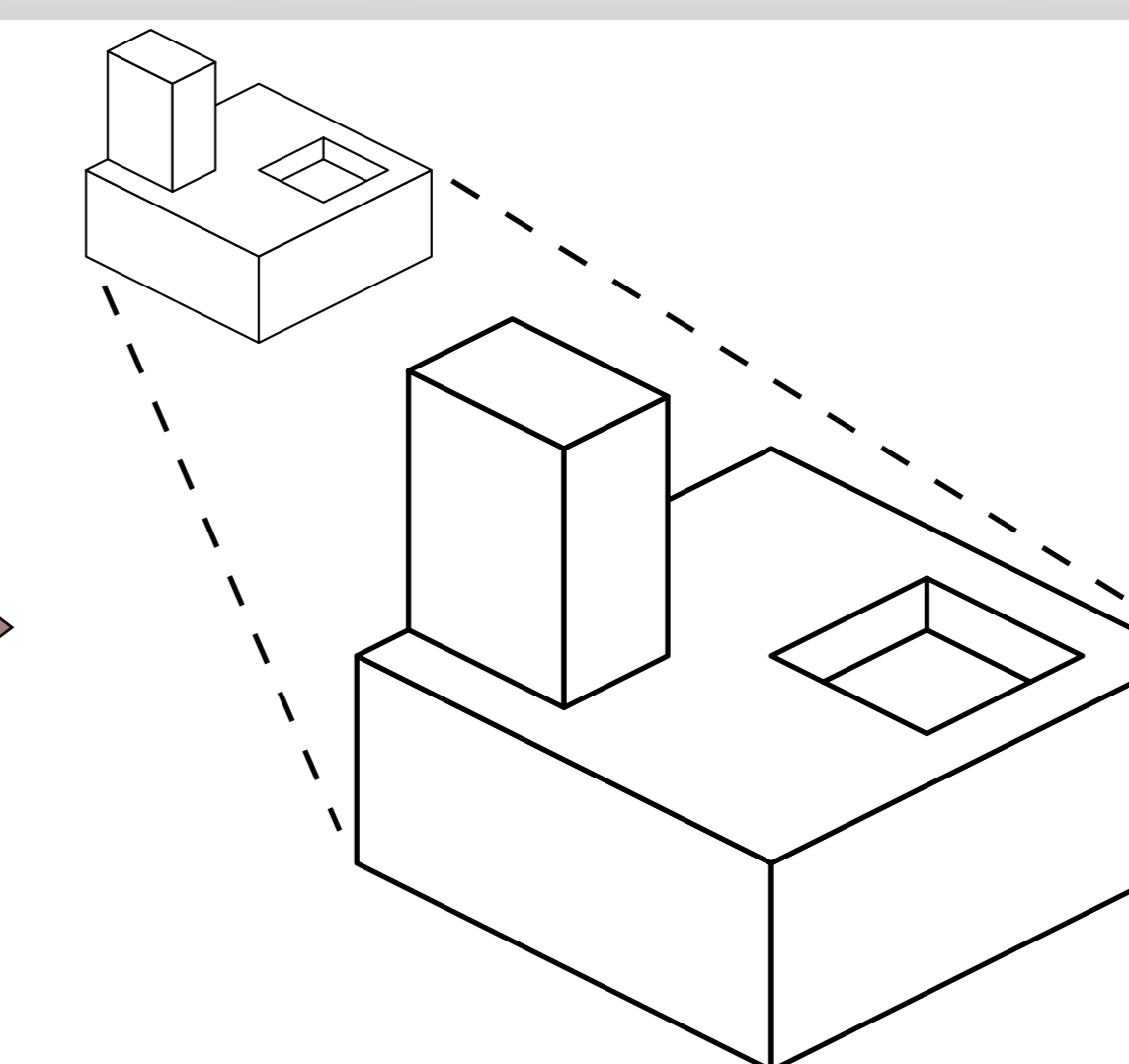


Pressure is used to trigger mode switch: rotate vs. dolly

high pressure

low pressure

## Dollying



Map one tilt axis to dollying: uses **lever** metaphor

Exponential mapping makes the most of tilt range.

