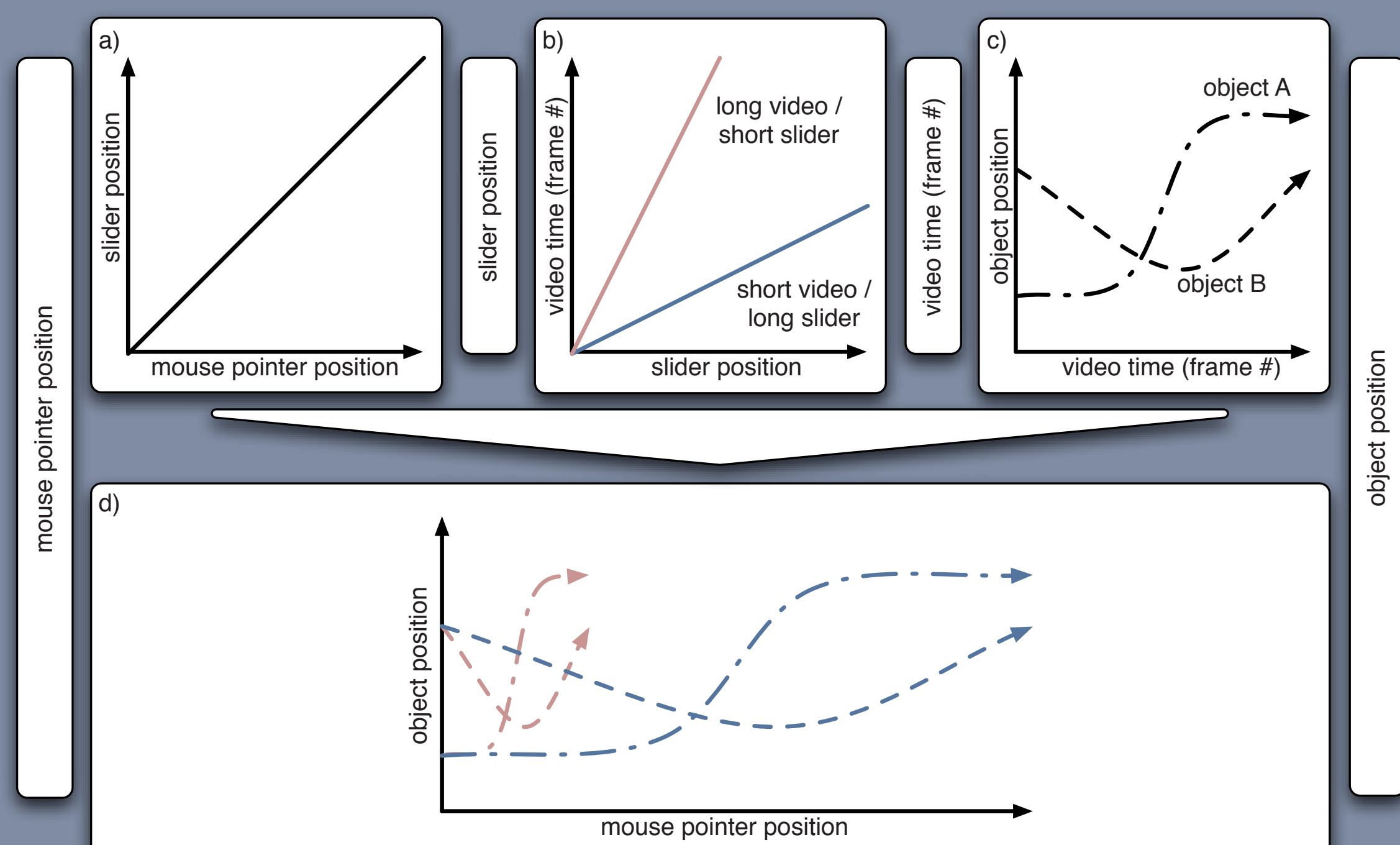


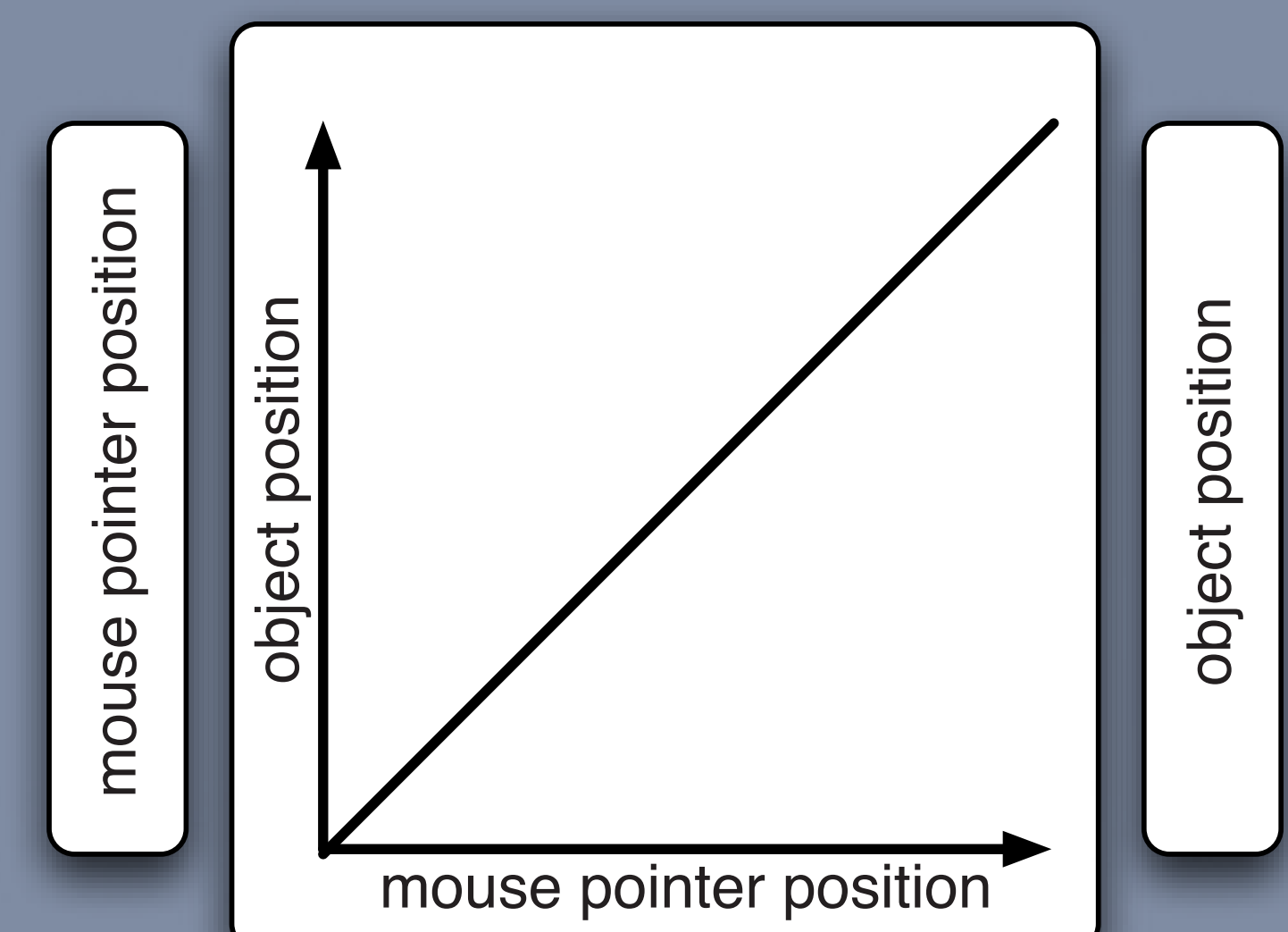
# DRAGON

## Video Navigation with the Timeline Slider is Hard



The mapping between the slider and the position of objects in the scene is non-natural. It depends on the duration of the video, the length of the slider, and the content of the video itself.

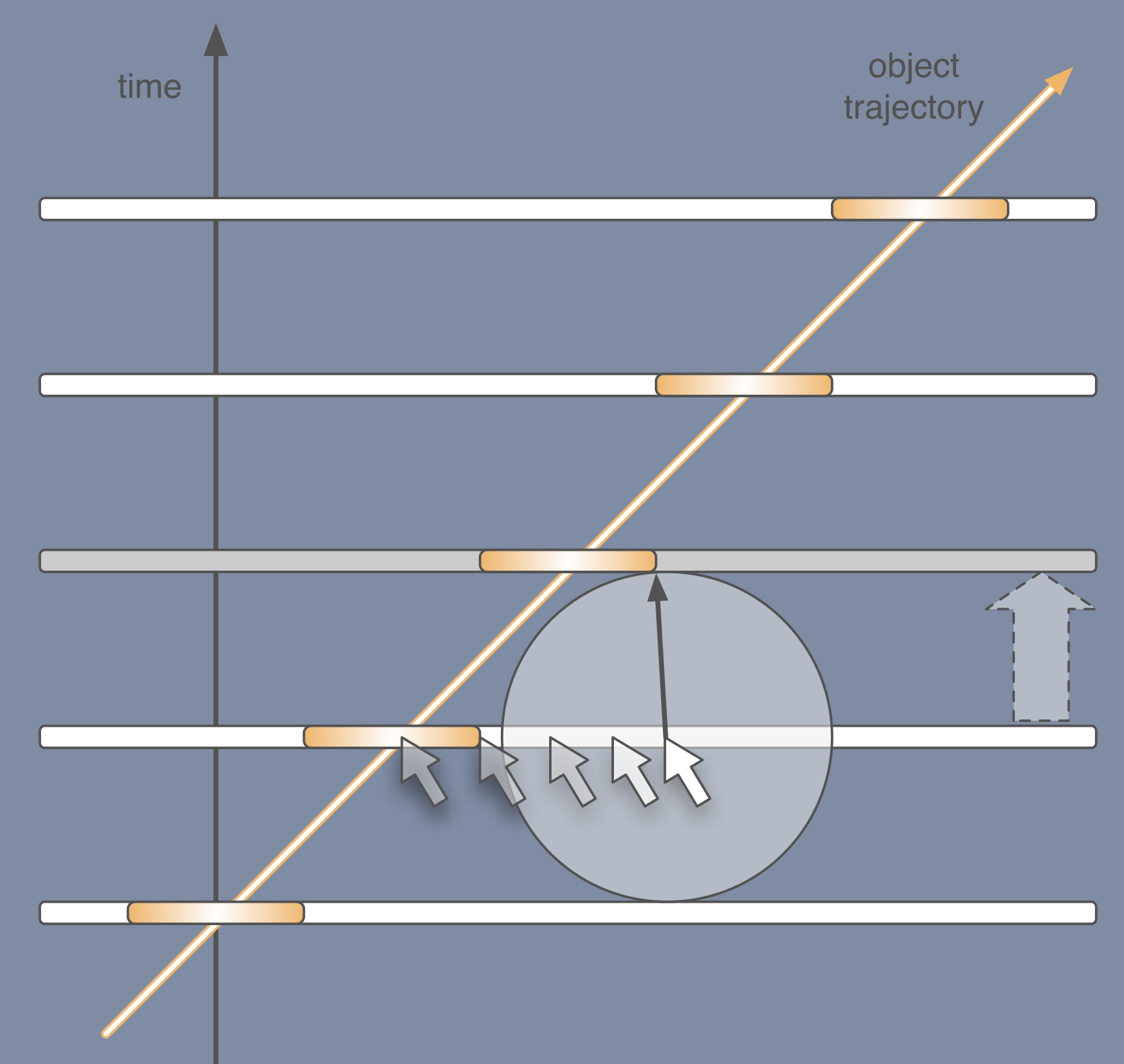
With DRAGON, the mapping becomes very simple: You can control the position of objects in the scene by directly dragging them around. This is what we call Direct Manipulation Video Navigation (DMVN).



## How does it Work?



We measure the motion of each pixel in every frame of the video with a technique called optical flow. This information allows us to reconstruct the motion of every pixel over the whole video scene. When the user clicks on an object, we reconstruct its trajectory through the video and show it on the screen. While the user is dragging the object across the screen, we calculate at which point in the video the object was closest to the mouse position. At the same time we take care not to select points in time that are far away; this ensures that the video does not jump across time during navigation. The user can thus position the object freely along its trajectory and the rest of the video fast forwards or rewinds accordingly.



## Results and Future Work

We could show that using DRAGON, people can navigate video scenes more easily and quickly than with the standard timeline slider. Also, they subjectively preferred using DRAGON.

We extended the concept of DRAGON to other media types and are developing solutions to the limitations of the technique, e.g., when objects are occluded or pause their motion.

