Interactive Session 7: Rendering a Wall

Allison M. Okamura
Stanford University

based on your suggestions…

- Explanation of answers to quiz questions will be added starting now. I will provide prerecorded lecture quiz question summaries before each graded quiz, as I have already done for Quiz 1.

- Changed Panopto quiz settings to not require an answer, is this solving the problem of skipping ahead when re-starting a viewing? (Please answer the quiz questions anyway)

- I will try to get the prerecorded lectures done earlier. If I can get ahead just once, I will hopefully stay ahead! (Unfortunately, didn't make it this week.)

- Panopto video settings: don't use full screen if you want to see Allison's face

- More animations/show by bullet point

based on your suggestions

- Will add more (optional) reading resources

- Moved discussion to piazza!
  Signup Link: piazza.com/stanford/spring2020/me327

- Please make sure your settings in both Canvas and Piazza will allow you to be notified about postings. Announcements will still come through Canvas.

- Zoom study room for class — invite people via piazza using the "study_room" folder

- Also use piazza's "search for teammates" function

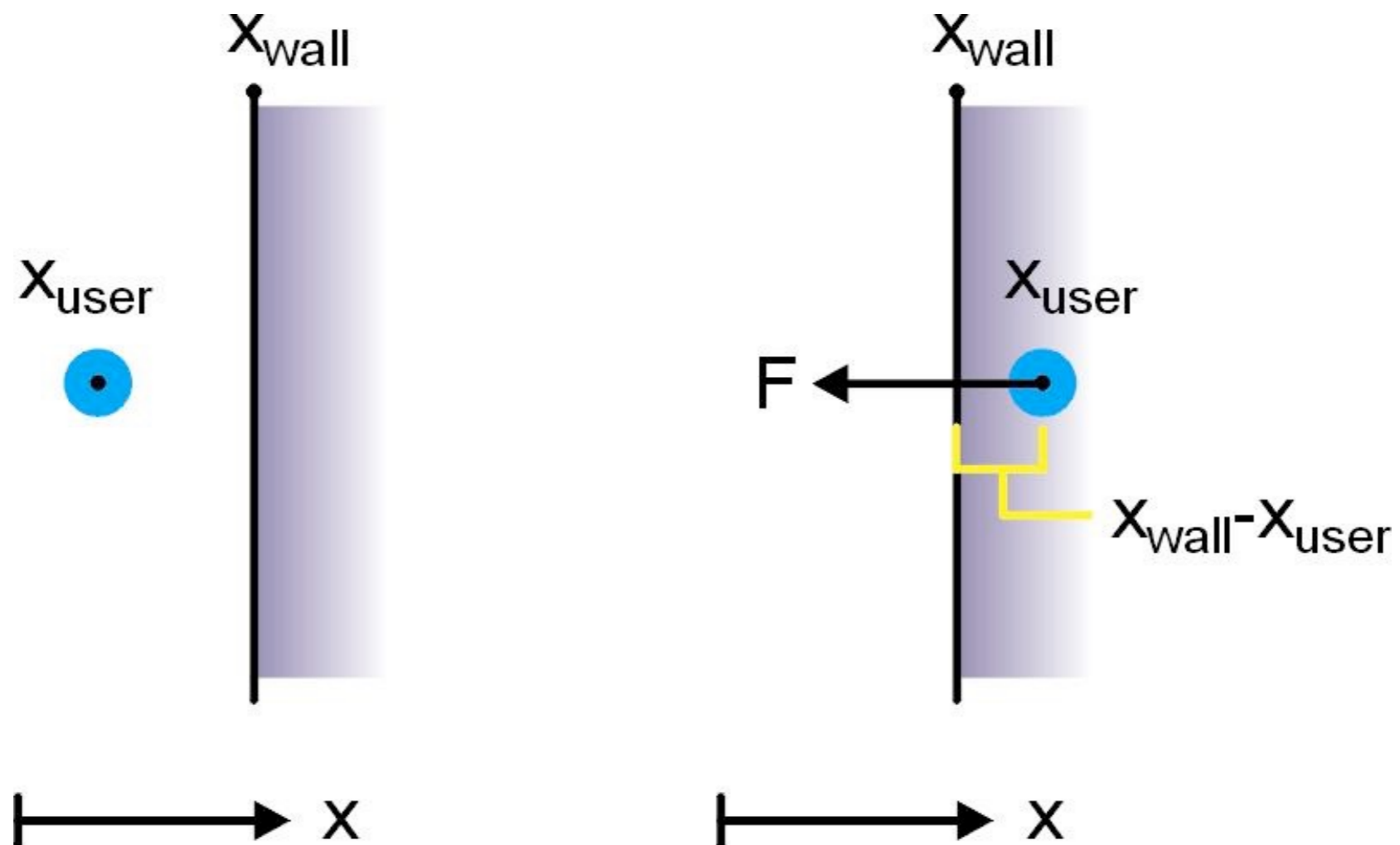- and… dedicated time to answer questions from prerecorded videos!

Questions from prerecorded video?

rendering a wall
(in one degree of freedom)

rendering a simple wall

$$\text{If } x_{user} > x_{wall}, F = k(x_{wall} - x_{user})$$
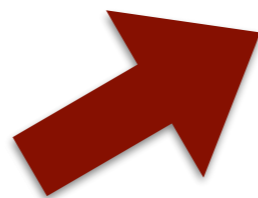
$$\text{stiffness } k > 0$$

discussion in breakouts

in what ways does this algorithm feel like a real wall?

in what ways does it not?

how could you make it feel more like a real wall?

to answer the last question, go to pollev.com/haptics

or

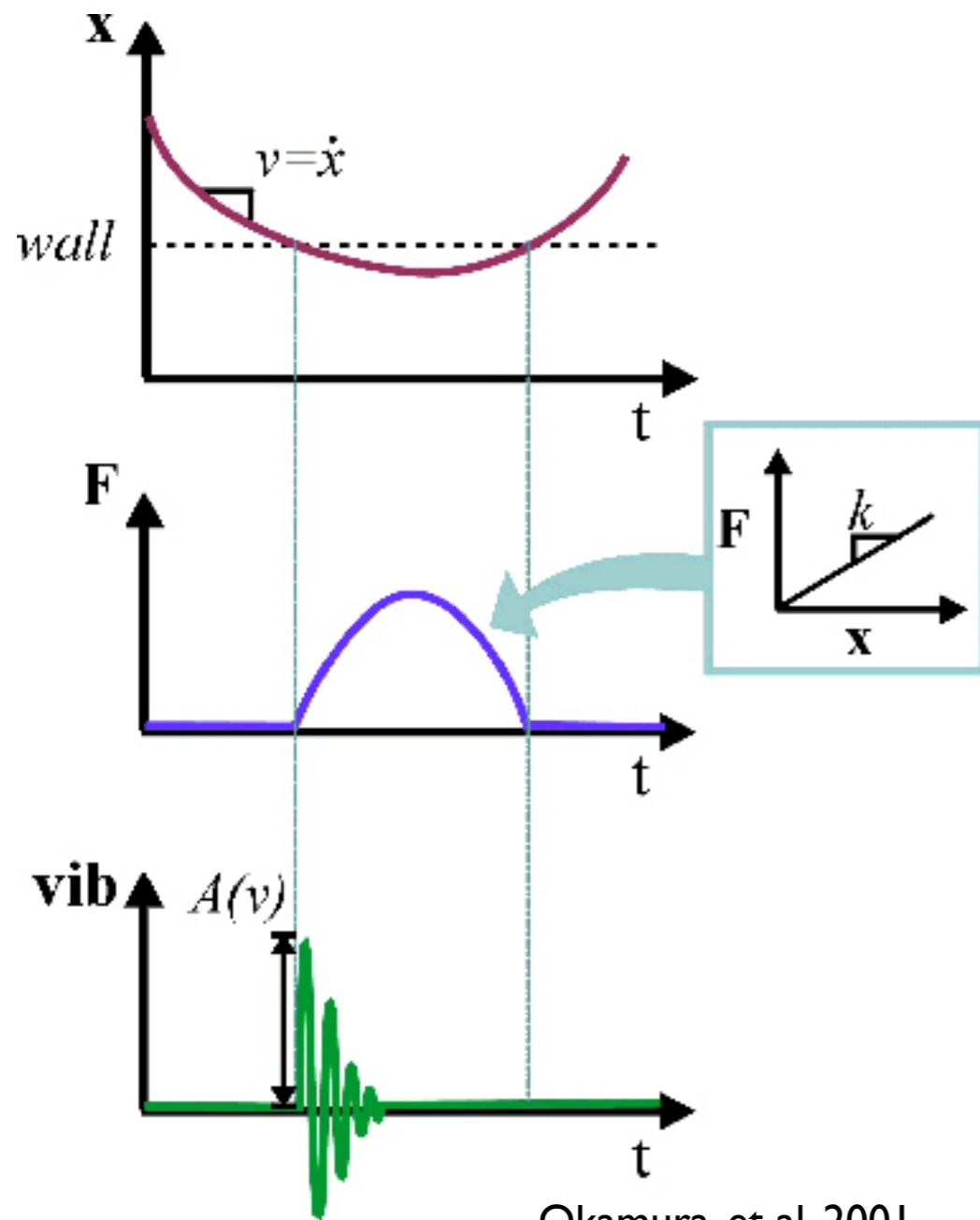text **haptics** to 22333 once to join and then text your response

(one favorite answer per breakout group)

visual feedback of stiffness
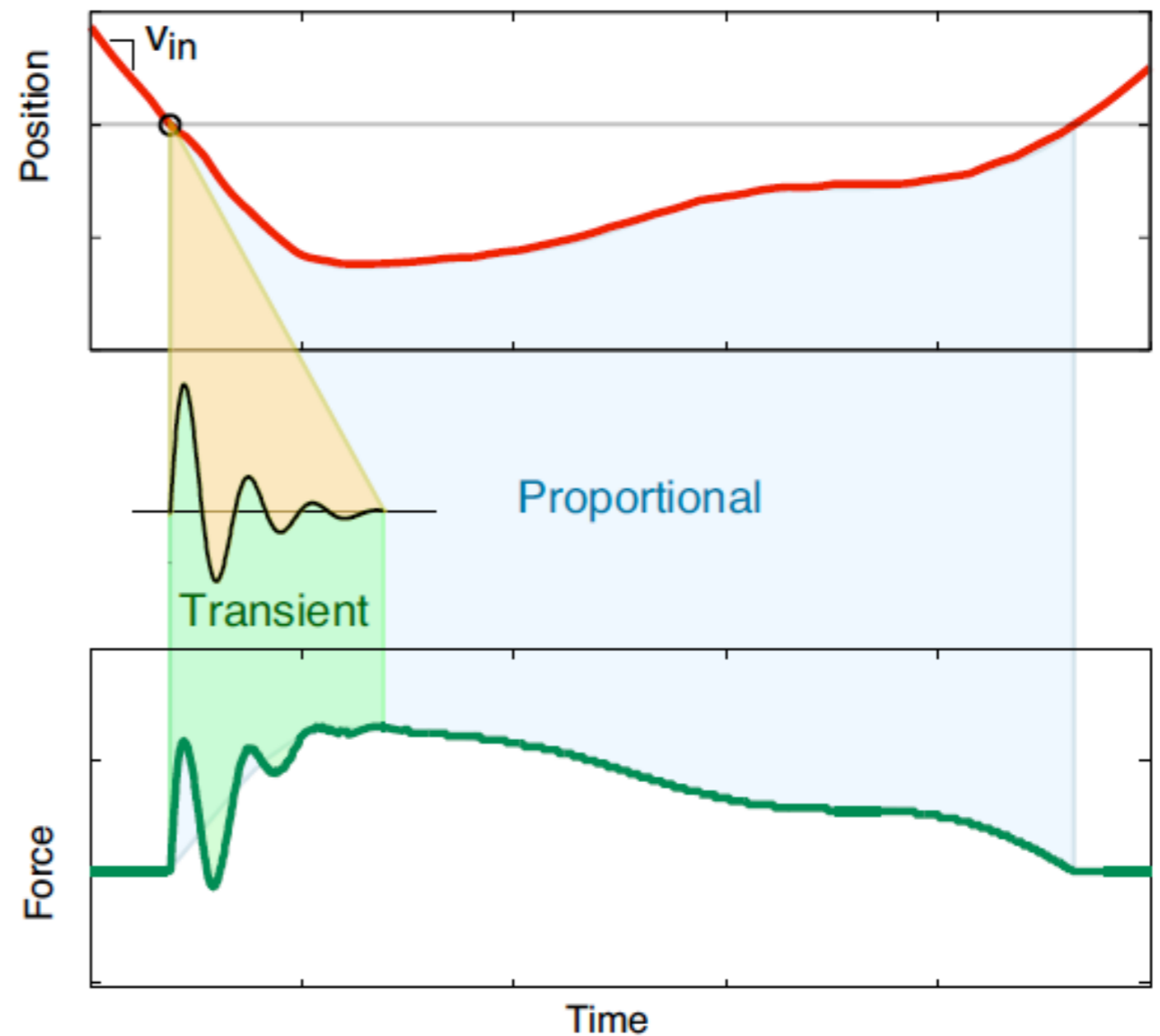
Actual:

X_{wall}

X_{user}

- trick: never show the point penetrating the surface, even if it is

- psychophysical studies have shown that this makes the surface appear stiffer/harder

Visual display:

X_{wall}
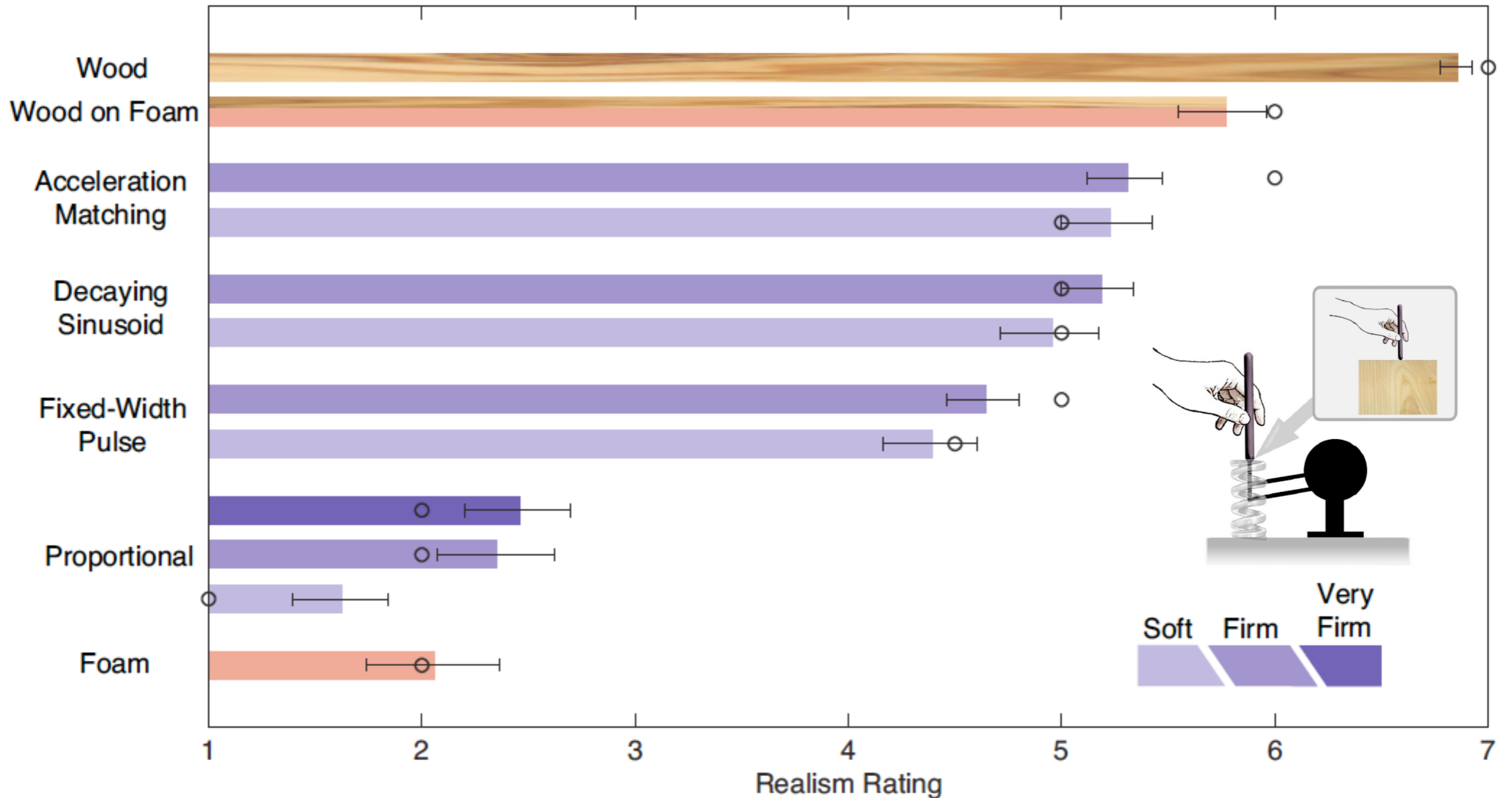
X_{user}
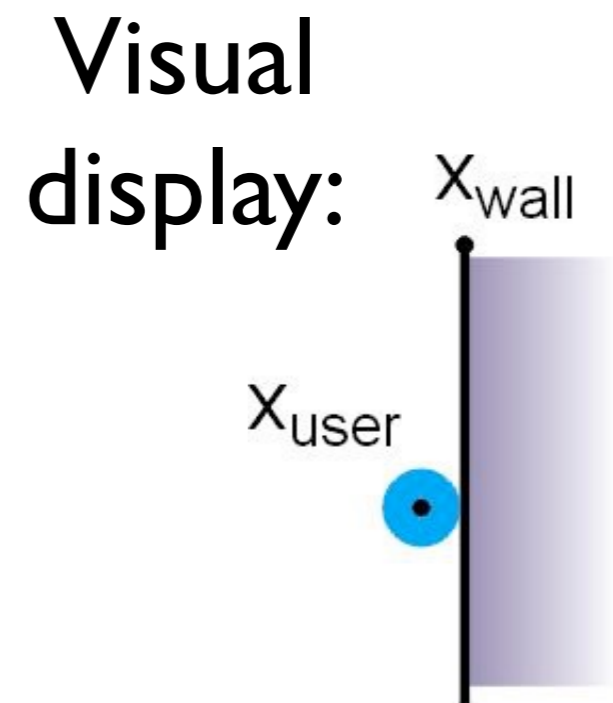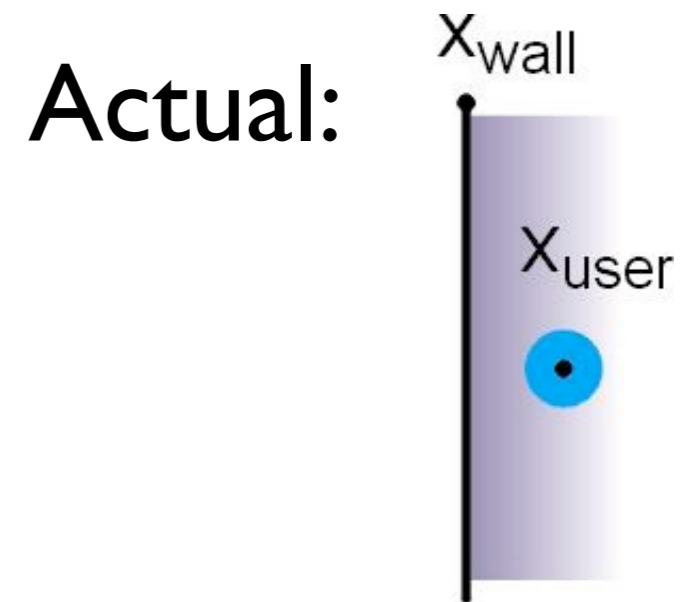
displaying impact vibrations

Okamura, et al. 2001

Kuchenbecker, et al. 2006

wall realism evaluation

Realism Rating

Kuchenbecker, et al. 2006

kinesthetic device challenges

- competing goals of high stiffness and low mass

- force feedback feels soft ("Nerf World")

- point-based interactions are overly simple

- devices of sufficient quality are expensive

- limited workspace size, degrees of freedom, and actuation power

- usually constrained to sit at a desk

- no programmable tactile feedback

Reminders:

Assignment 3 due this Thursday
(no late submissions allowed due to solutions being posted immediately after deadline)

Quiz 1: 60 minutes,
taken online any time on Friday, May 1

Office Hours/Q&A with Allison until 10 am.
Question queue (see tab with today's date):
https://tinyurl.com/HapticsAllison