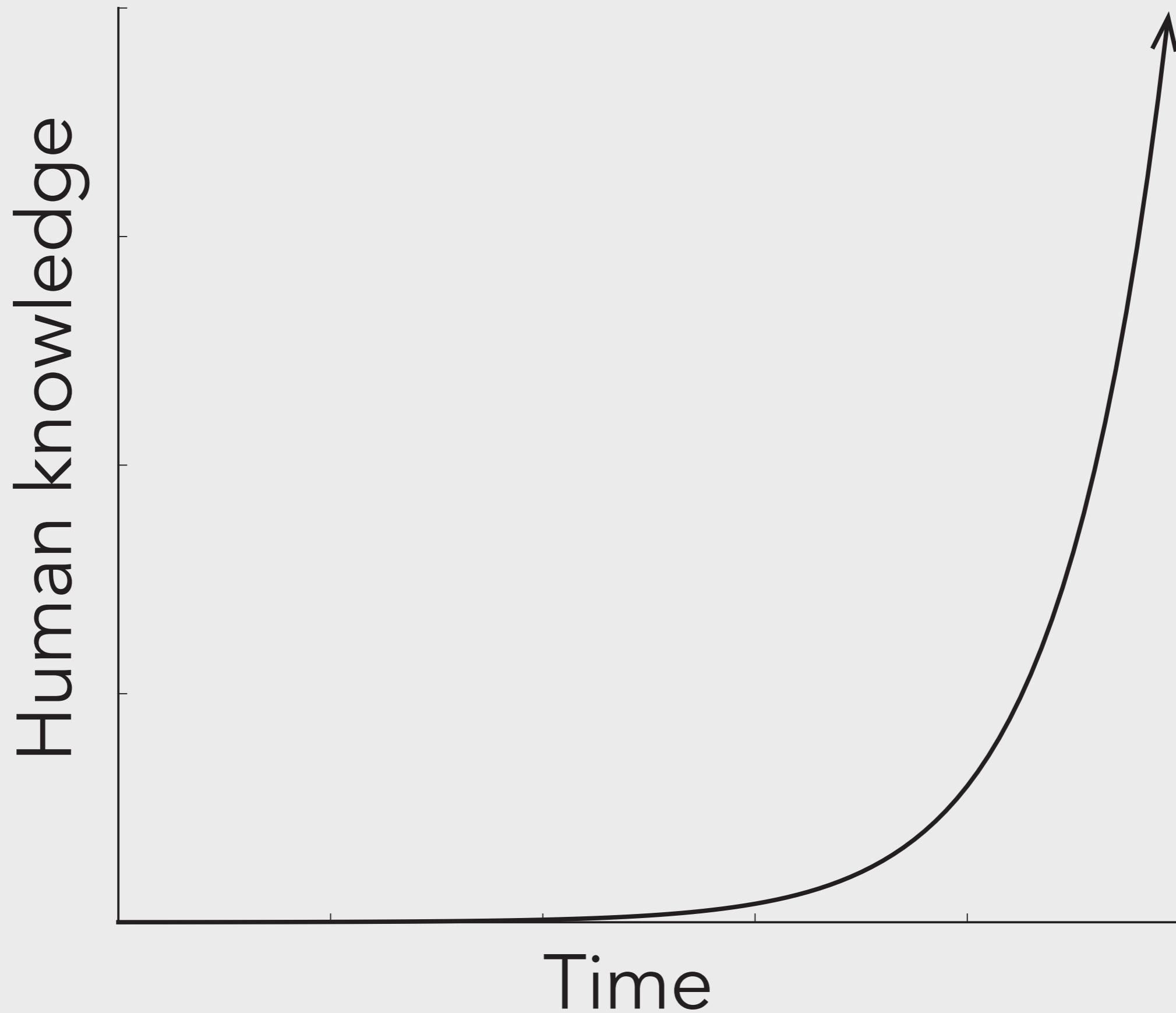


Can we improve real-world learning using scalable AI teachers?

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Imagine you could (in a few hours)...

- Become conversational in a new language
- Memorize several textbook-sized chunks of information
- Learn an undergraduate degree's worth of material
- Learn a doctorate's worth of material

What are our learning bottlenecks?

- Limits on how fast we can perceive?
- Limits on attention?
- Limits on rates of encoding?
- Limits on retrieval?
- Barriers to communication?
- Idea: align what you're best able to learn with what would most help you achieve your learning goals

Towards an optimal AI teacher

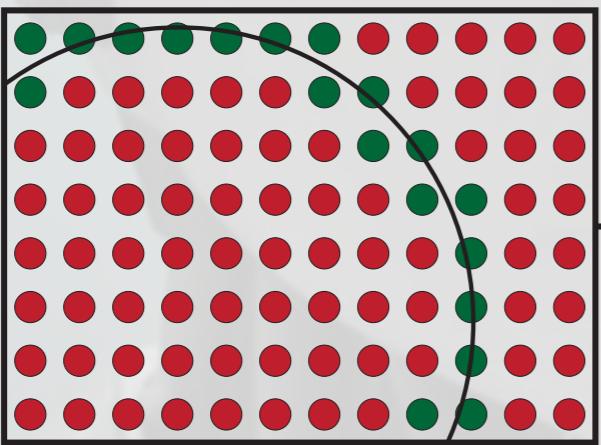
- **Build at scale:** generalize to (nearly) all things people might want to learn
- **Leverage existing content:** minimize burden on (human) teachers by drawing content from existing online course materials
- **Minimize learner effort:** learning should be relevant, easy, and fun

How might an optimal AI teacher work?

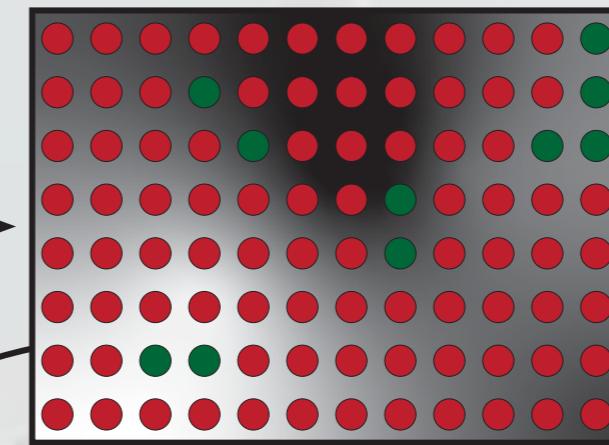
- Keep track of learning goals and dependencies
- Continually update estimates of knowledge (what you already know) and learning potential (how easily you could learn specific new stuff)
- In each new moment, teach you whatever will get you closest to your goal

How might an optimal AI teacher work?

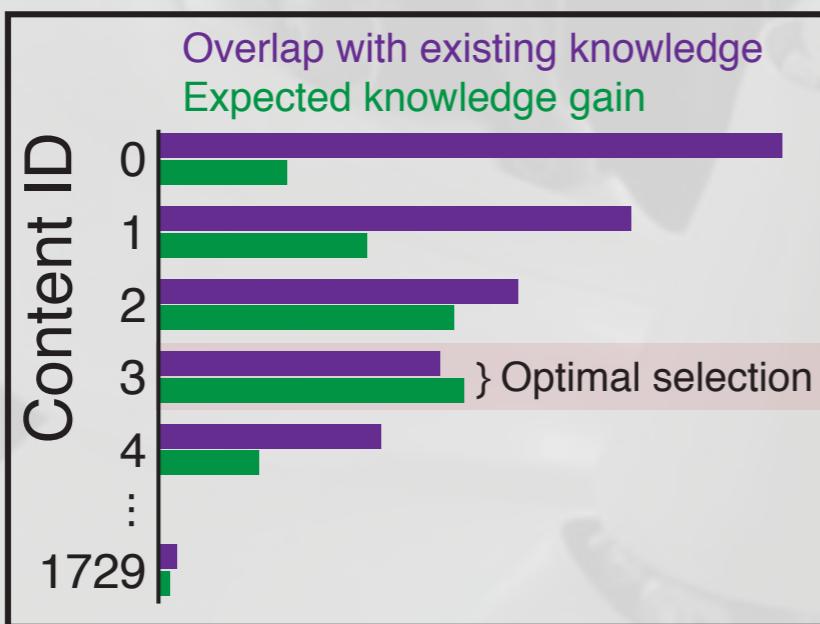
Select learning goal



Map knowledge and learning



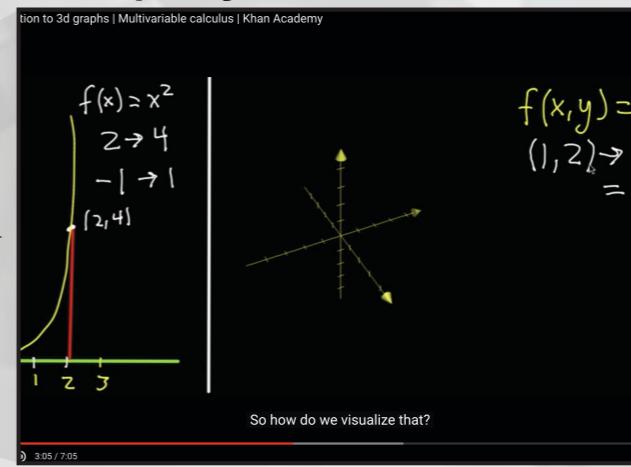
Update model



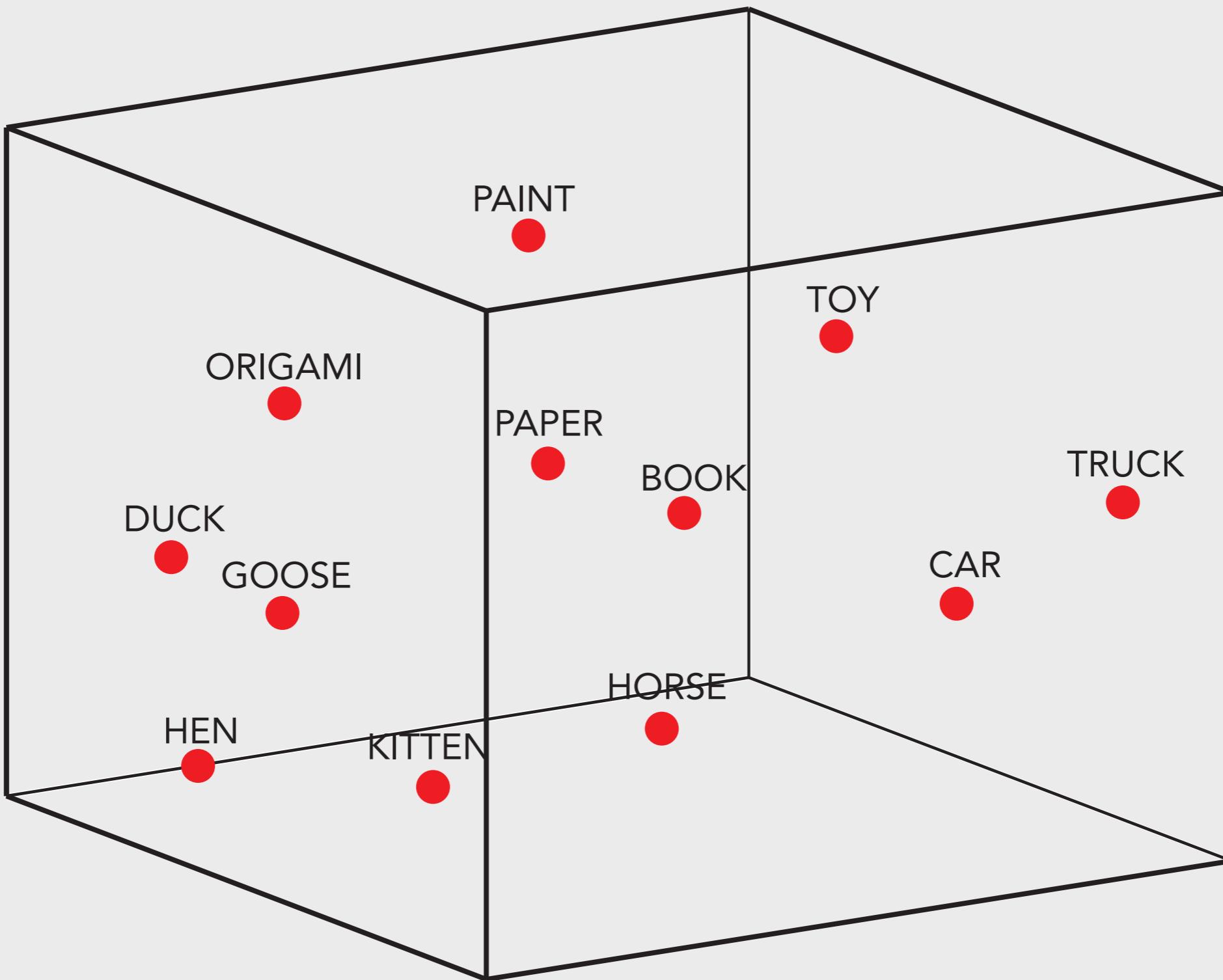
STOP



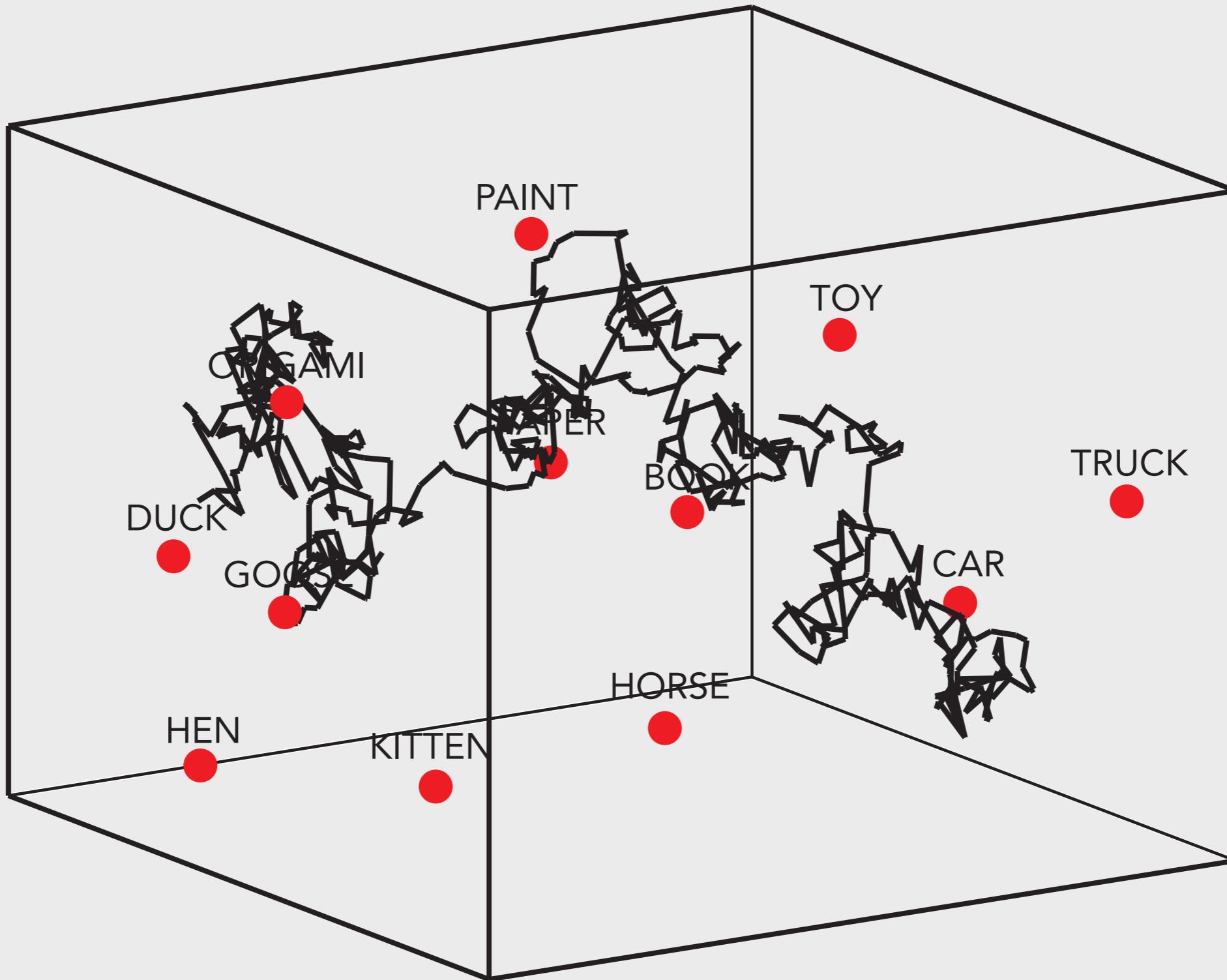
Display next content



Thought space

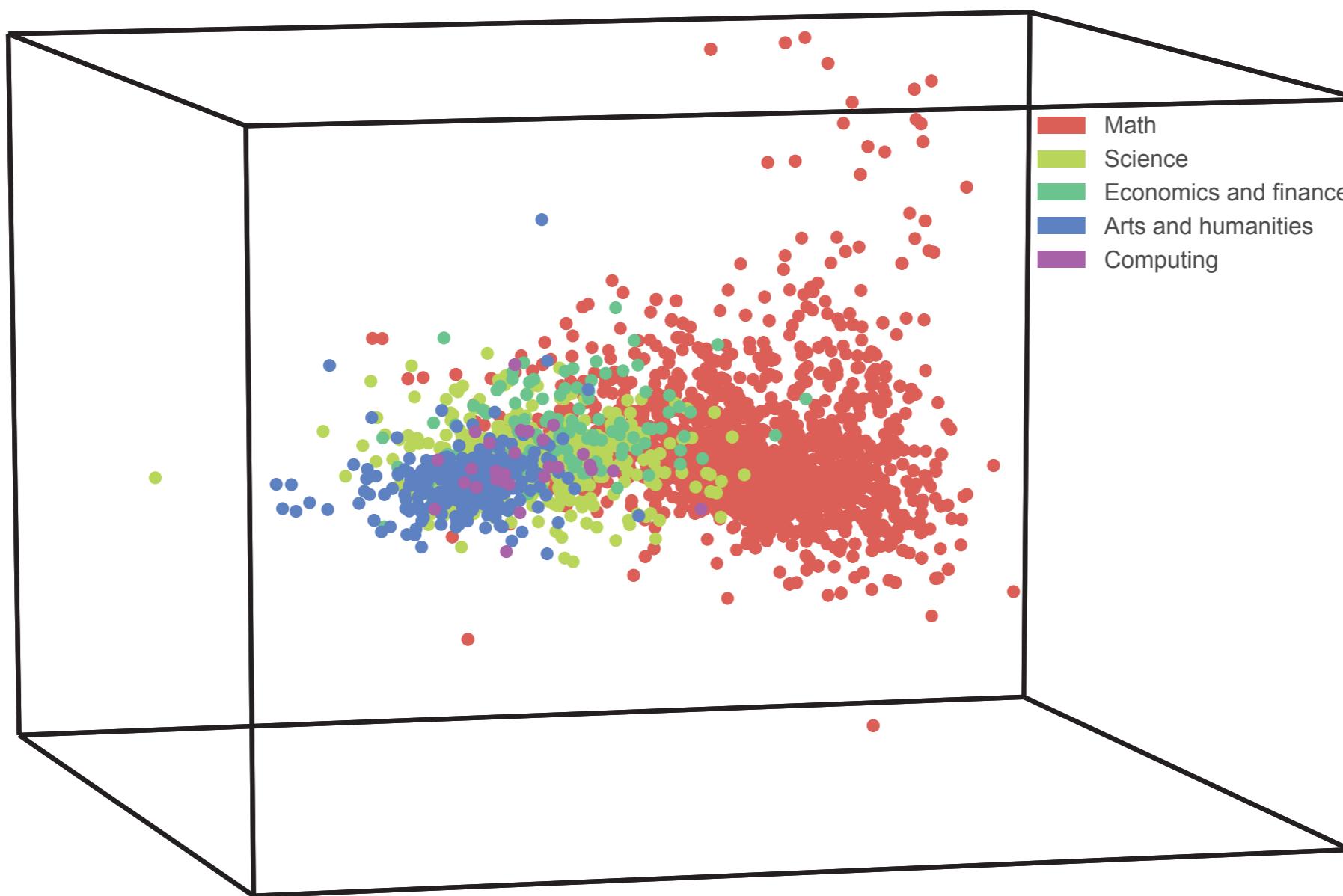


Thought trajectory



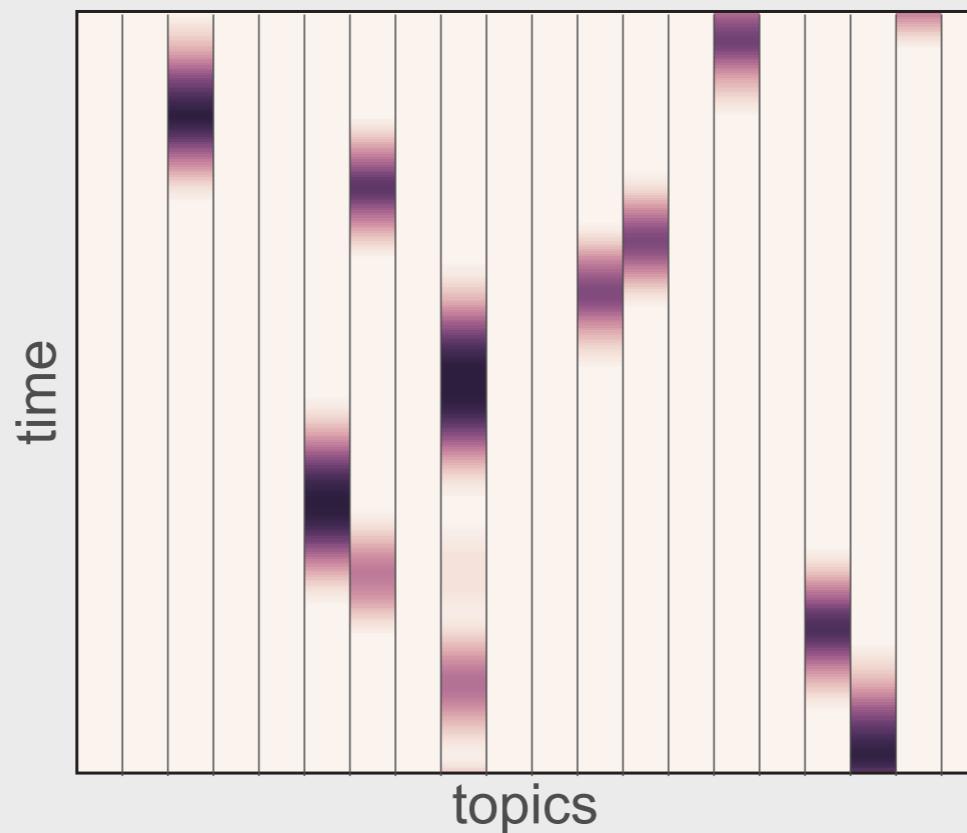
Modeling Khan Academy content

All courses



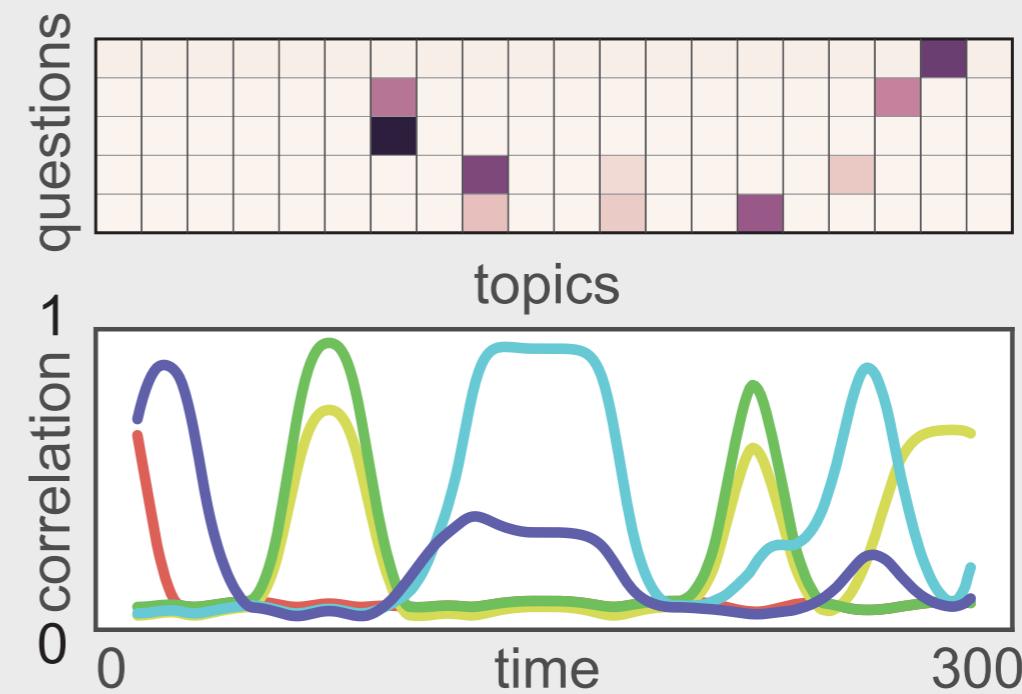
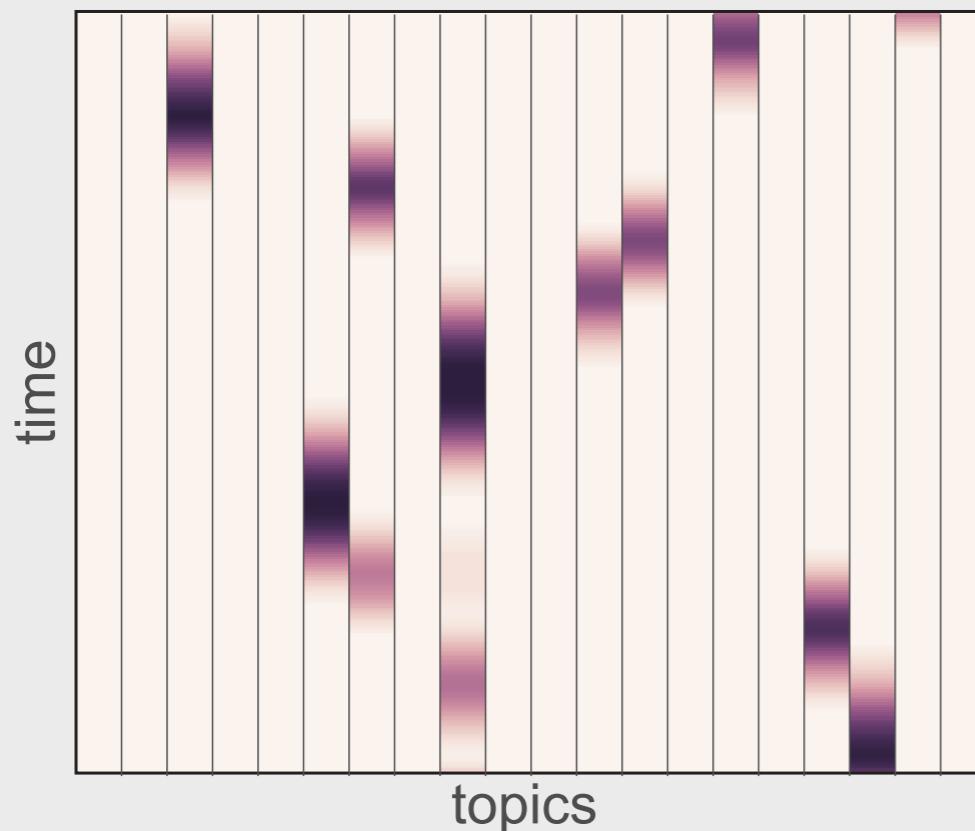
Modeling Khan Academy content

Single video (dynamic)



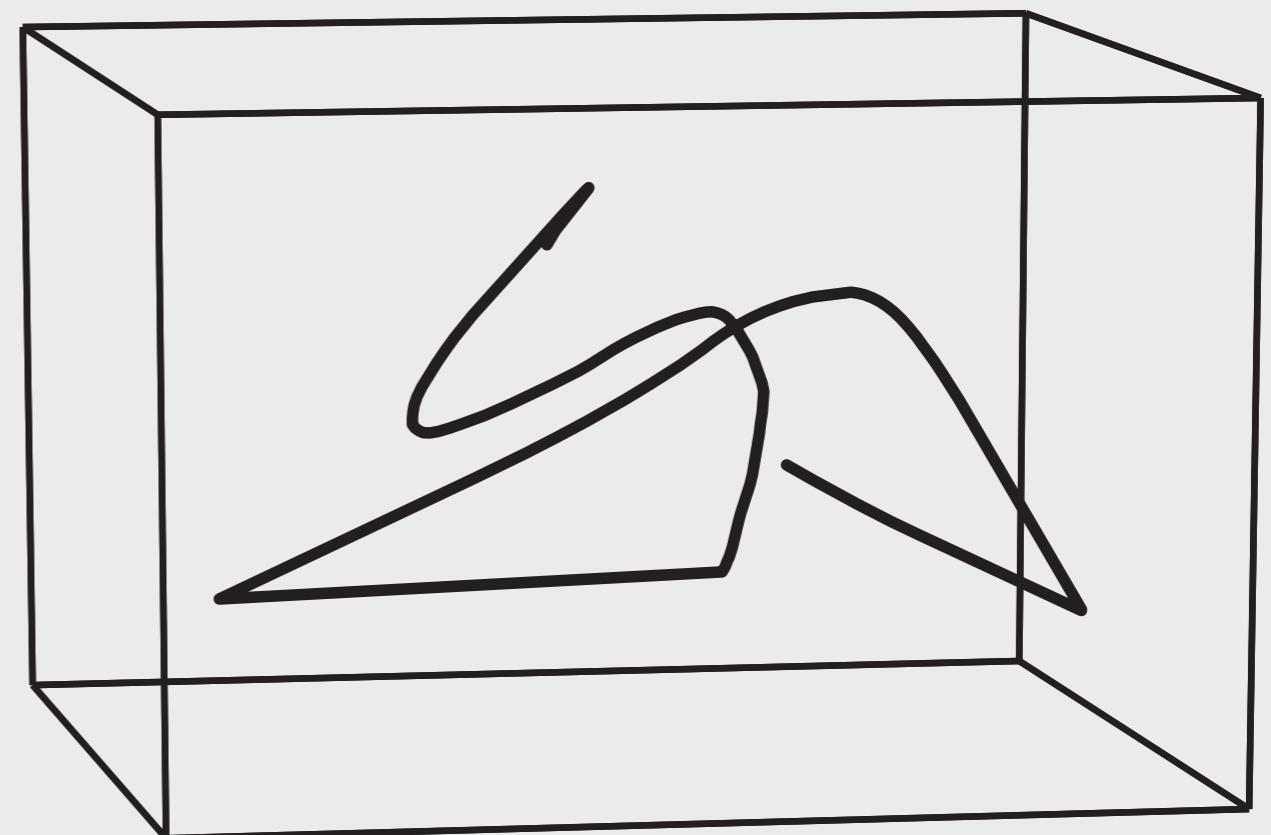
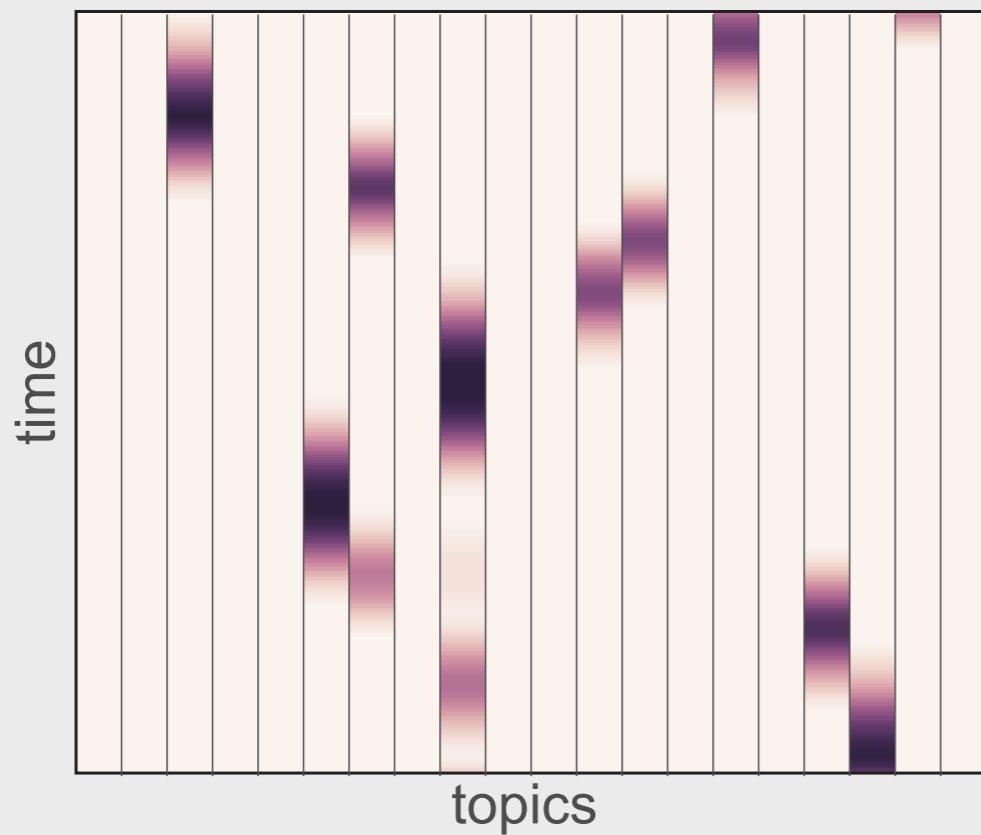
Modeling Khan Academy content

Single video (dynamic)



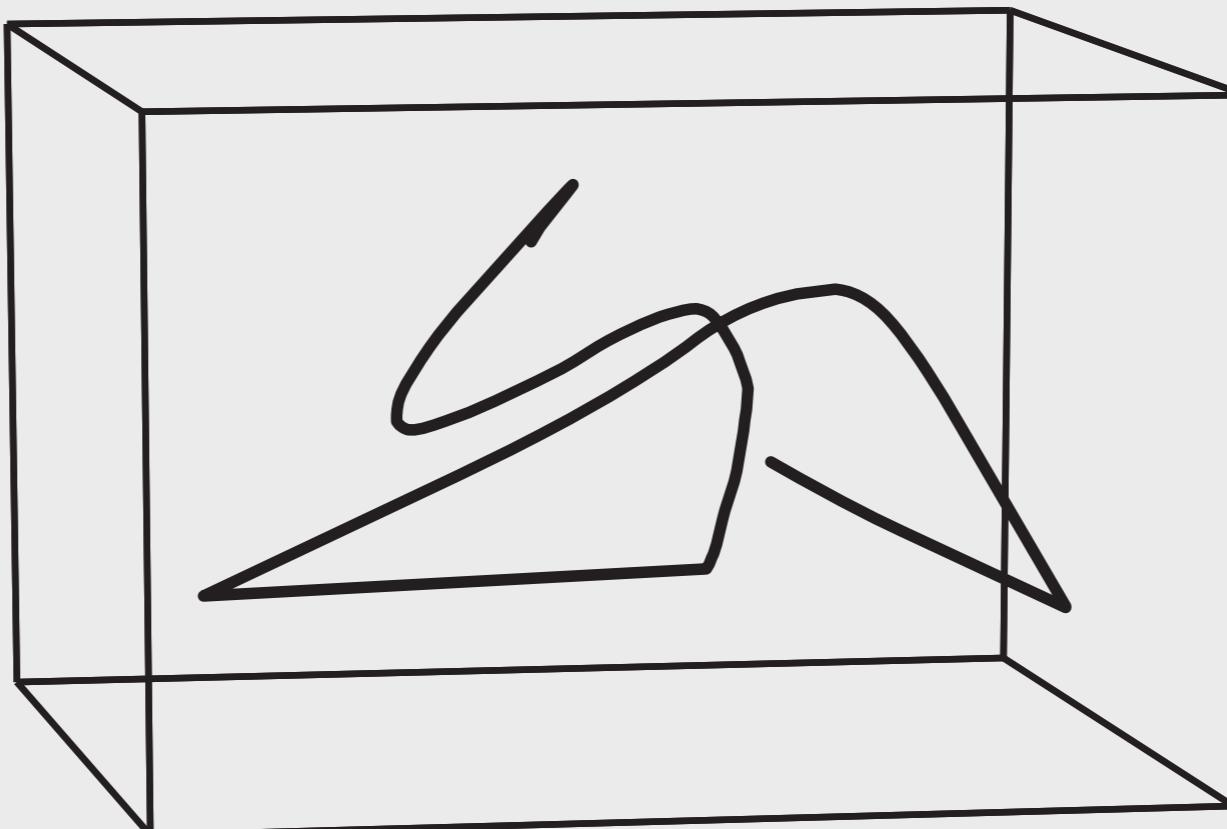
Modeling Khan Academy content

Single video (dynamic)



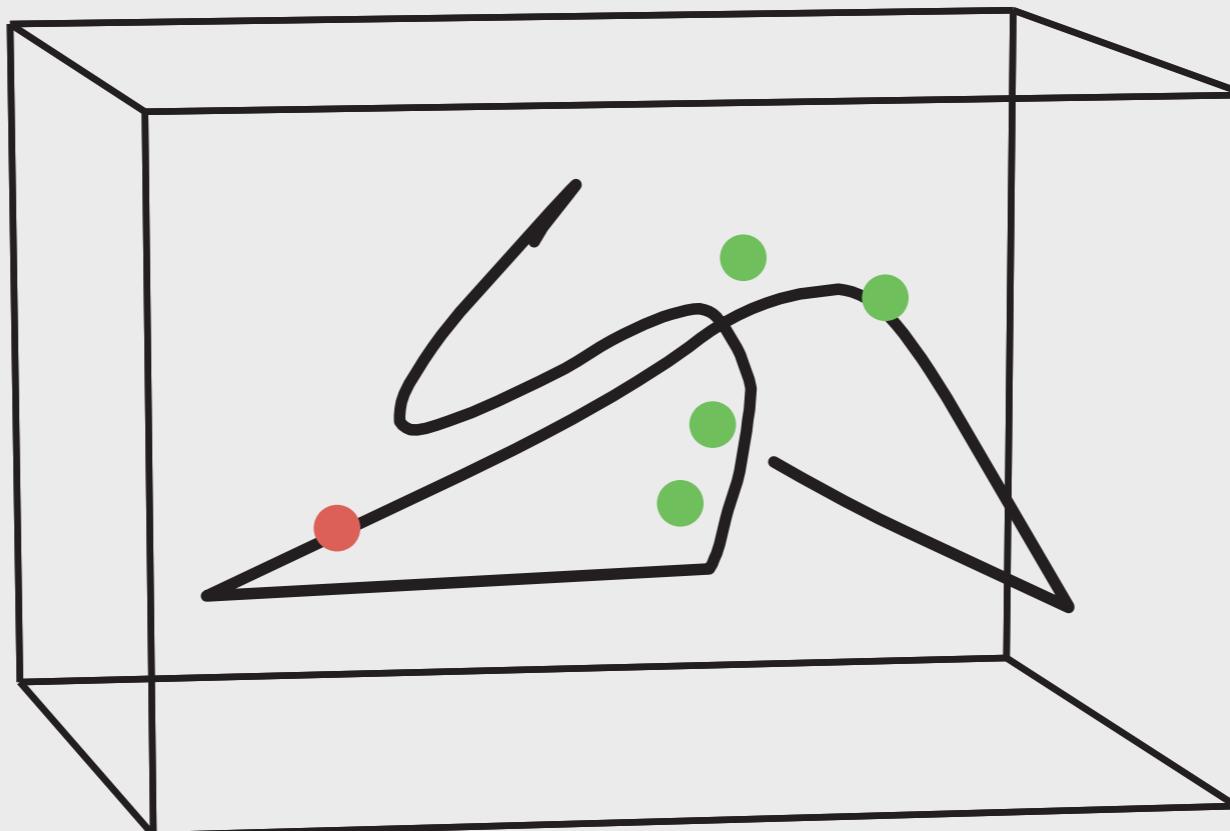
Modeling Khan Academy content

Single video (dynamic)



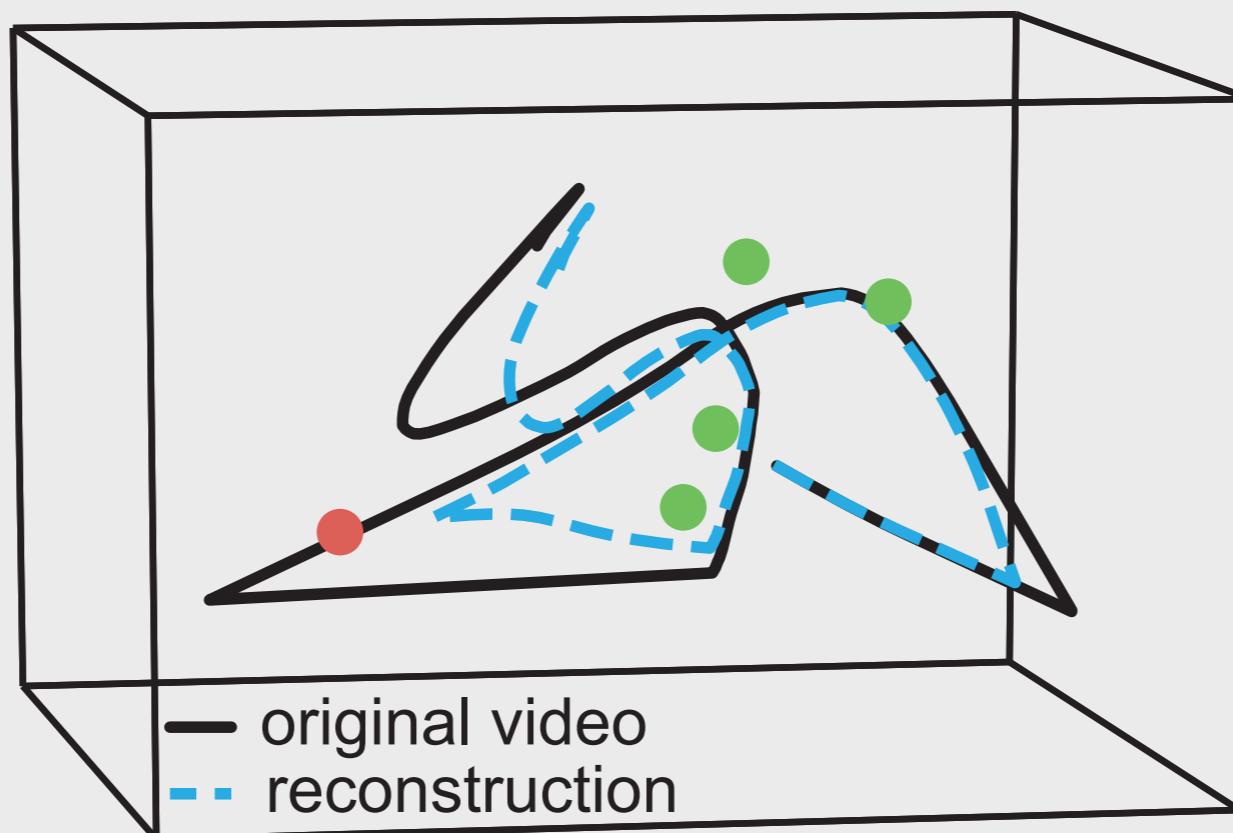
Modeling Khan Academy content

Single video (dynamic)

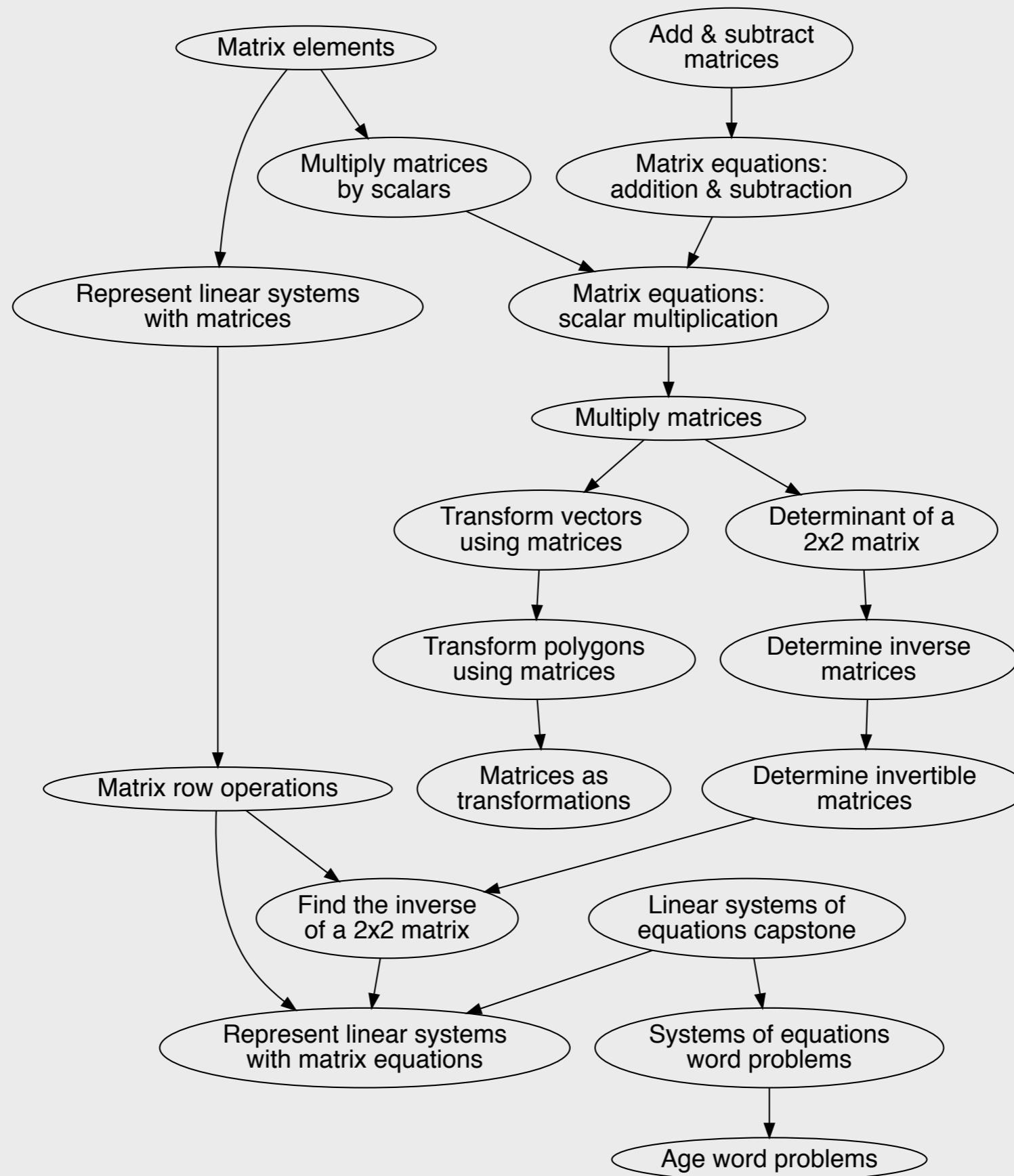


Modeling Khan Academy content

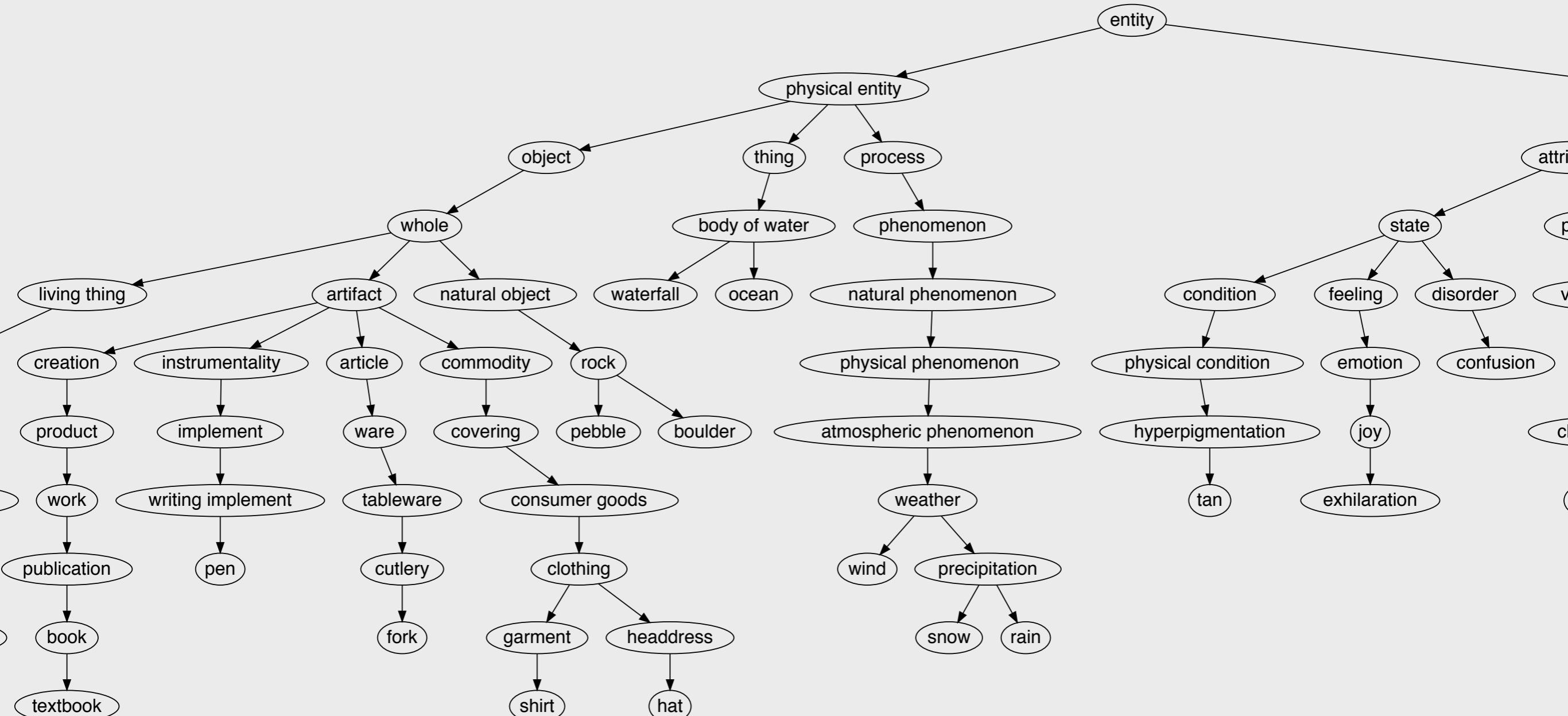
Single video (dynamic)



Knowledge dependencies



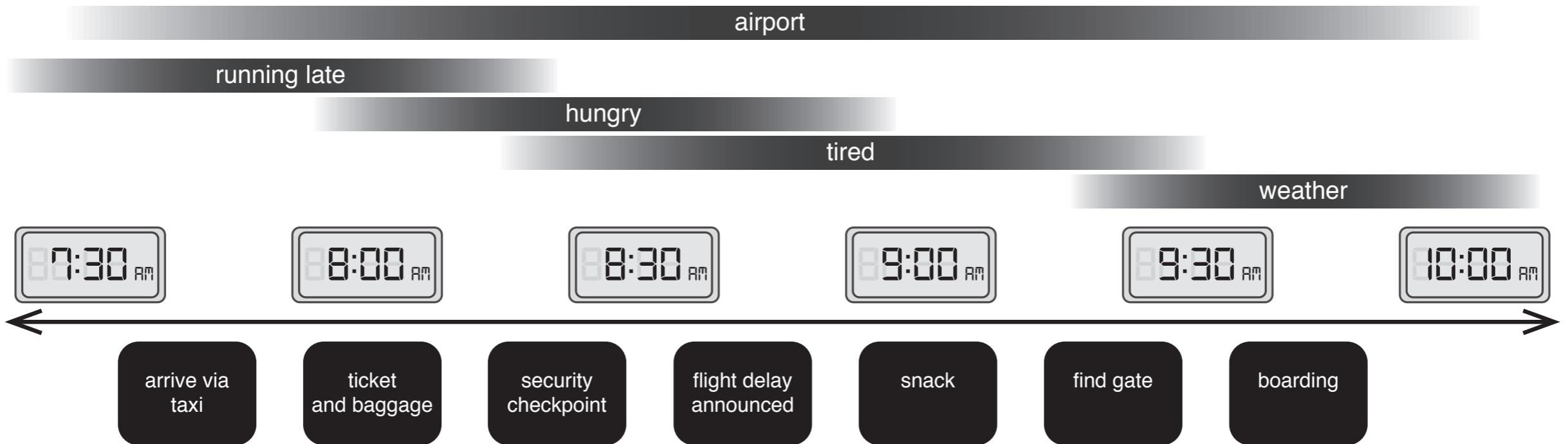
Hierarchical semantic maps



Hierarchical spatial maps



Hierarchical temporal maps



Summary

- We can build “**thought spaces**” for continuous course videos that capture their dynamic content
- We can estimate the **dynamics of learning** using quiz questions (or brain activity!)
- This allows us to estimate **out-of-sample** knowledge and learning
- Future: **leverage these predictions** to tweak which parts (of which videos) we show someone at each new moment

Contextual Dynamics Lab

www.context-lab.com



Jeremy Manning



Andy Heusser



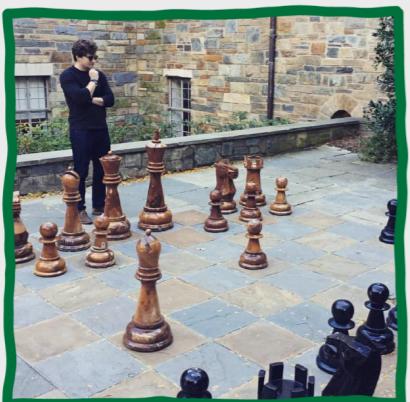
Kirsten Ziman



Lucy Owen



Paxton Fitzpatrick



Max Bluestone



Deepanshi Shokeen



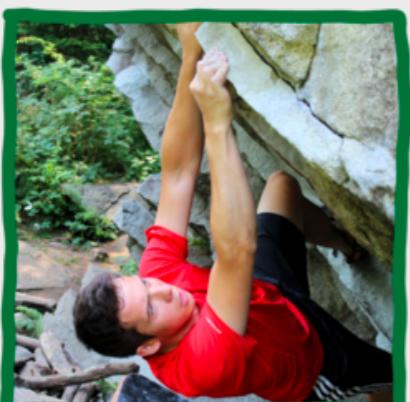
Maddy Lee



Alex Martinez



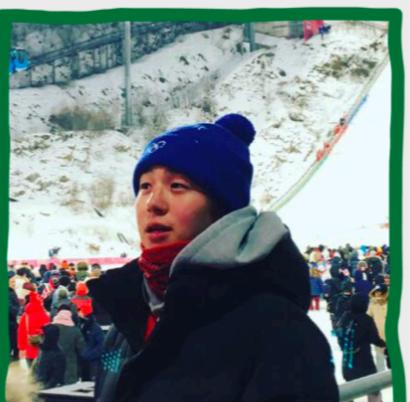
Will Baxley



Tudor Muntianu



Aaron Lee



Shane Park



William Chen

