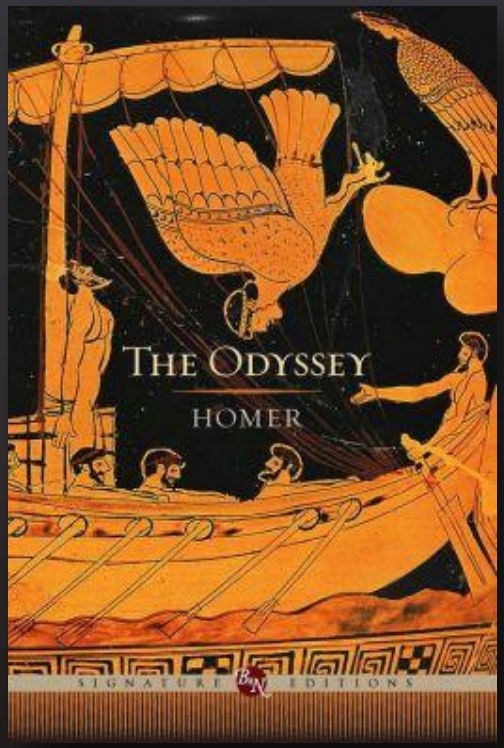
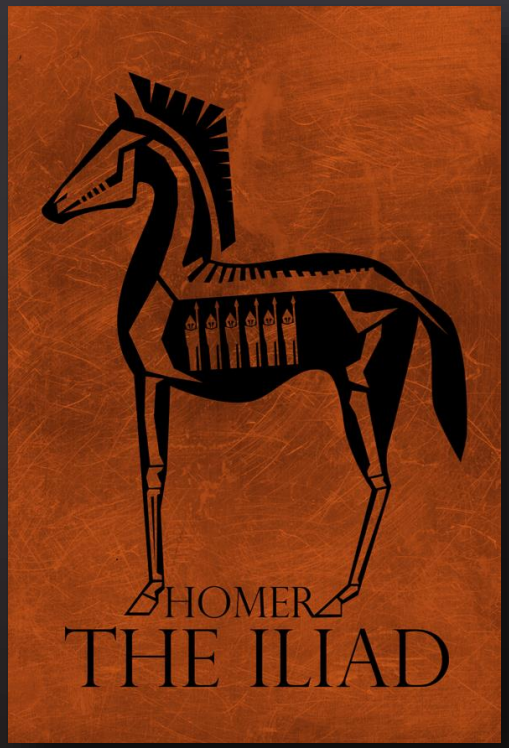
Scientific Narrative

Humans understand complex information via narrative



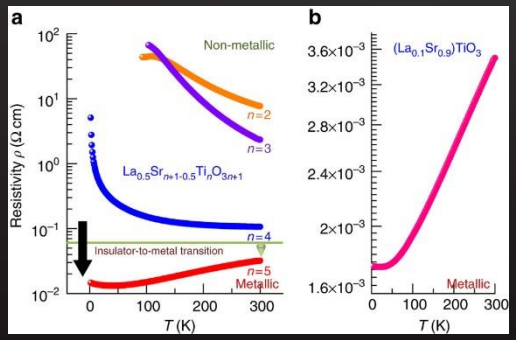


Every talk, paper, poster, thesis, etc. should tell a story!

A narrative is not a recipe / report

1 lock-in amplifier
3 RG-58 cables
1 oscilloscope
1 function generator
1 sample

1. Connect amplifier, function generator, scope
2. Scan current, measure voltage, vary T



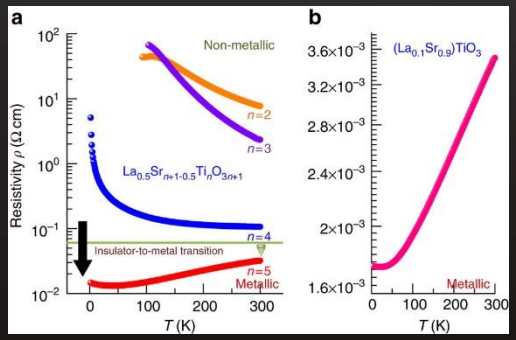
Conclusion: The insulator-metal transition is driven by dimensionality

A narrative is not a recipe / report

1 lock-in amplifier
3 RG-58 cables
1 oscilloscope
1 function generator
1 sample
0.5 student

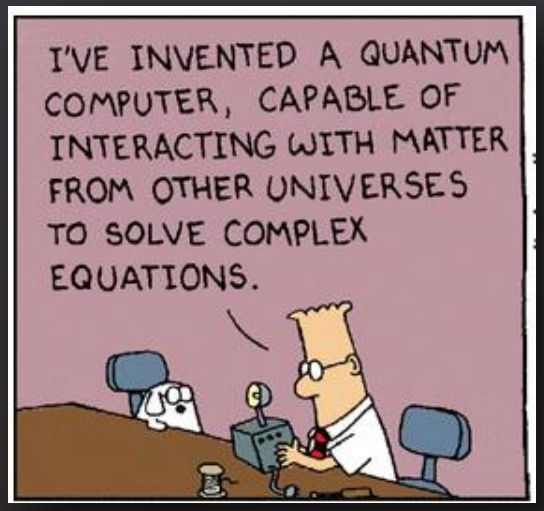
Adding jokes, anecdotes, or engaging material does not make a narrative

1. Connect amplifier, function generator, scope, student
2. Scan current, measure voltage, vary T



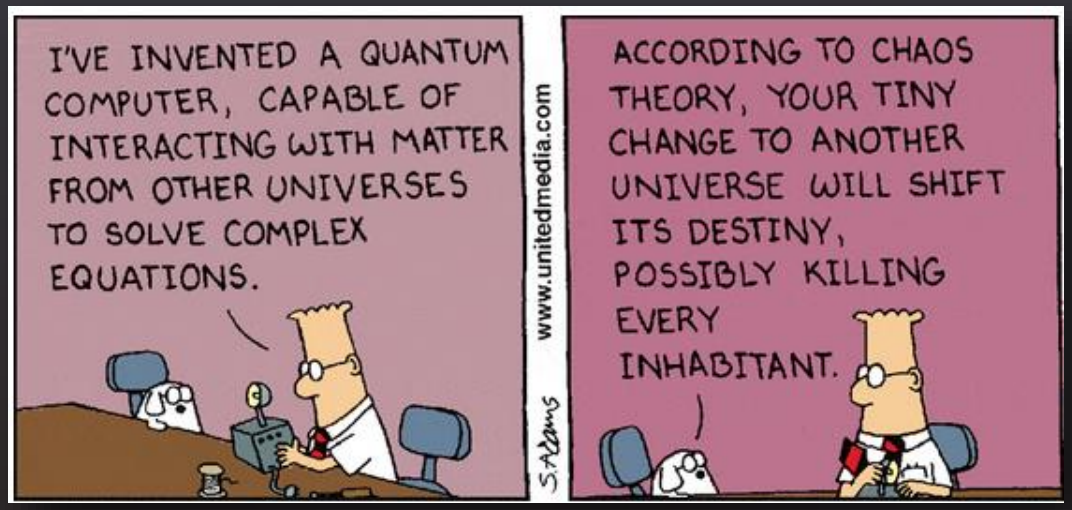
Conclusion: The insulator-metal transition is driven by dimensionality

Elements of a narrative



Beginning

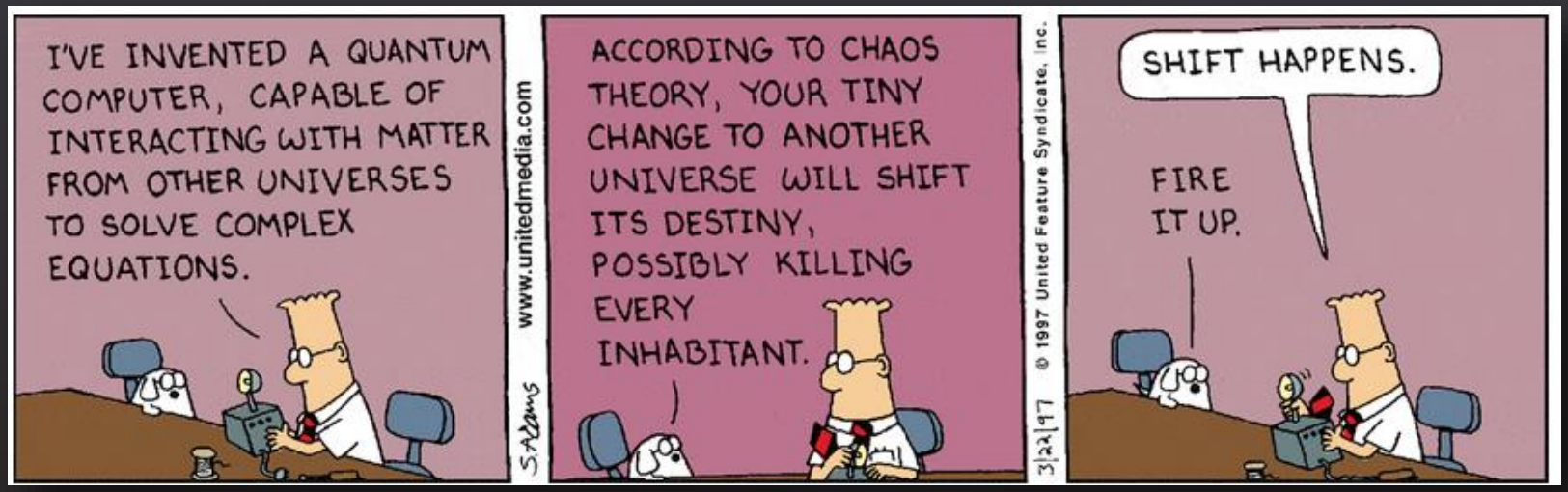
Elements of a narrative



Beginning

Middle

Elements of a narrative



Beginning → Middle → End

Logical connections

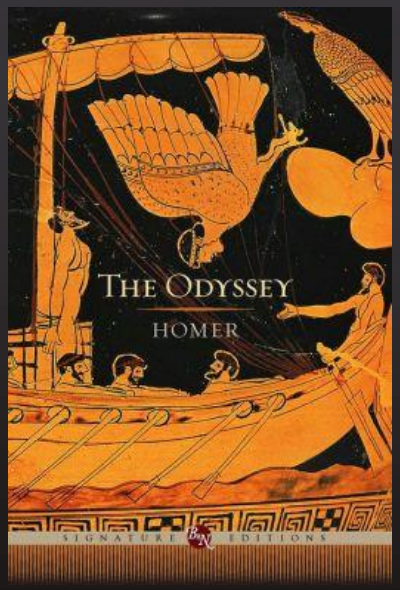
This structure should be mirrored at all levels

Beginning

What is your [paper, poster, talk] about?

Why is it interesting? What is the motivation?

Tell me, O muse, of that ingenious hero who travelled far and wide after he had sacked the famous town of Troy. Many cities did he visit, and many were the nations with whose manners and customs he was acquainted; moreover he suffered much by sea while trying to save his own life and bring his men safely home; but do what he might he could not save his men, for they perished through their own sheer folly in eating the cattle of the Sun-god Hyperion; so the god prevented them from ever reaching home. Tell me, too, about all these things, O daughter of Jove, from whatsoever source you may know them.



I'm going to tell you about how experimental data resolution can affect measurements of slip avalanche statistics in bulk metallic glasses, which are amorphous metals.

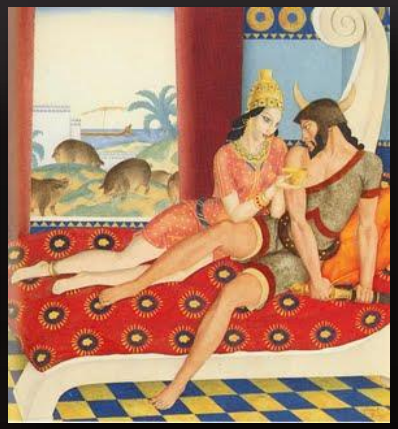
This work is important because metallic glasses have many uses (e.g., golf clubs and cell phone cases), but we do not understand how these materials fatigue under stress.

Middle

What did you do? What happened? What did you find out?

Penelope was faithful and foiled the suitors.

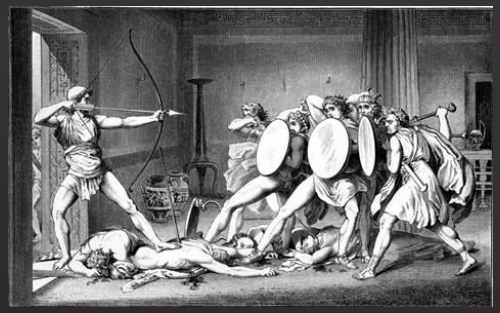
Odysseus had trouble getting home, because of many…monsters.



We borrowed some data involving measurements of applied stress for $Zr_{45}Hf_{12}Nb_5Cu_{15.4}Ni_{12.6}Al_{10}$ samples under compression from a group at Bucknell. We simulated varied resolutions by averaging over different timescales. By fitting the fake data at different resolutions to a model, we found out that false avalanches can appear at low resolutions.

The End

So what? What is the impact? What's next?



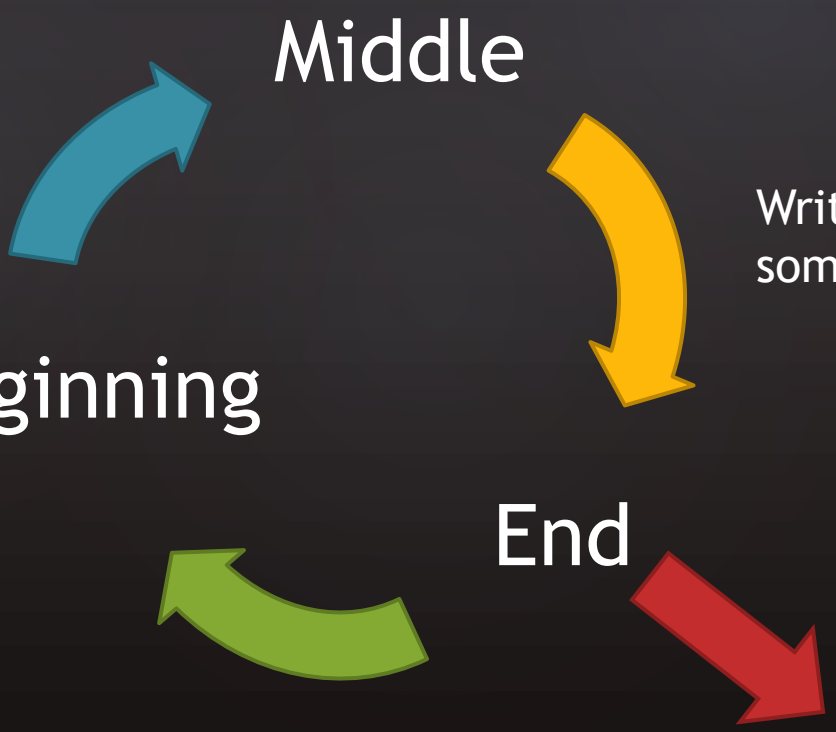
Odysseus finally makes it home and kills all the suitors. Their parents are ticked off, but Athena makes them forget the whole thing. Peace is restored to Ithaca.

We learned that high temporal resolution is critical to measuring and understanding fatiguing of metallic glasses under compression. This information will inform future measurements and may change the interpretation of existing data. Next, we will examine how temporal resolution impacts…

Logical Connections

You make them for the [reader, listener]

We are theorists, and to do our analysis we borrowed some data taken at the highest possible temporal resolution. That way we can artificially reproduce low temporal resolutions.



Tips

- Decide on your story before you beginning outlining
- Make the story obvious! State it directly and simply.
- Less is usually more
  - Some details are best left out or buried in an Appendix
- Give information as needed
- Get outside of your own head
  - Think critically: what does the [reader, listener] know?
  - The right answer always: not much
- Refer back to the story often
  - Explain how details connect to the overall narrative
- Make the connections for the [reader, listener]