Using Science to Communicate Science

A talk for the Human Early Learning Partnership community

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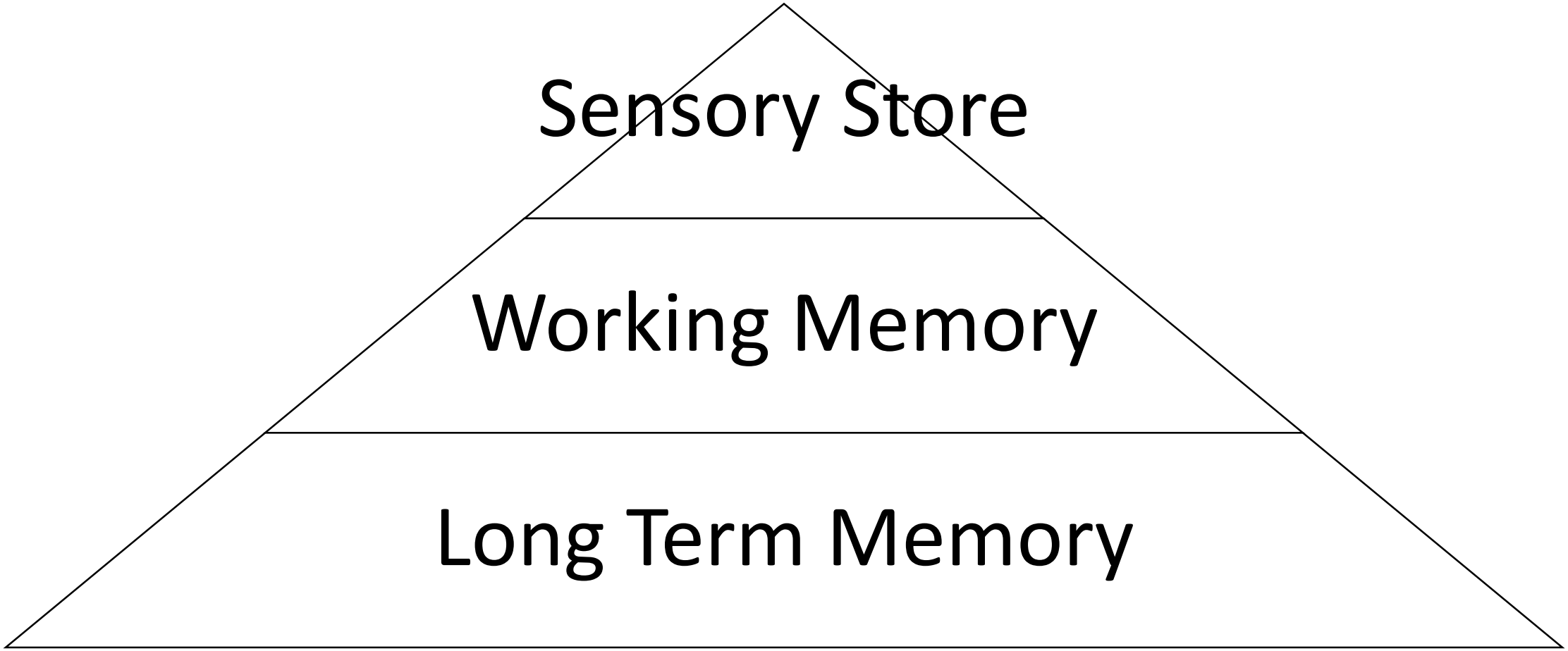
Today's Goal

- Remind you of basic principles in memory to help you apply that knowledge for effective science communication

To promote…	• *Consider…*
Understanding	• Working Memory limits
Adoption	• how knowledge is arranged • resistance to change
Application	• difficulty recognizing new contexts

To promote…	• *Consider…*
Understanding	• **Working Memory limits**
Adoption	• how knowledge is arranged • resistance to change
Application	• difficulty recognizing new contexts

Basic Model of Memory



Experiencing the limits

18121867191419392001

Working memory is limited.

keep the visual presentation simple

use straightforward diagrams

avoid or display jargon and acronyms

omit as many “irrelevant” details as possible

To promote…	• *Consider…*
Understanding	• Working Memory limits
Adoption	• **how knowledge is arranged** • **resistance to change**
Application	• difficulty recognizing new contexts

Knowledge is arranged in schemas.

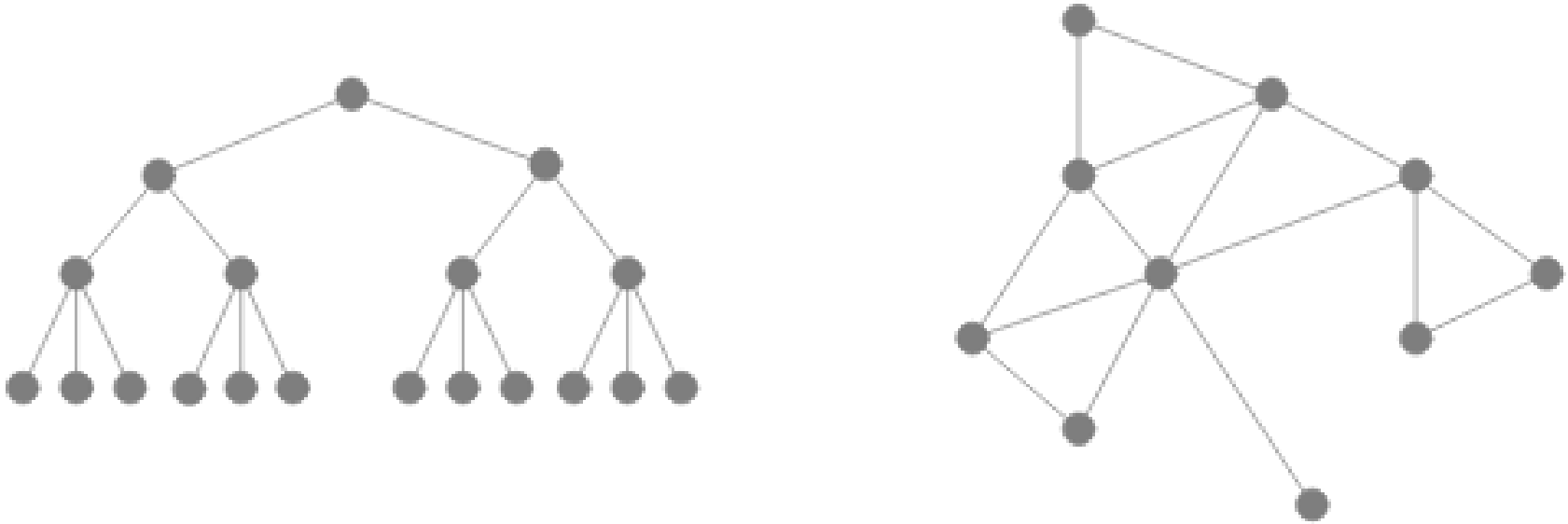


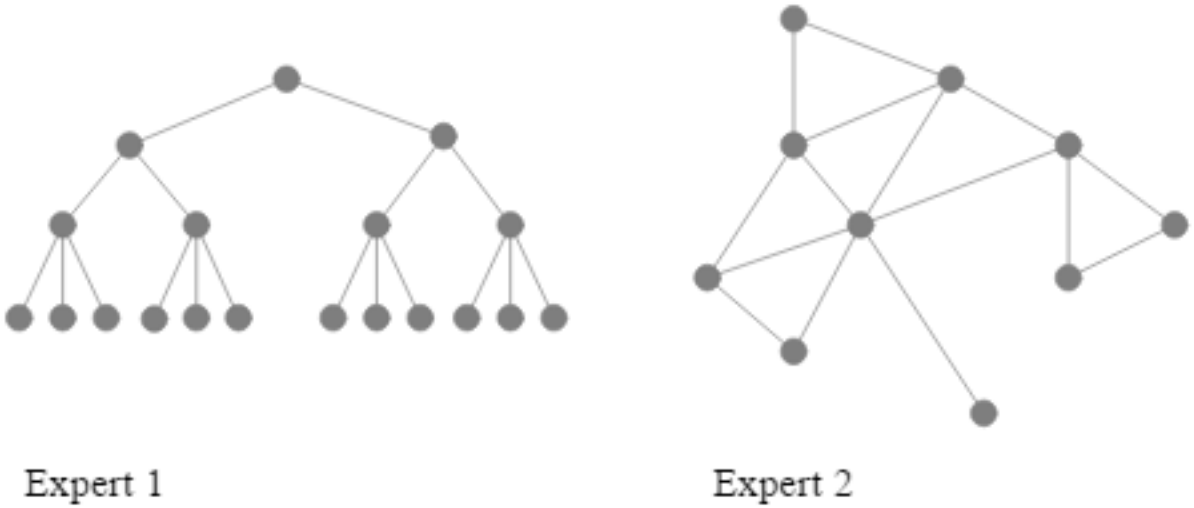
Image from Mathew Mitchell: http://mathewmitchell.net/multimedia/schemas/

Arrangement of knowledge matters.

1812 1867 1914 1939 2001

When experts learn, simply link to existing knowledge.

If you had prior knowledge of dates



Expert 1

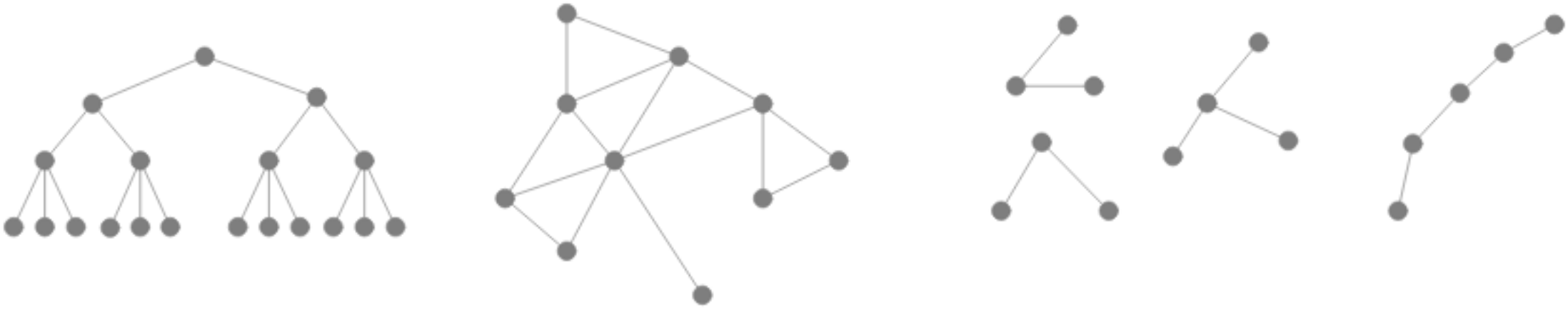
Expert 2

Image from Mathew Mitchell: http://mathewmitchell.net/multimedia/schemas/

When novices learn, have to construct a schema.

If you had prior knowledge of dates

If you didn't have knowledge



Expert 1 Expert 2 Novice 1 Novice 2

Image from Mathew Mitchell: http://mathewmitchell.net/multimedia/schemas/

Help audience build their schema or link to pre-existing schema.

scientists

audience?

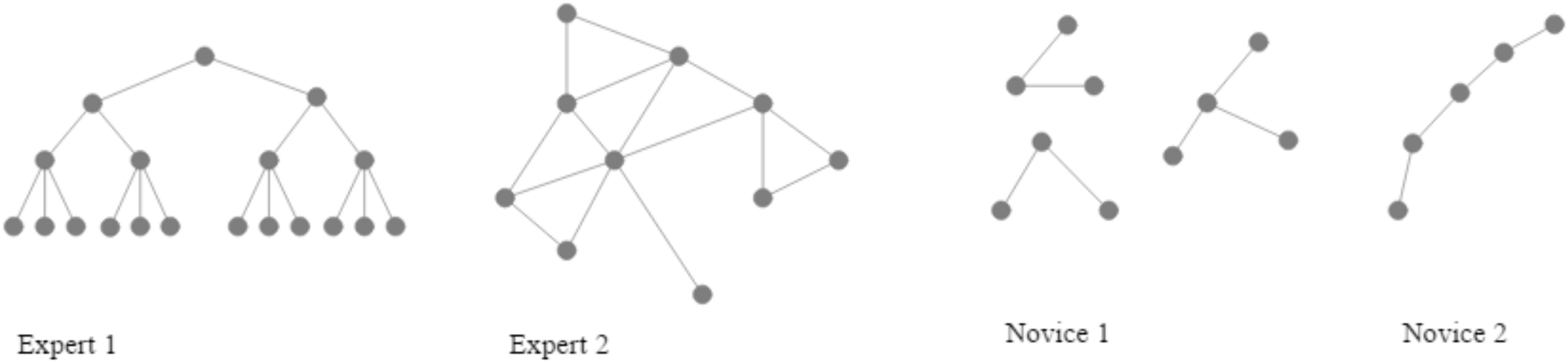
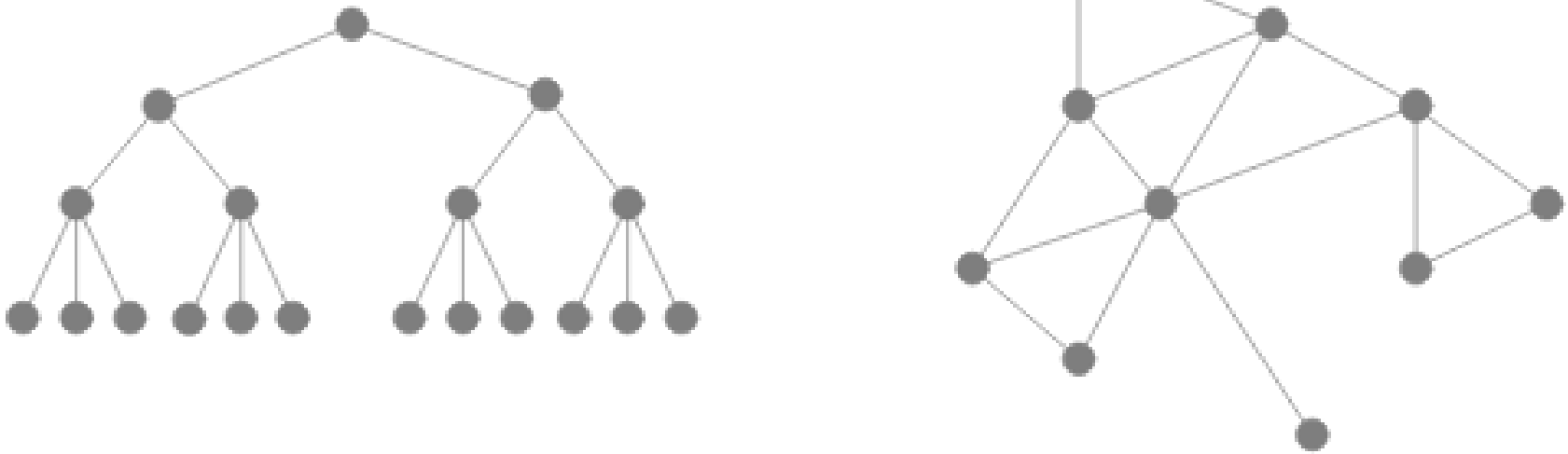


Image from Mathew Mitchell: http://mathewmitchell.net/multimedia/schemas/

Tap in to your audience's most well-developed schema

- The Self!

Changing well-developed schemas is difficult.



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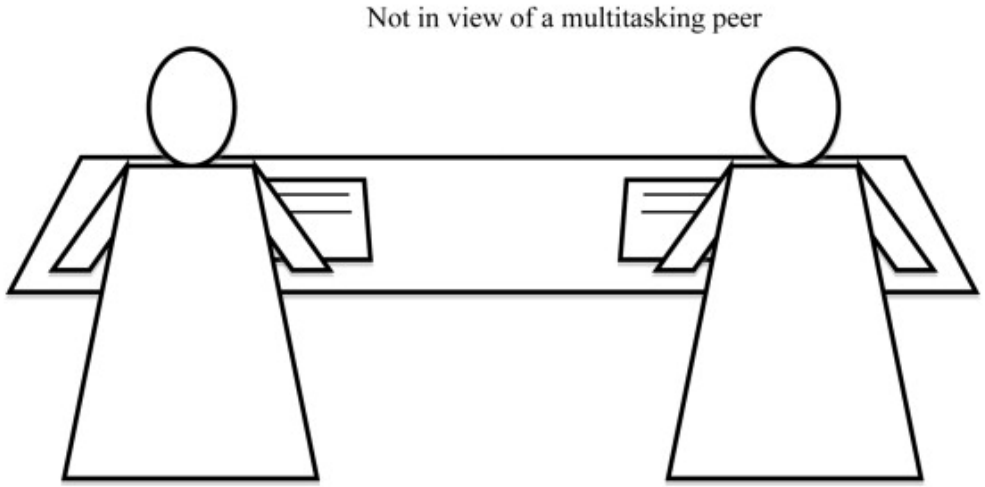
If I change this, what else do I have to change?

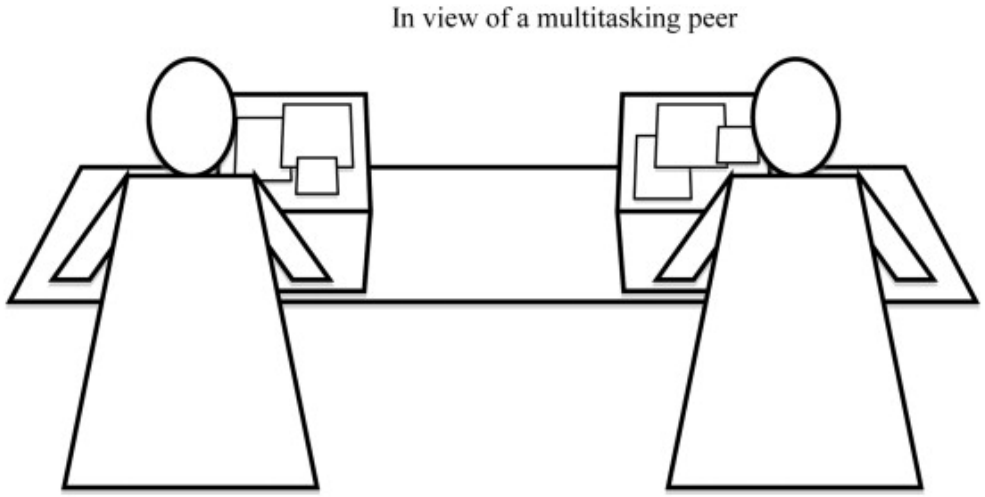
How could I have been so stupid?

No but that doesn't apply in *my* case

Example: “Laptop multitasking hinders classroom learning for both users and nearby peers”



Sitting here? Average comprehension score = 73%



Sitting here? Average comprehension score = 56%

Sana, Weston, & Cepeda (2013)

Knowledge is arranged in schemas.

help novices develop their schemas

link new information to existing schemas, especially Self

changing schemas is difficult (emotion, motivation)

To promote…	• *Consider…*
Understanding	• Working Memory limits
Adoption	• how knowledge is arranged • resistance to change
Application	• **difficulty recognizing new contexts**

Applying knowledge to new contexts can be difficult.

offer varied examples

facilitate commitment

practice using the information

To promote…	• *Consider…*
Understanding	• Working Memory limits
Adoption	• how knowledge is arranged • resistance to change
Application	• difficulty recognizing new contexts

What is one idea that you might apply in your outreach communications?

What is one idea you want to think about more deeply?

Share with your neighbour.

Additional Resources

- How People Learn
- Kosslyn, S. M. (2007). *Clear and to the point: 8 psychological principles for compelling PowerPoint presentations.*
- Cook, M. P. (2006). Visual representations in science education: The influence of prior knowledge and cognitive load theory on instructional design principles. *Science Education, 90*, 1073-1091.
- Brownell, S. E., Price, J. V., & Steinman, L. (2013). Science communication to the general public: Why we need to teach undergraduate and graduate students this skill as part of their formal scientific training. *Journal of Undergraduate Neuroscience Education, 12*, E6-E10.
- Marshall, M. (2012). *Talk Nerdy to Me.* https://www.ted.com/talks/melissa_marshall_talk_nerdy_to_me?language=en
- Mason, A. S. (2016). *10 tips for academics writing for a general audience.* https://medium.com/@wwnorton/10-tips-for-academics-writing-for-a-general-audience-d9f946fbd5de#.42g5982h8