

# GUIDING RESIDENT LEARNING

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# Learning Theory

- Metacognition
- Retrieval Strength & Storage Strength
- Working Memory & Cognitive Load Theory
- Spaced Repetition & Retrieval Practice

# Metacognition

- The ability to ask oneself & address the following questions is critical to intentional learning
  - What do I know?
  - What do I struggle to understand?
  - What are my **goals** in learning?
  - What do I do when I make mistakes in learning?
  - What **strategies** work best for my brain when learning new data?
  - When I struggle with a topic, do I **modify** how I try to learn it or mentally flee the scene?
  - Do I practice **long-term learning** strategies or just cram & forget repeatedly?
- **Metacognition is a critical foundational element to learning (not simply studying) material.**

# Retrieval & Storage Strength

- **Retrieval Strength**

- How easily we recall information
  - Develops with practice and increasing access points to a memory
  - Can be weak or strong depending on variety of factors

- **Storage Strength**

- How well/permanently information is stored
  - Develops over time with attention to cognitive load theory and mindful cultivation
  - Can be weak or strong depending upon a variety of factors

# Retrieval Strength

**Storage Strength**

**Weak**

**Strong**

**Weak**

**Essentially forgotten data**

Your seat numbers for the last ballgame you attended

**Crammed Material**  
Your parking space today

**Strong**

**“Buried” data**  
Your grandparents’ address

**Mastered Material**  
Your current address

WHY DO LEARNERS LOVE  
TO CRAM FOR EXAMS?

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# HOW DO EDUCATORS FOSTER LONG-TERM RETENTION?

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# WORKING MEMORY & COGNITIVE LOAD THEORY

## SPACED REPETITION & RETRIEVAL PRACTICE

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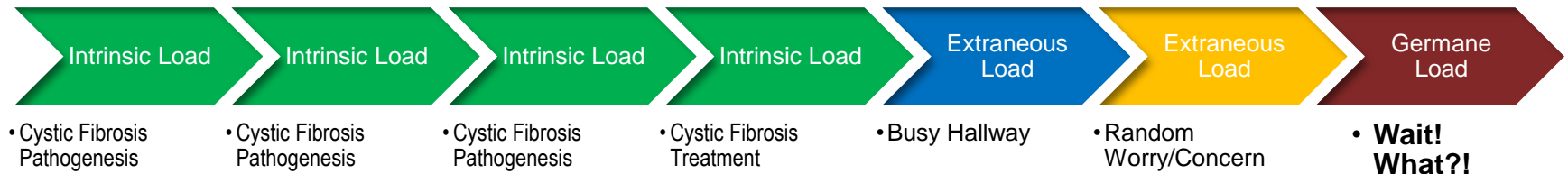
# Working Memory

- Information you've consciously noted
- 7 +/- 2 spots
- Brain uses 2-4 spaces to compare & contrast information
- 30 seconds of retention

# Cognitive Load Theory

- Management of cognitive load is essential for schemata development
- Three components:
  - **Intrinsic**
    - Load actual information requires
  - **Extraneous**
    - Load from elements unrelated to the piece of data currently the main focus
  - **Germane**
    - Load a learner needs in order to make sense of the material

# Cognitive Load Theory in Action



# Managing Cognitive Load

- **Intrinsic Load**

- **Leader -**

- When working with novice learners, calibrate what you try to cover in 1 hour
    - Explain how you think through a process

- **Learner -**

- Study complicated things in smaller chunks
    - Spaced Learning vs. Massed Learning

- **Extraneous Load**

- **Leader -**

- Build PowerPoints with the learner in mind
    - Images & diagrams often better than lots of words

- **Learner -**

- Reduce problematic extraneous load from the learning environment
    - Incorporate helpful extraneous load into the learning environment

- **Germane Load**

- **Both leader & learner**

- Give it a chance to do its job

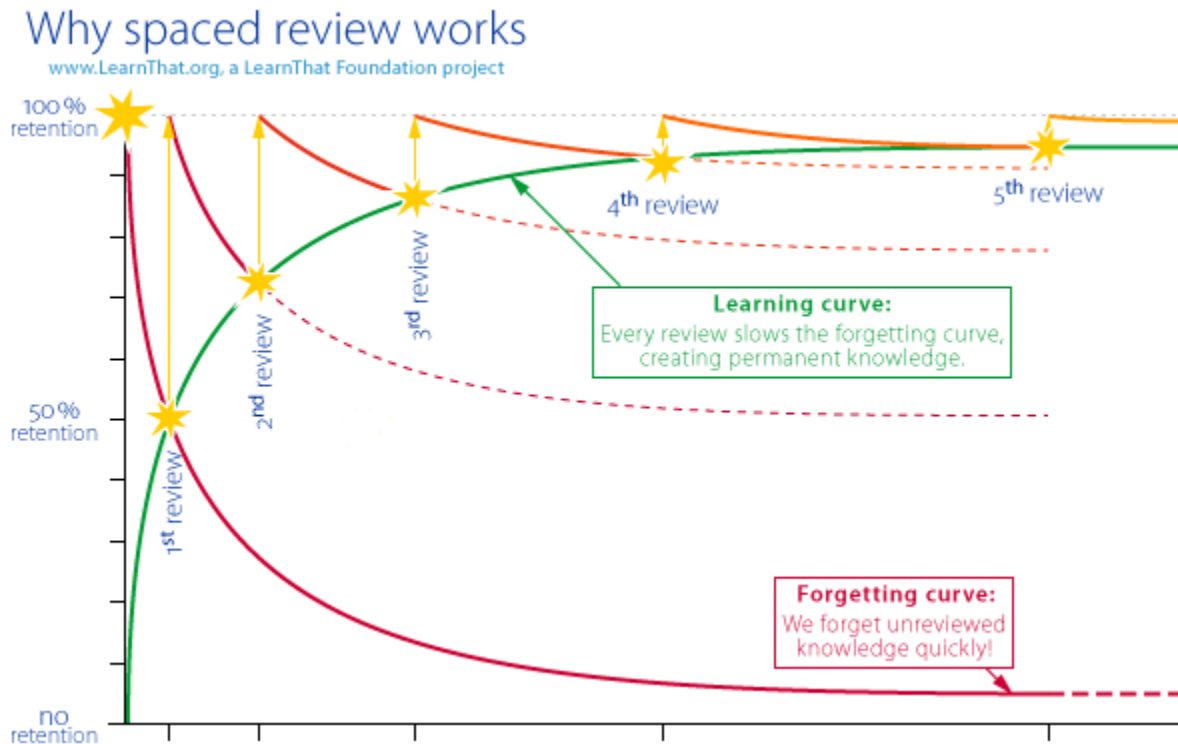
# SPACED REPETITION & RETRIEVAL PRACTICE

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# Spaced Repetition

- Designed with the forgetting curve in mind
- Facilitates memory retention; mitigates forgetting
  - Retrieval Strength
- Metacognition is critical for proper implementation
  - Learner needs to monitor their forgetting
  - Short intervals for challenging, complex, and/or boring material
  - Wider intervals for fun, interesting, and/or easily understood material

# The Forgetting Curve



# Retrieval Practice

- Practicing various methods of spaced repetition with retrieval techniques will improve retrieval strength and foster a most robust storage strength
- Types of Retrieval Practice:
  - Striving
  - Interleaving
  - Practicing in a SIM lab
  - Routine testing/quizzing
- **Key:** “Desirable difficulty” (Bjork et al., 2013)



# OPTIMAL OUTCOME:

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Masterful learning –accurate automated memories with strong retrieval strength & strong storage strength

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