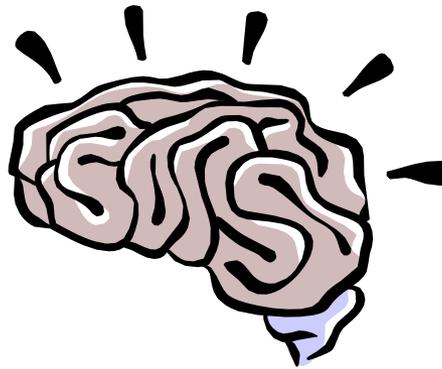


Some Useful Things to Know About Cognition



Taking better advantage of what we know about cognition to help people learn

Daphne LaDue

405-325-1898, dzaras@ou.edu

Anchor yourself into real problems

In 5 minutes!

- **What particular items have you seen forecasters fail to learn from training?**

Anchor yourself into real problems

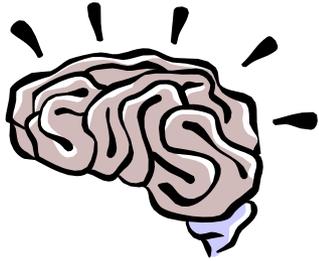
Problems

Reasons



Motivating learners

MANAGING THE GAP



Managing Emotions

Getting inside their hearts....



**Emotion is
involved in
learning**

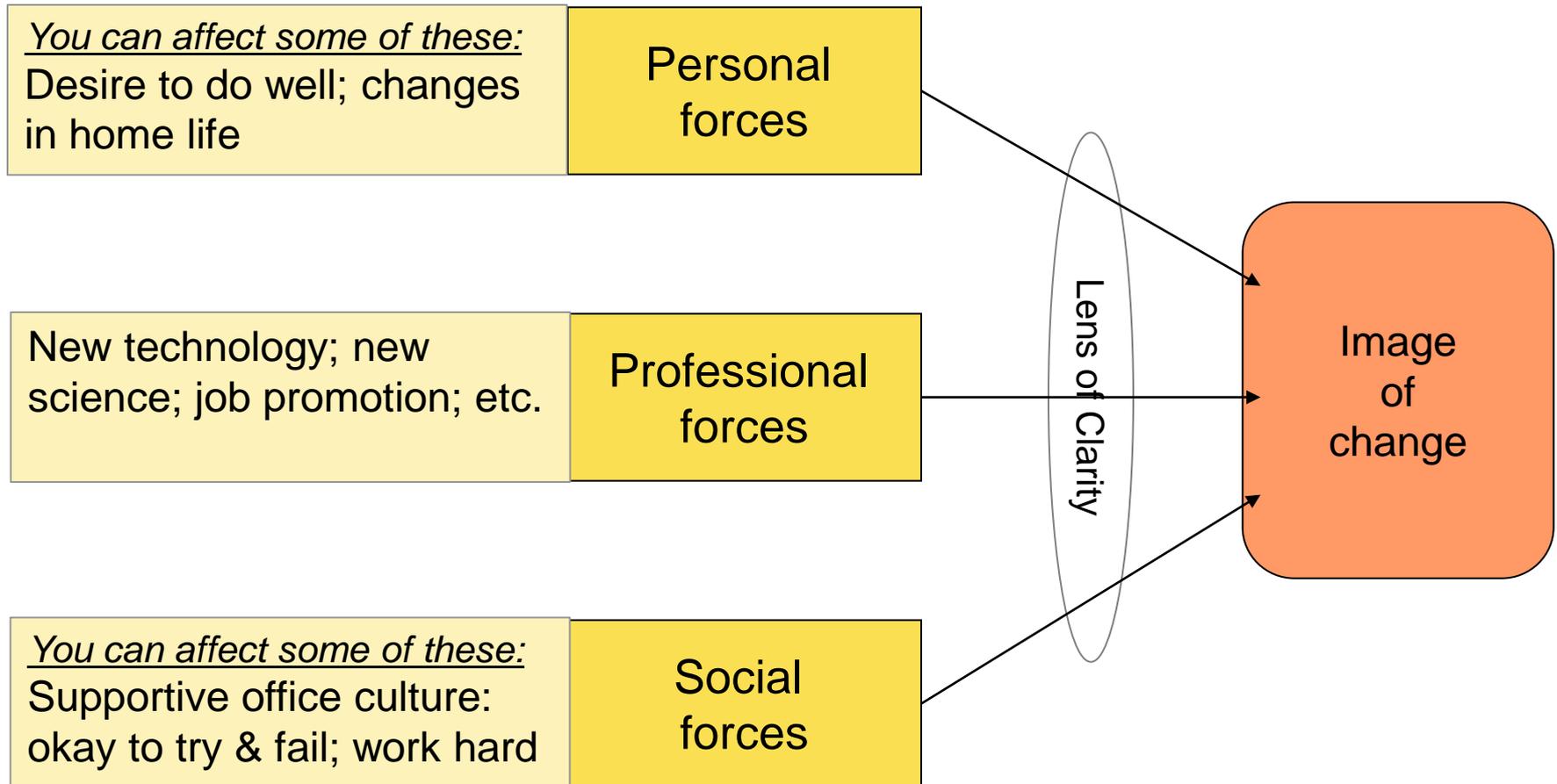


**Some people freak
out or have very
negative emotions
about learning**

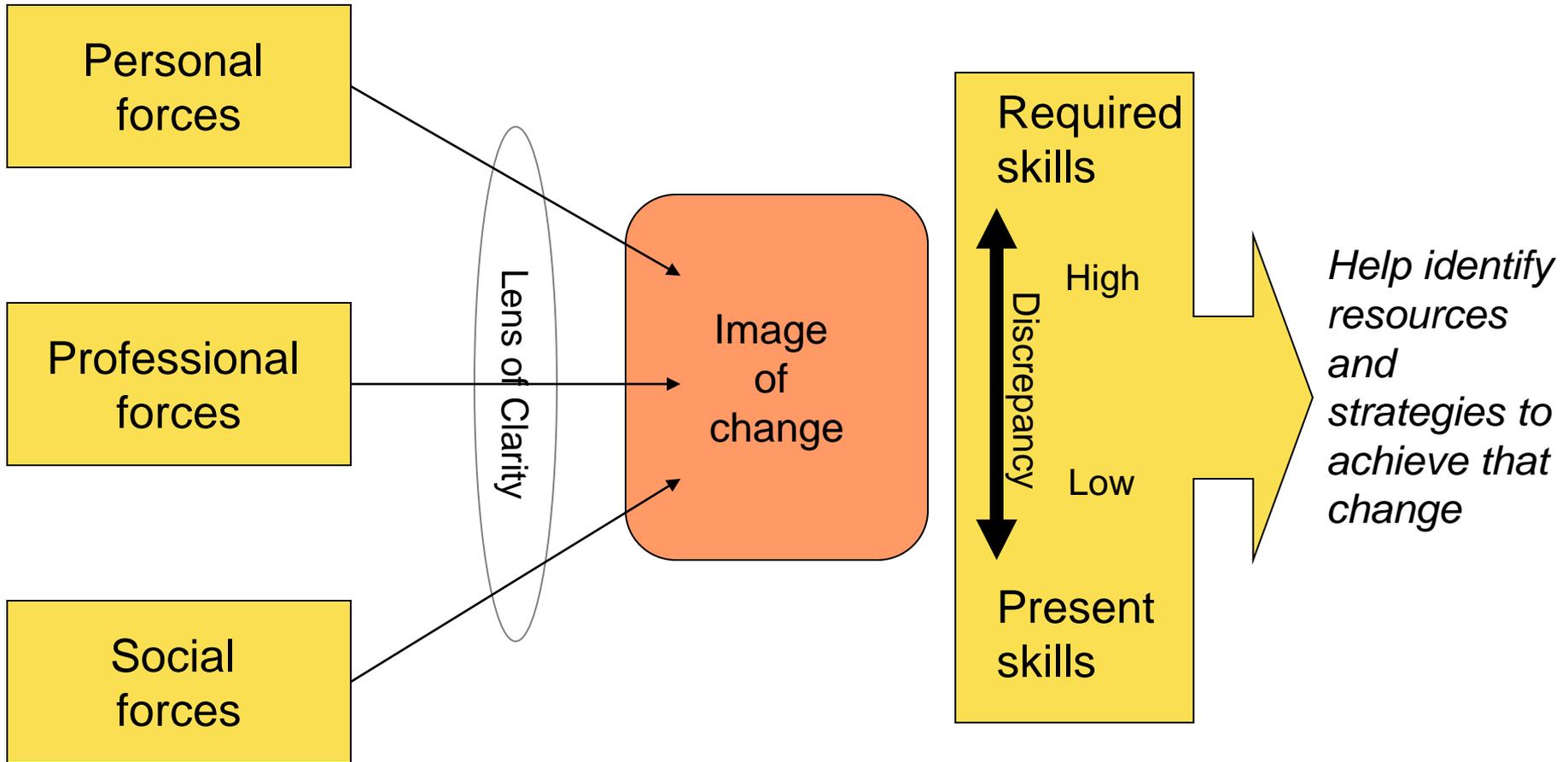


**Consider how you'll
manage those, lest
you end up doing
CPR!**

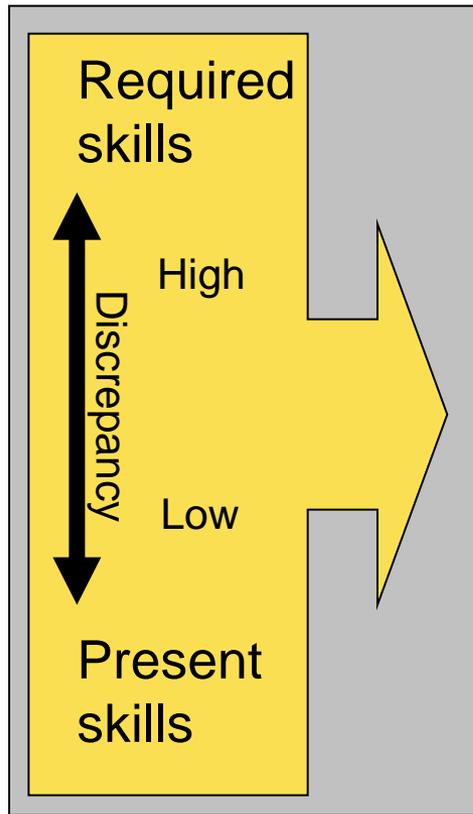
Help Them Create an Image of Where They Want to Be



Manage the Gap; Assist with Resources, Strategies



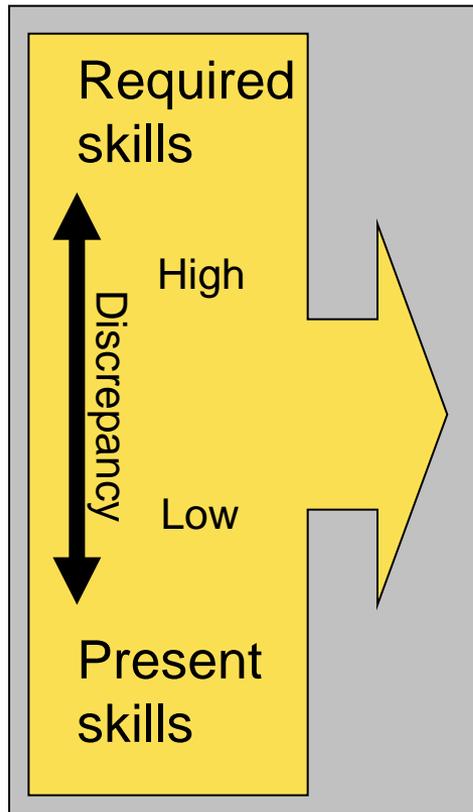
Magnitude of the Gap Influences Motivation



Actual Needs

		High	Low
Perceived Needs	High	•High motivation	•Inaccurate self perception
	Low	•No motivation •No learning	•No need for learning

...and Emotion



- Very Large Gaps
 - high anxiety
 - reaction might be aversion
- Customary Gaps
 - apathy
 - reaction may include procrastination, dismissal



Find yourself doing CPR!

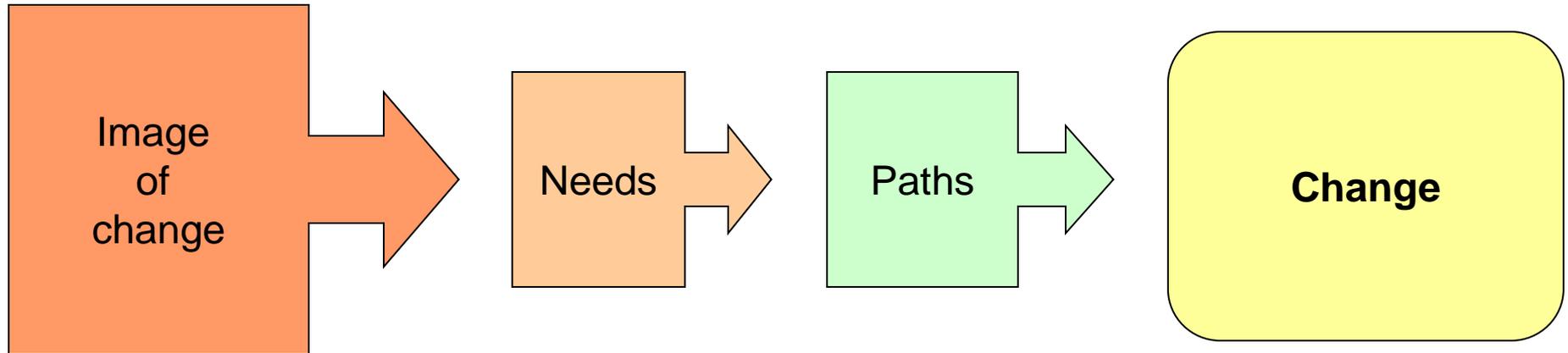


Find yourself having to jar them awake.

How Big is the Gap Between Where You Are vs. Want to Be?

- 1. Small & Unmotivated**
- 2. Small**
- 3. Medium**
- 4. Large**
- 5. Large & Scared**

Moving From An Image To Actual Change



Identify
excellent
performance

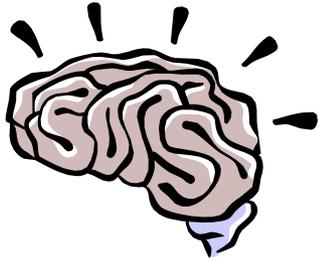
Perceived
vs.
Actual Needs
*(you need to
identify both!)*

Facilitation Strategies:
Hopefully lots of ideas from this
workshop!

*E.g., Liz's types of simulations tie to
what they need to learn*

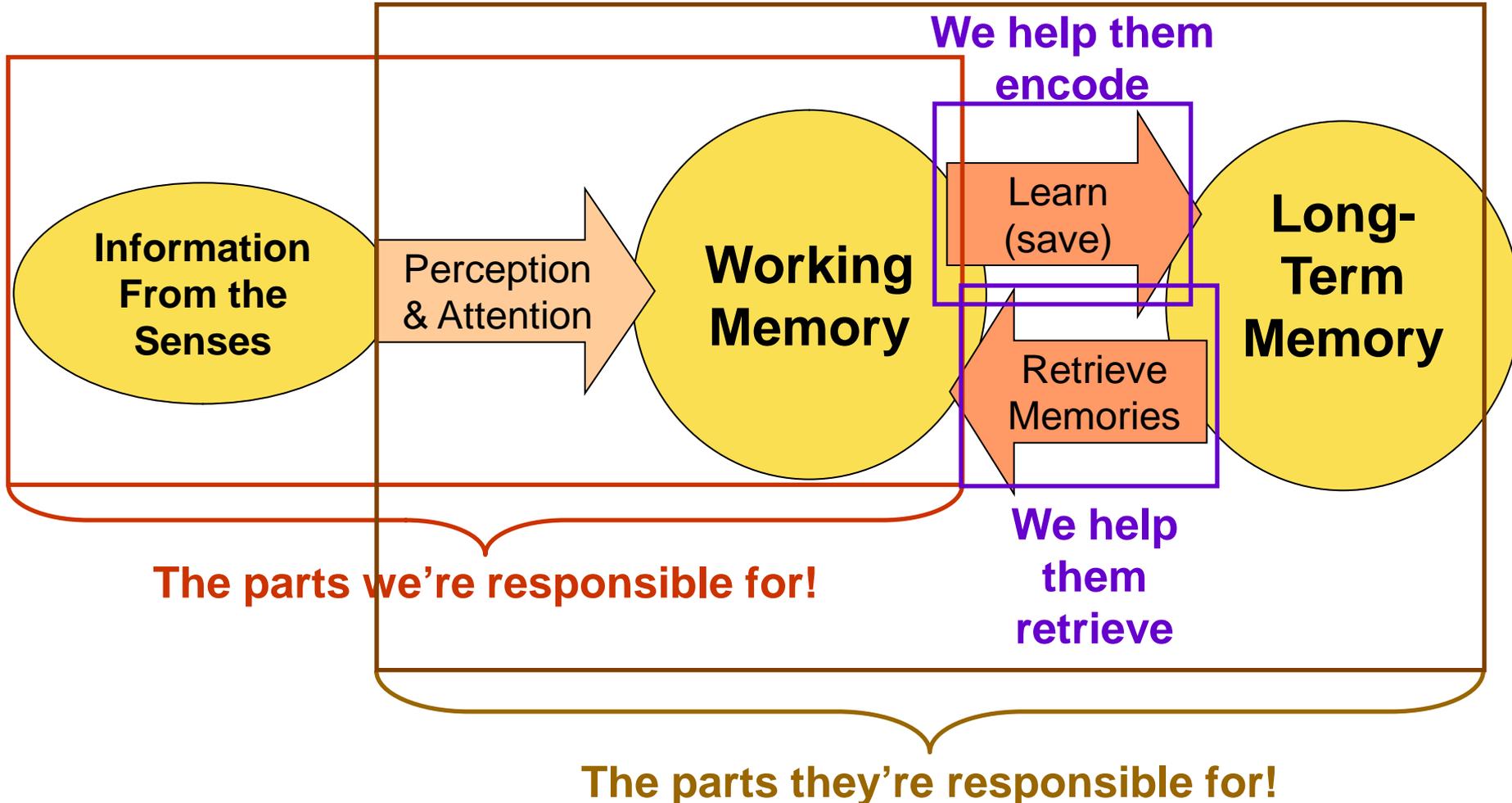
Drawing their attention to what matters

FOCUS



Information Processing

Getting inside their heads....



Information
From the
Senses

How We Perceive: Visual & Auditory

- We have 2 processing systems:
 1. Visual
 2. Auditory
- We remember things better when both systems are active.



Information From the Senses

Two Processing Systems

Visual



Auditory

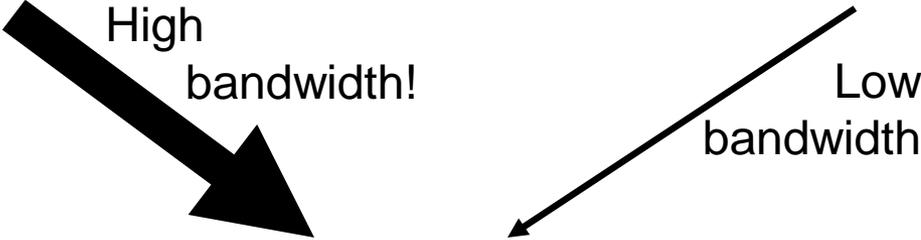


Bottlenecks:
Attention on one location at a time!

[video]

Bottlenecks:
Can only listen to one audio stream at once.

[demo]



Bottleneck!

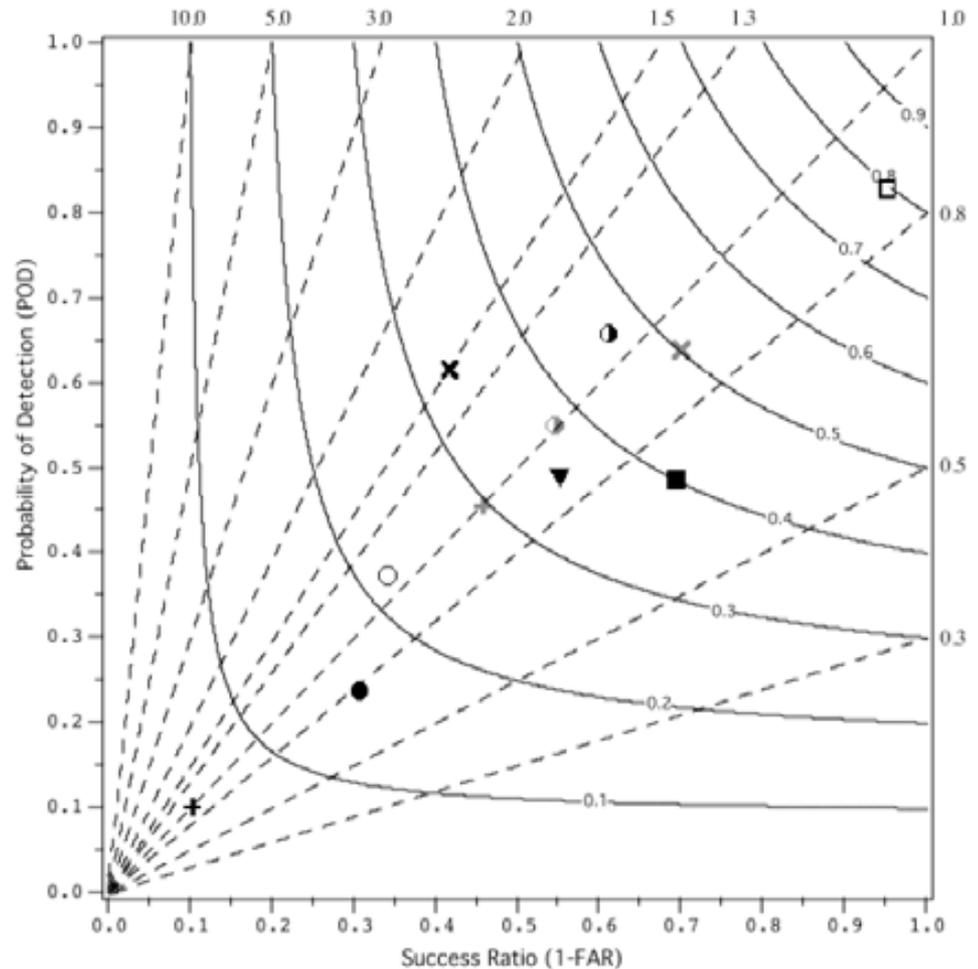
Central Processing

Information From the Senses

Overwhelm You With Too Much to See

Clobber the visual bottleneck

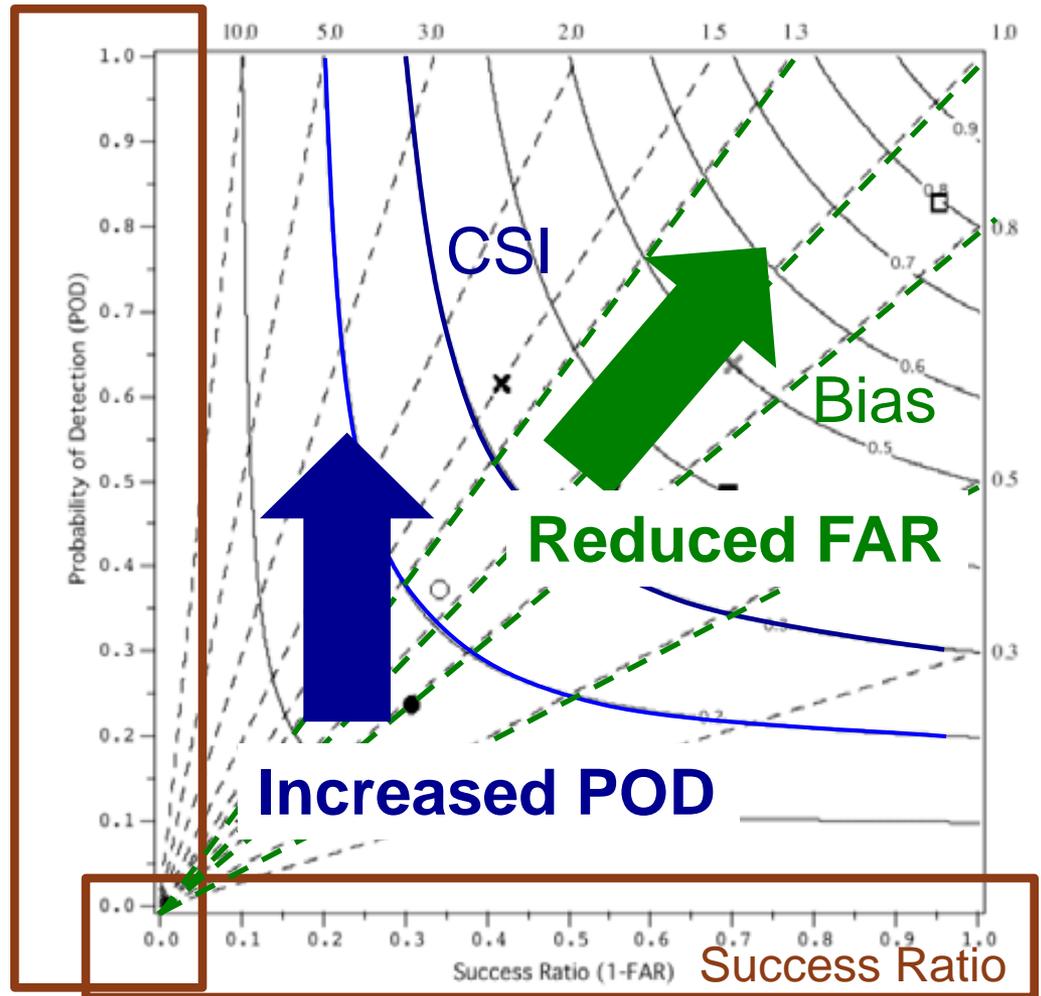
Along the x-axis is the SR. The y-axis gives POD. The solid contours represent CSI, while the dashed lines give Bias results, with the values indicated on the outward extension of the lines. In this diagram moving to the right is a reduction in FAR or moving up, which is an increase in POD.



Information
From the
Senses

Example of Better Use of Dual-Processing

Probability of
Detection

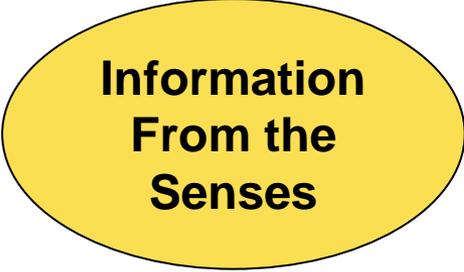


Information
From the
Senses

Overwhelm You By Saying Something Different

Clobber the auditory bottleneck

- Chapter 2 described the enormous parallelism that characterizes our perception. The human visual system and other perceptual systems are simultaneously processing information from all over their sensory fields. One of the fundamental facts of human cognition, however, is that this parallelism does not continue throughout the information processing system. This chapter will document the evidence for bottlenecks in the auditory and visual systems: the points at which we can attend to only one spoken message or one visual image at a time.
 - Anderson, Cognitive Psychology and Its Implications, 6th Ed 2005



**Information
From the
Senses**

Bore You By Saying The Same Thing

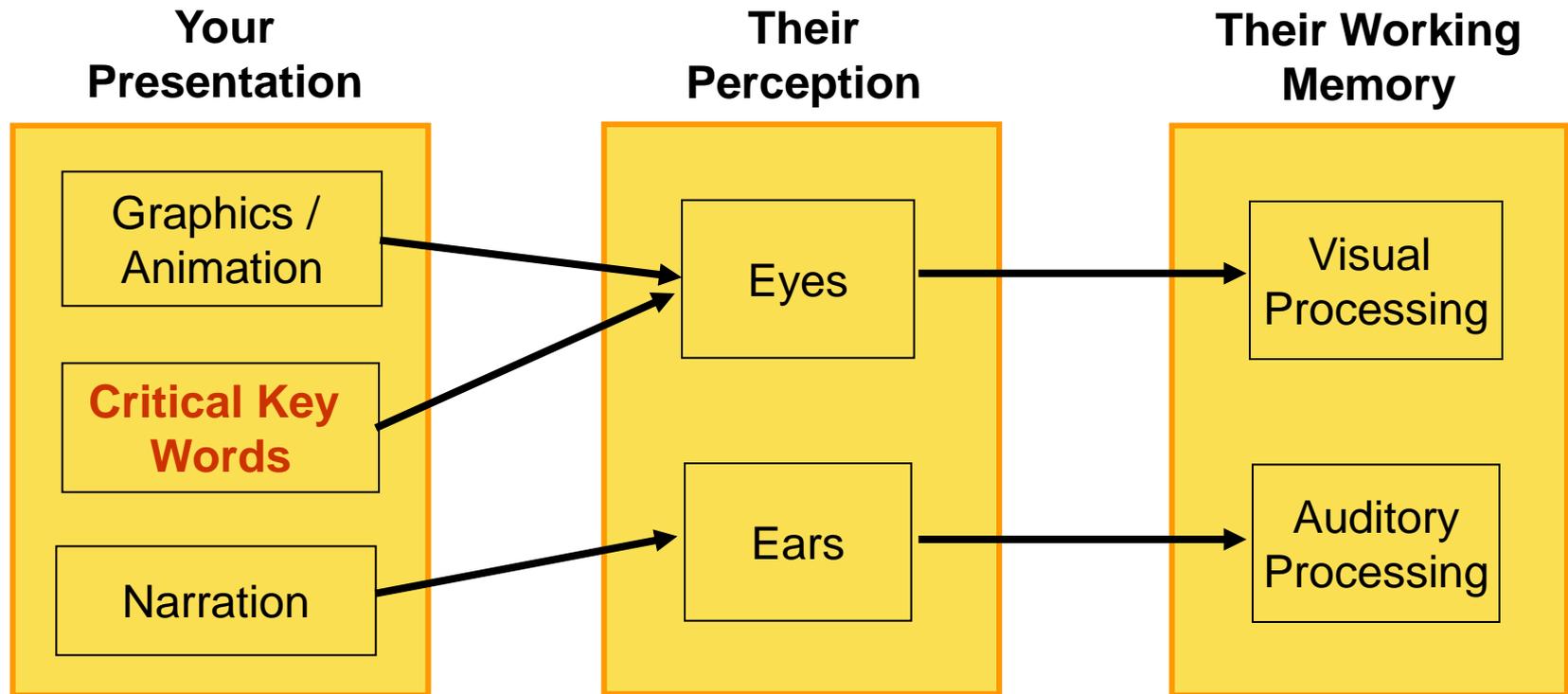
Fail to take advantage of bandwidth!

Chapter 2 described the enormous parallelism that characterizes our perception. The human visual system and other perceptual systems are simultaneously processing information from all over their sensory fields. One of the fundamental facts of human cognition, however, is that this parallelism does not continue throughout the information processing system. This chapter will document the evidence for bottlenecks in the auditory and visual systems: the points at which we can attend to only one spoken message or one visual image at a time.

- Anderson, Cognitive Psychology and Its Implications, 6th Ed 2005

Information
From the
Senses

When To Keep Printed Words: Dual-Channel Processing

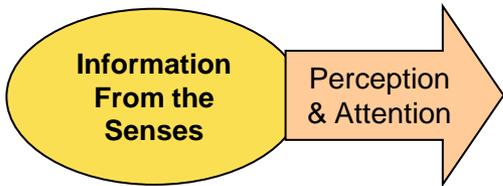


[example]

Apply It!

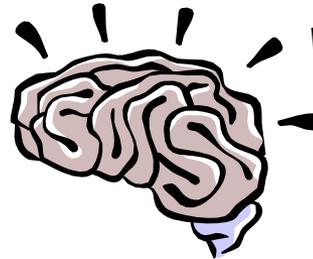
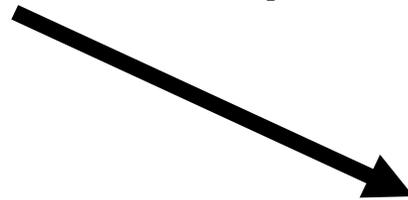
Effective Multimedia Briefings

- How could this presentation be more effective?
- <http://www.screenr.com/GuY>
- E.g.: what are you looking at on the first graphics slide (~1:10min)?



Two Pieces to This Puzzle: Attention + Perception

- We also attend (or not) to stimulus
- Attention + Perception determine what gets in

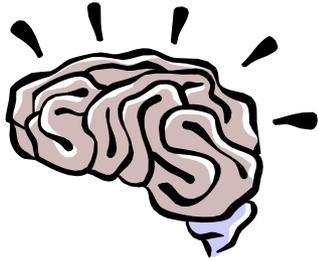


*Attention or perception –
which comes first?*

We need to help forecasters learn how to perceive and attend to what is important.

Helping them build strong, effective knowledge structures

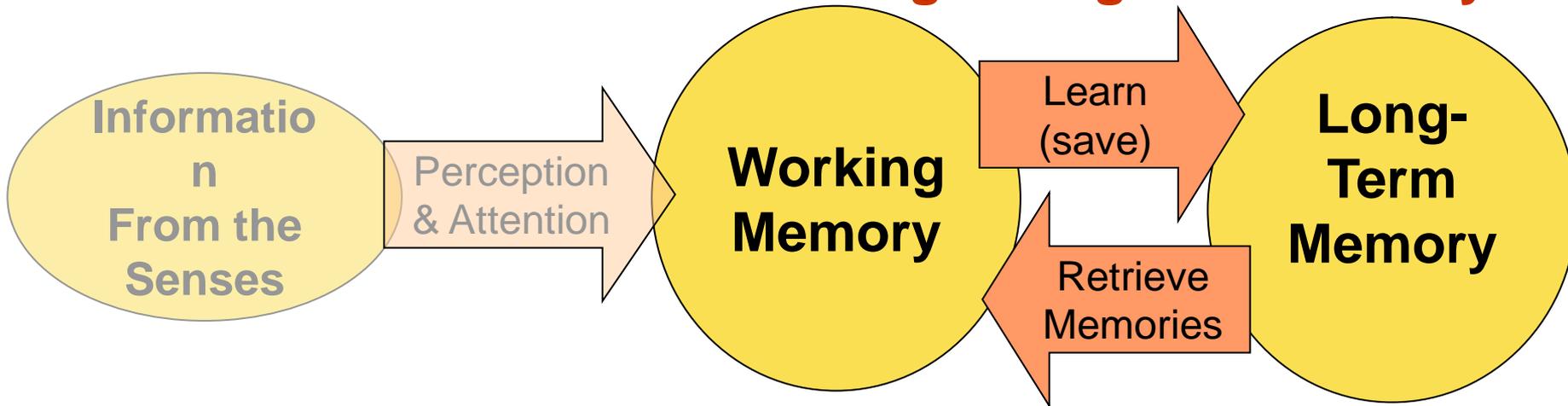
LINKING



Information Processing

Getting inside their heads....

Now we're going to focus on
working & long term memory



Remind ourselves: What are they trying to learn?

- Back on slide 3 we collected problems
- What kinds of things did they have trouble learning?

Declarative

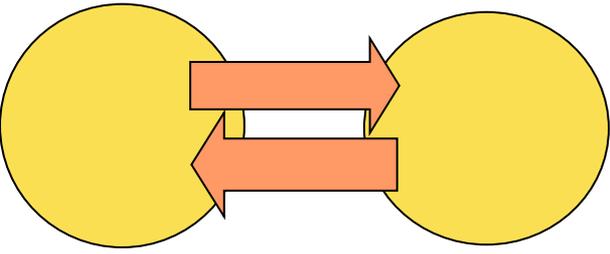
- facts
- information

Procedural

- series of actions
- processes

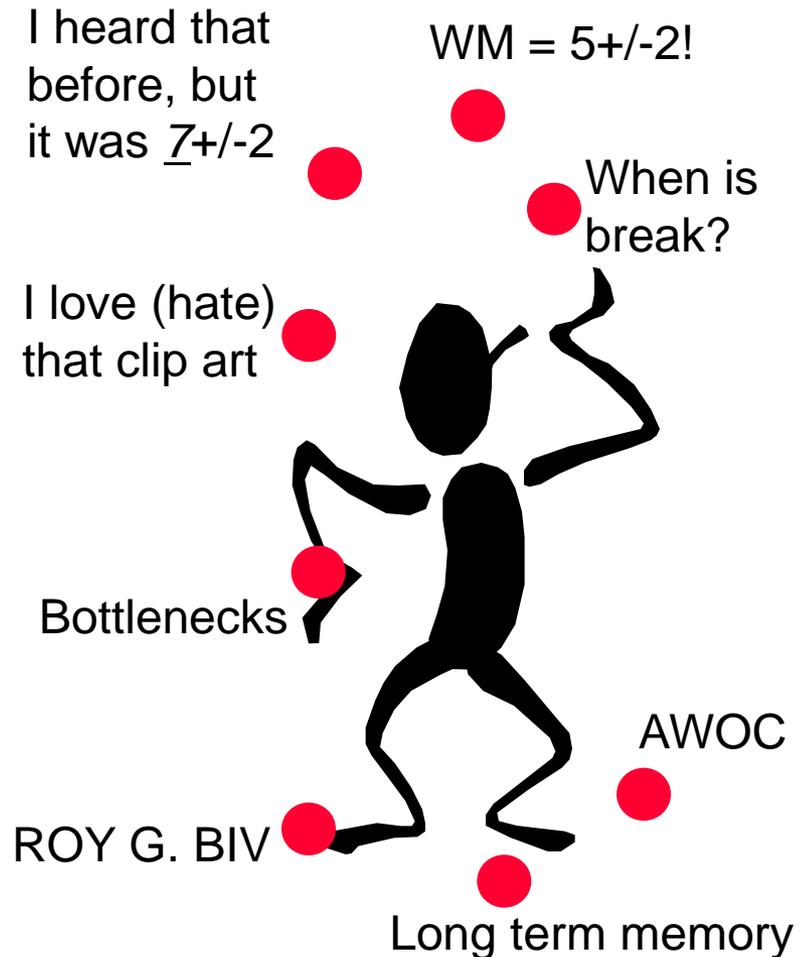
Metacognitive

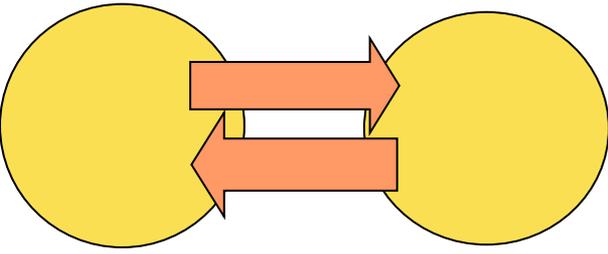
- monitoring yourself
- awareness of your status



How Much Can We Handle?

- Working memory:
 - 7 +/- 2 but...
 - **5 +/- 2** is more realistic
- **What else are you thinking about right now?!**





5+2 Includes Chunks! Woo Hoo!

- We chunk a lot of information
- Simple example:
 - **telephone numbers**
325-1898 is 7 digits,
but it is not 7 pieces of
working memory!

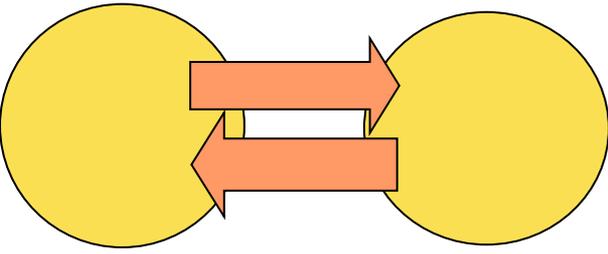
Chunking is the way to sneak complex information into long term memory! Build up the pieces so they're chunkable.

325 325 – ah, an OU number

18 98

What's next? I'm ready for more

1898 was just before the start of last century



Processing Ranges Shallow to Deep

- Information processing continuum:

Shallow:

Superficial

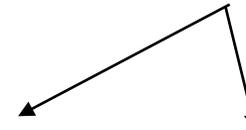


Superficial: Rote memorization. Risk of remembering the trick but not the content.

Does anyone remember a memory trick but forgot what it means?

Deep:

*Meaningful
or Elaborate*

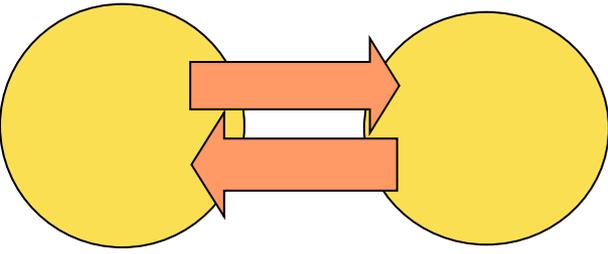


Elaborate: add details to the item.... Makes for more hooks into memory

Meaningful: link directly to relevant knowledge, schemas



For each learning situation, which kind of processing is key?



Deep Processing is Key

- Information processing continuum:

Shallow:

Superficial

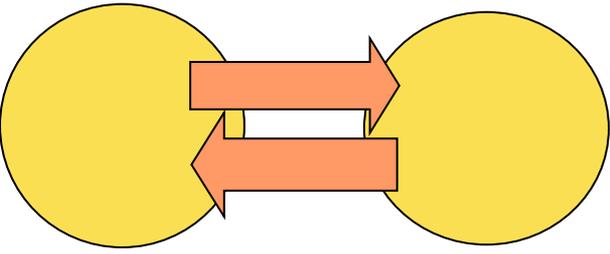
Deep:

*Meaningful
Elaborate*

- Learners have tendencies toward shallow or deep processing

Learning
Styles

Deeper processing → better memories!



Elaboration Can Get You in Trouble

- (Any) Elaborations can get you in trouble!
- But elaborations are a natural part of how we think.
- Read about Nancy...

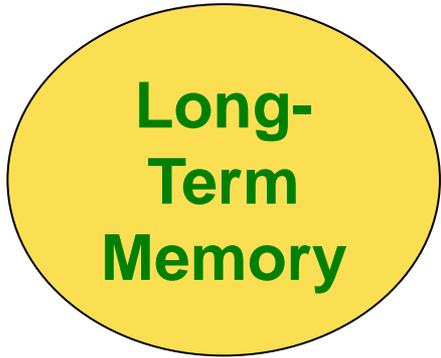
Long-
Term
Memory

Organizations & Schema

House

- *Isa:* building
- *Parts:* rooms
- *Materials:* wood, brick, stone
- *Function:* human dwelling
- *Shape:* rectilinear, triangular
- *Size:* 100-10,000 sq ft

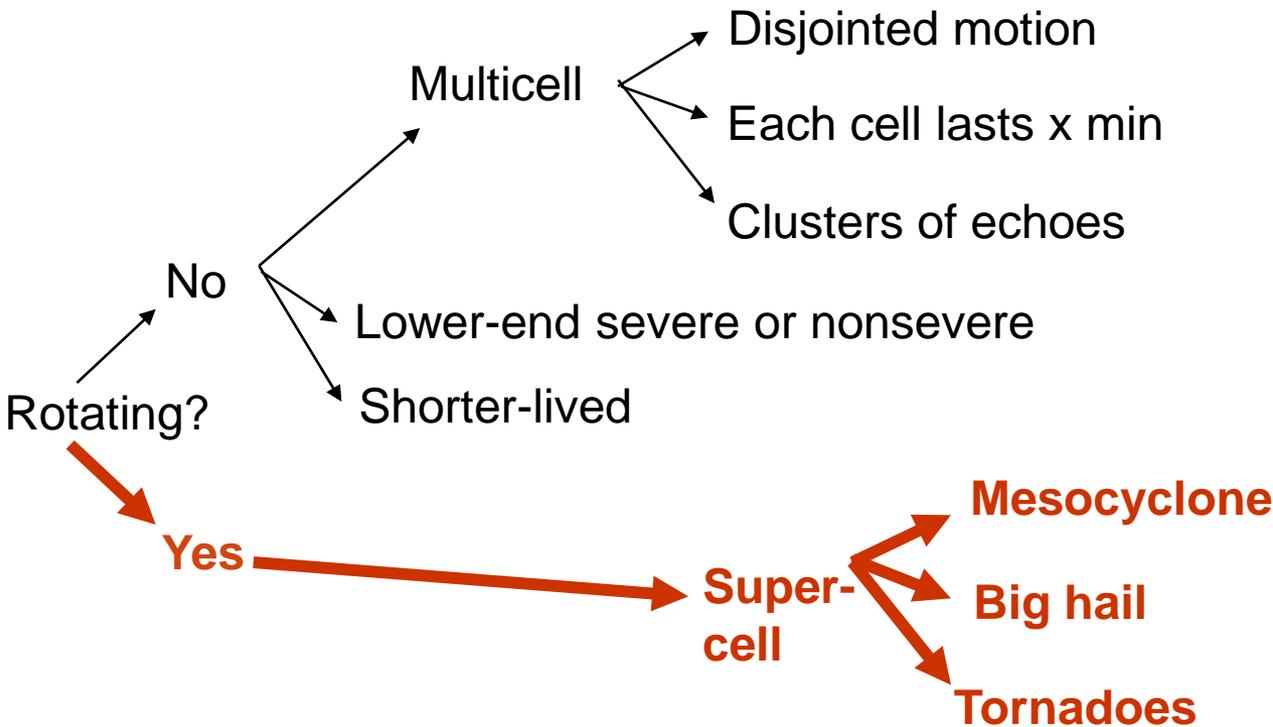
Isa: Inherit characteristics –
e.g. roof, walls, sits on
ground



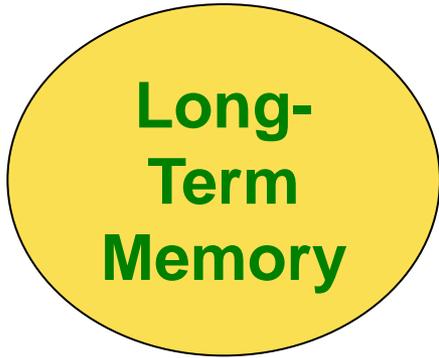
Help Learners Link Important Concepts for Use on the Job



Activation:
Teach information the same way you need to use it on the job!



Hierarchical knowledge scheme



Help Learners Practice Processes Needed on the Job



WES Cases:
Consider using both “horses” and “zebras” for training. “Horses” are ordinary cases that allow practice of underlying thinking / analysis.

Tropical environment suggests weak tornadoes possible and main threat.



Form a mental model and continually check against it



Assess storms w/rt conceptual model
(e.g.,
• rotation aligns with notches
• rotation shallow)



Watch trends in rotation strength; reassess alignment of rotation with inflow notches; etc.

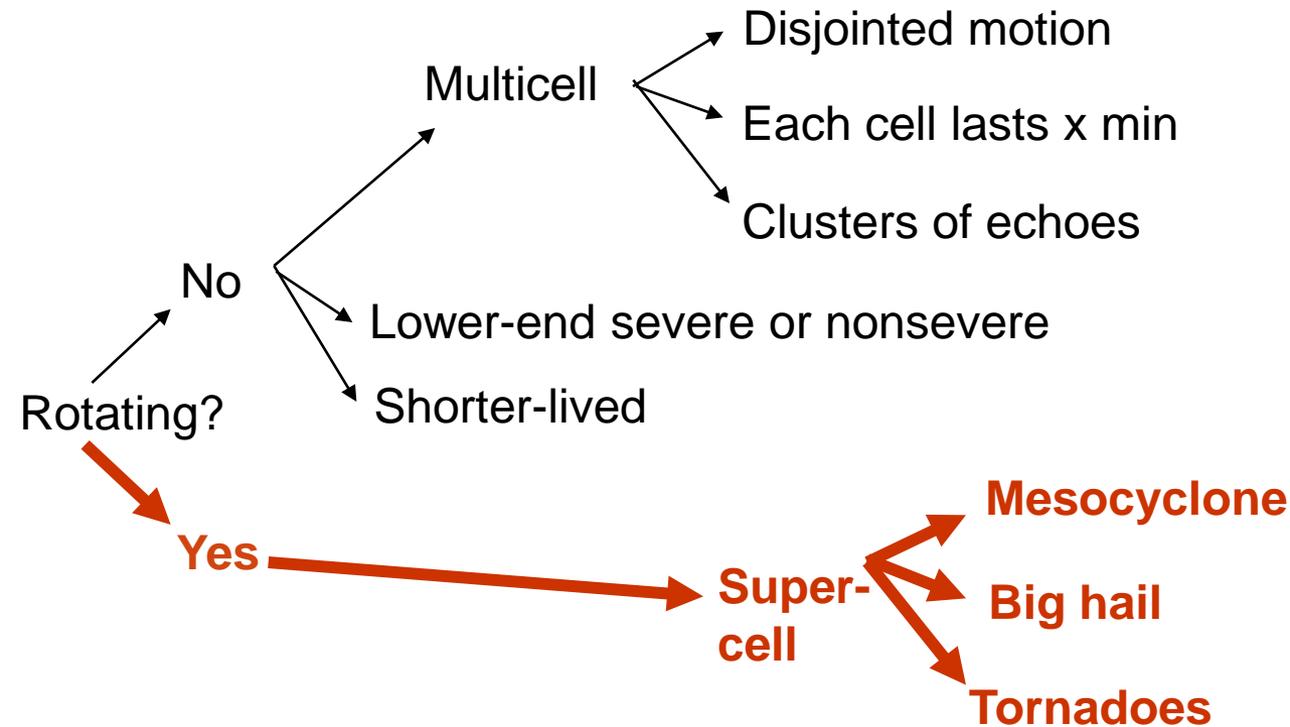
Thinking processes and strategies

Strengthen knowledge and process thinking

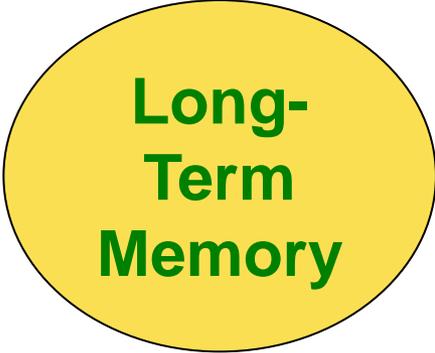
PRACTICE

Practice Makes for Stronger Trains of Thought

Long-Term Memory



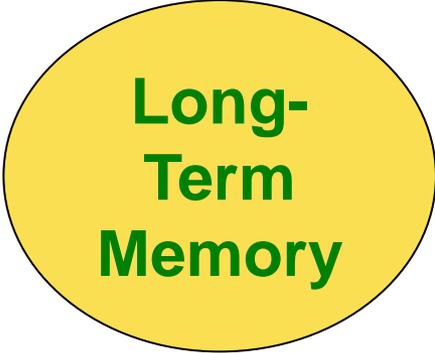
Activation:
We want to exercise the same links during learning that they need on the job!



Long-
Term
Memory

Automation

- **Our very survival as a species. 😊
- We automate common tasks/procedures
 - Literally use less brain power!
- Examples of things you've automated?



Long-
Term
Memory

Automation

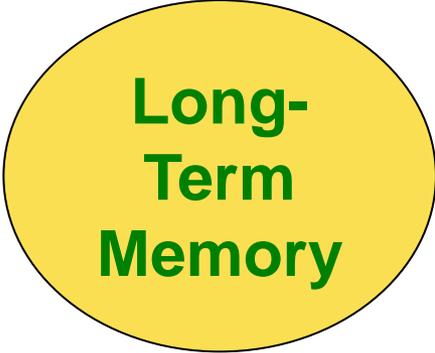
- **High quality feedback** is critical while things are being automated!!
 - reinforce the good stuff
 - correct the point at which things go sour

Apply It!

Automation of Procedures

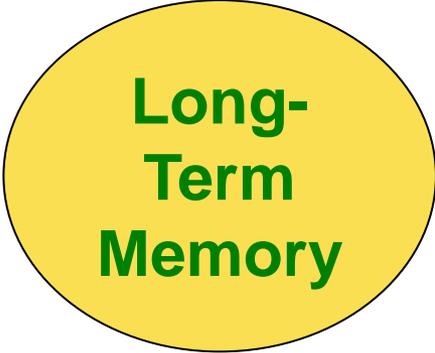
- What should forecasters be automating?

Interference



Long-
Term
Memory

- Previous knowledge can conflict with new knowledge & inhibit learning
 - Retroactive: something new makes you forget something old
 - Pro-active: something old prevents you from learning something new
- Think of an example where you have seen this happen....



Long-
Term
Memory

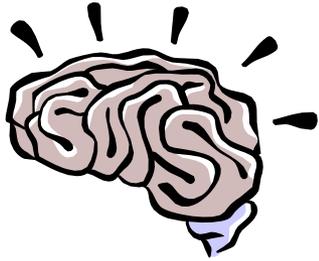
Types of Knowledge

- Declarative – facts & info, organized
- Procedural
- **Metacognitive**
 - **Monitoring your learning**
 - **This is a skill you can learn!**
 - **We can facilitate them monitoring – how?**

Apply It!

Metacognition

- How can I help my forecasters monitor how they're doing?



Helping Them Learn



We help them realize, but manage the gap



We focus their attention and take advantage of dual-processing



We them them exercise to strengthen process and knowledge links

Shallow Processing

Deep Processing

We help them think deeply and connect new information to what is needed on the job