

Mistakes, the engine of learning: Using Retrieval Practice for VTNE Success

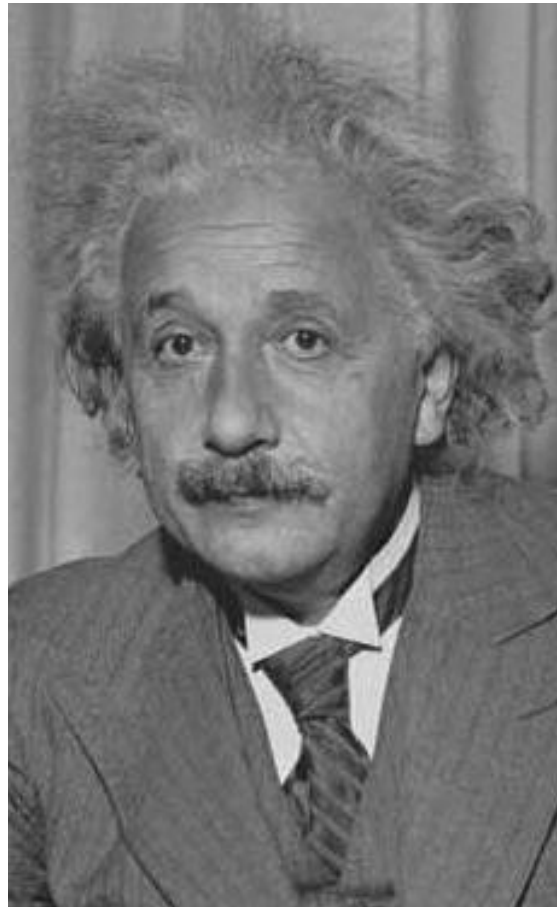


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Mistakes: The Engine Of Learning

-or-

If mistakes are the best teachers, how come
I'm not a genius by now?



Denial, Grief and Acceptance

Graduation day



"Damn, I'm good."

1 week before
VTNE



The morning
after

"My name is mud."



**OK, that happened,
now what?**

Adaptive Learning and Retrieval Practice for VTNE

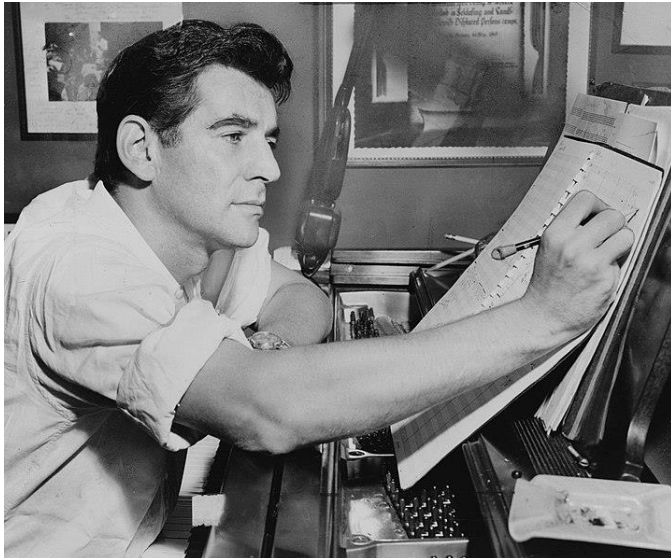
Helping Students Succeed on a Test About "Everything"

- **Walk before you run:**
 - Best laid plans
 - Accountability & the den mother effect
- **Learn by testing**
 - Mistakes, engine of learning
 - When in doubt, GUESS
- **ACTIVE independent study**
 - Legos learning
 - No zebras



A Study Plan That Works

**“To achieve great things,
two things are needed;
a plan, and not quite enough time.”**



- Leonard Bernstein

The biggest mistake people make (by far):

- They don't complete their program
- They don't complete 80-100% of the timed tests in the final 5-7 weeks.
- Over and over, when we interview retakers, the single most common thing they share?
- They did not finish their timed tests in the home stretch

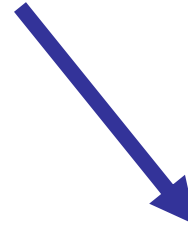
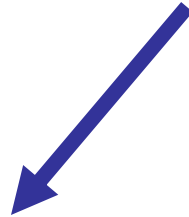


Study Smarter

- **Use VTNE study to help you in clinics**
~3-4 months: Practice testing habit + books/notes
- **1st pass (2 mos): Steady progress**
 - 2/3 Practice testing
 - 1/3 Active independent study (books,notes)
- **2nd pass (1 mo): Push 6 wks pre-VTNE®**
 - 2/3 Timed testing
 - 1/3 Active review of indep. study topics



Simple Prep Plan for VTNE®:



Practice testing **2/3**

- ROUTINE, a habit
- 6-7 days a week

Independent study **1/3**

- Hit the books, make notes
- QUIZ YOURSELF

ACCOUNTABILITY

Where the magic happens

Accountability



Den Mother

or



Drill Sargent

Accountability

- Most important ingredient for a successful prep program is you.
 - Students need to know you are paying attention
 - Skin in the game matters
 - Continuity and **structure** matter
 - Positive reinforcement helps a lot



Walk before you run:

Organizing the Home Stretch for VTNE Success

- **Example: Lab Review**
 - 1-2 weeks
 - Correctly complete 80% of practice tests (in-class and at home)
 - High-altitude summary reviews on things like CBC, U/A, Basic Blood Chem, Parasites etc
 - Use retrieval practice Qs at end of each class
 - Timed quiz on topic each week
- **Mock readiness exam at end of class**

**Some stress in school is normal,
BUT
it's hard to learn or perform well if you
are totally stressed out**



**Invest some positive energy in
exercise, sleep and breaks**

What doesn't work

Organizing for VTNE Success



- Free test prep service, no skin in the game
- No structured program (“Sink or swim”)
- Negative reinforcement / punishment-based

Your study plan: Simple, but powerful

3 months ago:



"I've got a plan"



Test in 1 week:



Pop Quiz... yay?



Horses usually can **NOT** do which one of these things?

- A. Breathe through their nostrils
- B. Vomit
- C. Digest grains
- D. Sleep standing up
- E. Pass gas

Horses cannot [usually] do which of the following?

B. Vomit

The position of the stomach when it is full plus a tight sphincter between the oesophagus and stomach make vomiting nearly impossible

SO...

if you see a horse with feed coming out its nostrils, it's an emergency!

(either esophageal obstruction or a stomach that is about to rupture)

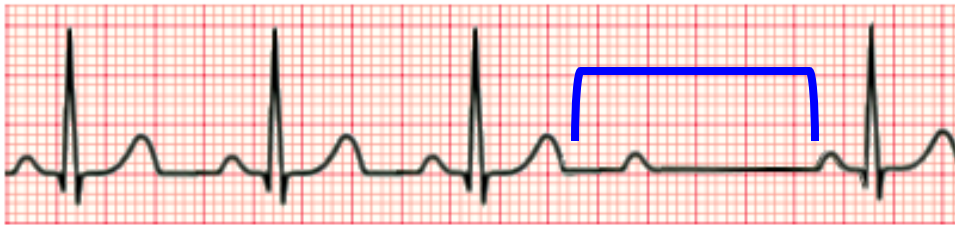
This is why we pass nasogastric tubes on any horse with colic.



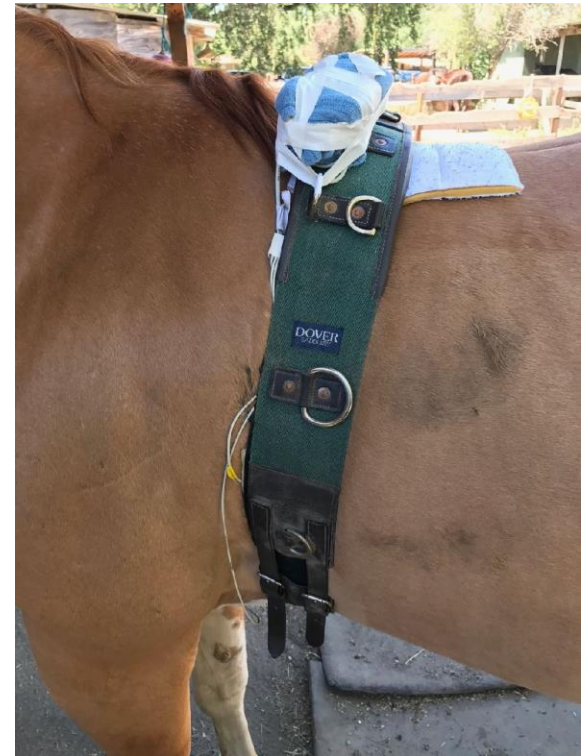
Unique horse physiology

Cardiovascular

- Large animals w/ **slow** resting HR (24-48 bpm)
- Prone to a normal arrhythmia called **second-degree AV block** (dropped beat)



Top - A horse wearing a Holter monitor - records a 24-hour and exercising ECG.
Bottom - 2nd degree AV block is common in horses. See the "dropped" beat (arrow).
Images courtesy of Nora Grenager, VMD, DACVIM (top) and [apatchett](#) (bottom)



Respiratory

- Horses **cannot breathe through their mouths**
- They are athletes with HUGE lungs

We call our work “practice” for a reason



- The point of life (and VTNE®) is not to avoid mistakes
- The way to success is to learn from our mistakes,
...and improve



Two wrong ideas about learning



- **Cramming facts in = learning**
- **Mistakes are bad**

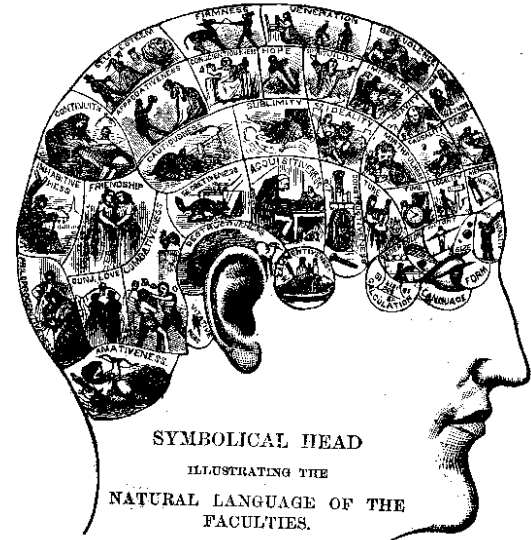
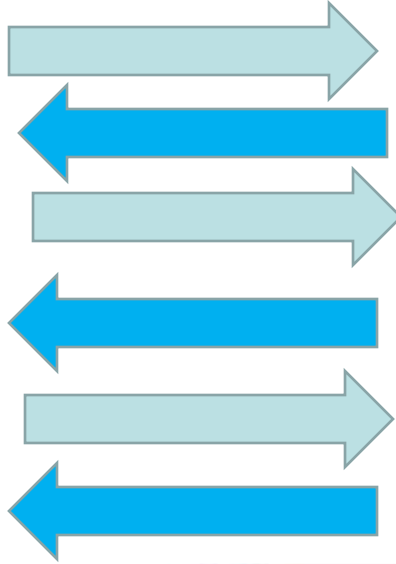
Learn Better, by Testing: Retrieval Practice

- Pulling information **OUT** of our heads (retrieval) beats cramming
- **LOW-stakes** practice testing=**DECREASED** anxiety
- **INCREASED** comfort making mistakes is good for learning

How We THINK We Learn



How We Really Learn: Working Memory



Learn Better, by Testing: Retrieval Practice

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- **LOW-stakes** practice testing=DECREASED anxiety
- **INCREASED** comfort making mistakes is good for learning
- As missed questions recycle, you learn

Retrieval practice

- **A learning strategy,**
(not an assessment strategy)
- **“Desirable difficulty”**
 - Mental struggle during retrieval strengthens learning
 - Better than easy learning w/out struggle (cramming)
- **Charlie Parker and Miles Davis weren’t born playing jazz...they practiced**
 - When when we practice our knowledge
 - We remember information better, long-term



Retrieval Practice How Tos

- **When is best?**
 - **AFTER** a lesson = more robust learning
 - Also good to challenge yourself a day, a week later
- **Should I accept feedback? YES!**
 - Corrects retrieval mistakes
 - Better explanations= more powerful learning
- **Should I use multiple choice, short answer, essay, call and response or what?**
 - **All of the above**

Retrieval Practice How Tos

- **Should I do retrieval practice for grades? NO**
 - Low-stakes practice decreases student anxiety
 - Less pressure & more comfort with mistakes
=Increased learning
- **Do I need to change my curriculum? NO**
 - Just add quick retrieval opportunities to class
 - Help students get information OUT
- **Will frequent quizzes increase test anxiety? NO**

Strategic Guessing -or- If it works in Vegas...



Multiple choice tricks of the trade

- **The Good News**

Correct answer is **GUARANTEED** to be among the choices

- **The Bad News**

You **WILL** hit questions you don't know

Common mistake: Spending MOST of your time on questions about which you know the LEAST.

- **Key to success:**

Train yourself to MAKE CHOICES and then MOVE ON.

01:04:55

Timer clock

Save & Exit

1 2 3 4 5 6 7 8 ... 60

Hide Jumper

Show Jumper

Show all

Which of the following organ systems is most likely involved in the problem shown in this cat?



- ☐ Hepatic
- ☐ Endocrine
- ☐ Renal
- ☐ Gastrointestinal
- ☐ Respiratory

If you don't know an answer,
guess strategically

Hide choices that feel wrong,
narrow it down...and **GUESS!**

HIDE

HIDE

HIDE

HIDE

HIDE

1

2

3

4

5

6

7

8

...

60

Hide Jumper

Show Jumper

Show all

Which of the following organ systems is most likely involved in the problem shown in this cat?

☐ Hepatic☐ Renal

HIDE



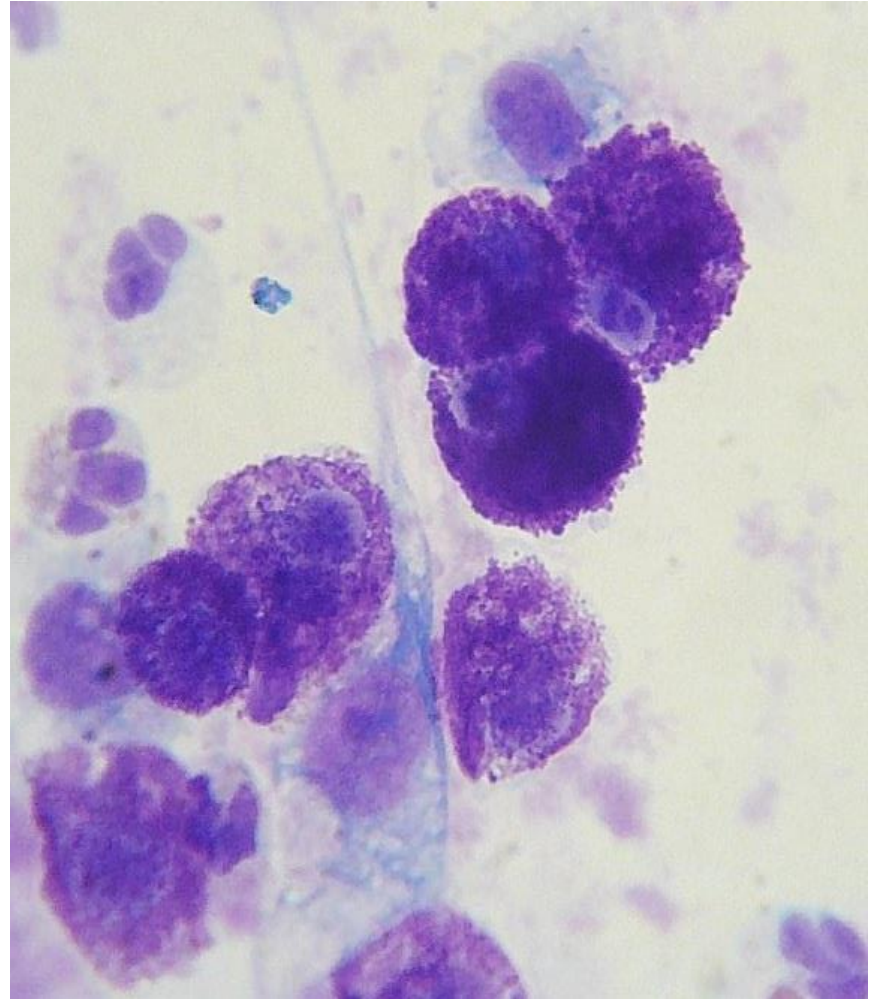
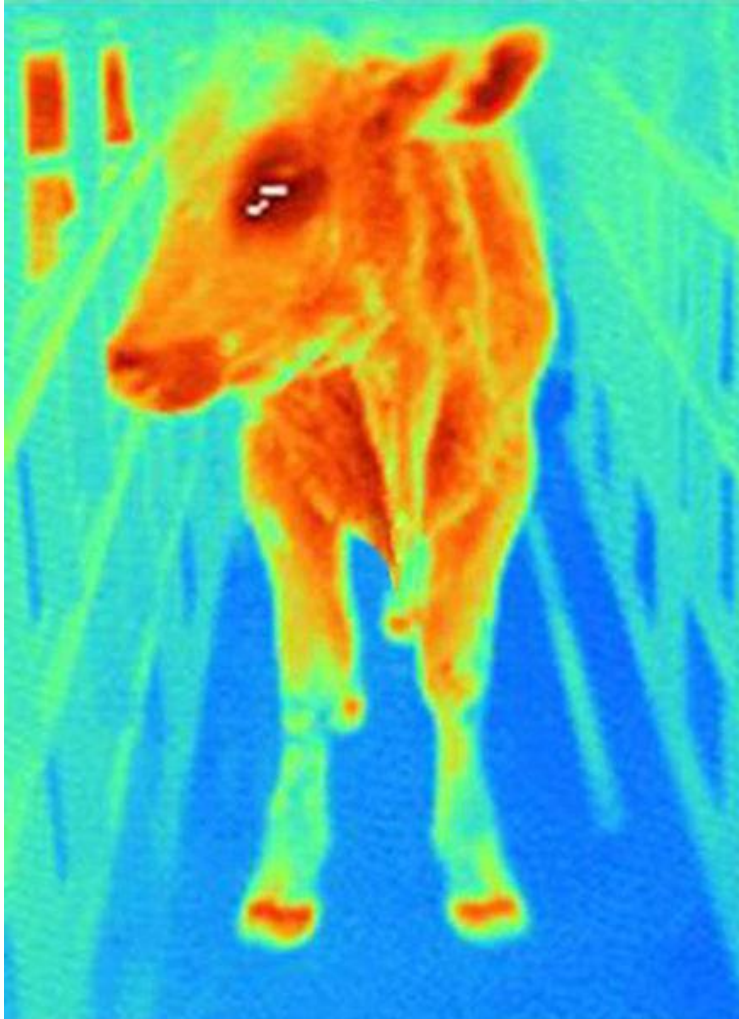
HIDE



Strategic Guessing

Hide choices that feel wrong,
narrow it down...and GUESS!

Strengthen your working memory with images and cases



The **SECOND** biggest mistake people make:

- They don't do independent study
- Or they read **passively**
- They don't actively **QUIZ** themselves on the thing they just read
- Give 1/3 your prep time review notes & books on topics that give you trouble

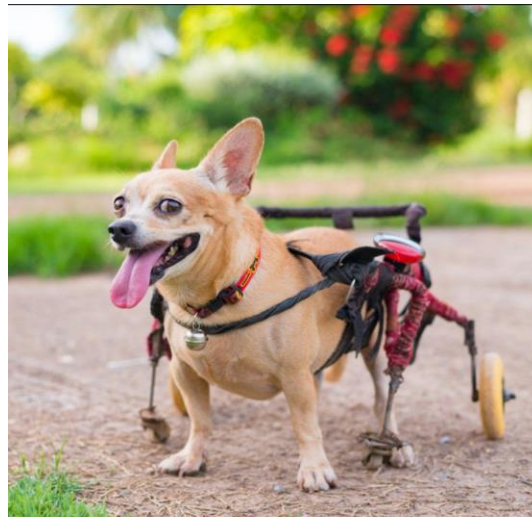


Why independent study?

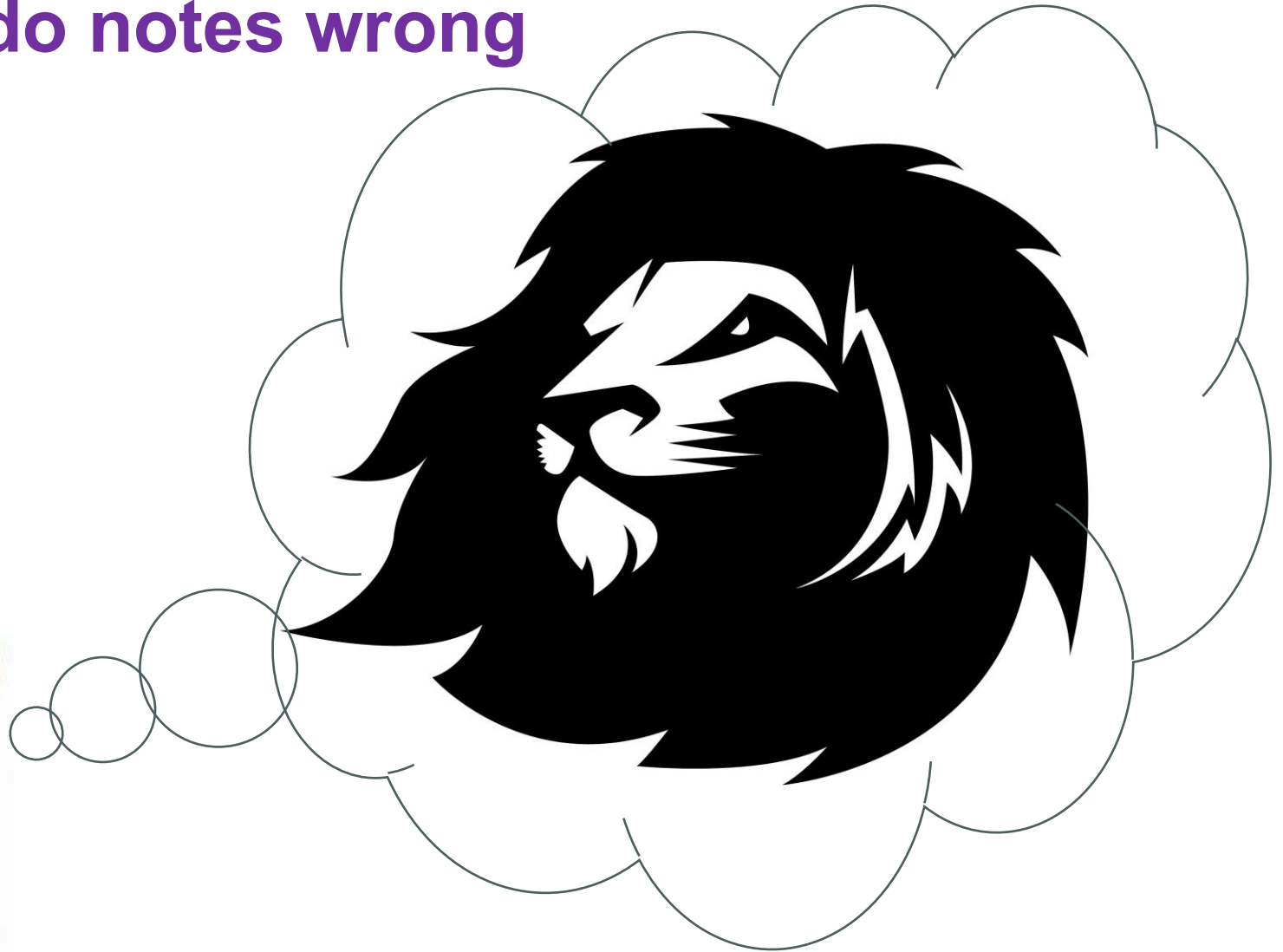
- If all you do is memorize Q's, it's like your mind is as stiff as a calf with tetanus



Image courtesy: [L. Mahin](#)

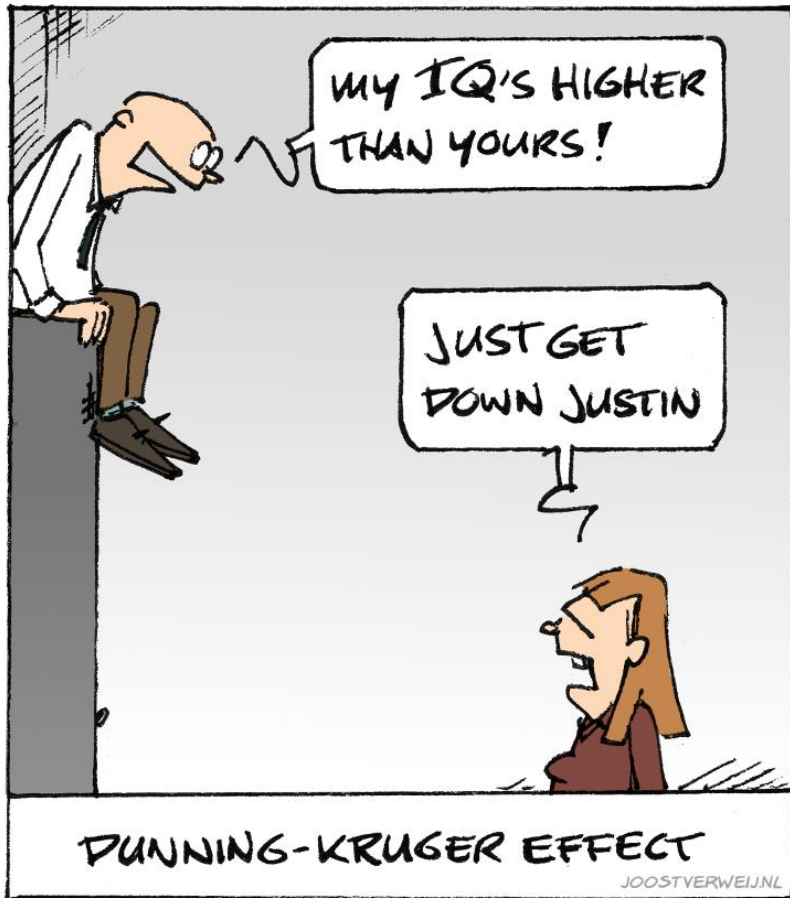


Overconfidence bias or How to do notes wrong



Overconfidence bias & Notes

- **The Dunning–Kruger effect:**
A cognitive bias where people with limited competence overestimate their knowledge or abilities.



Activating Prior Knowledge

Connecting the dots



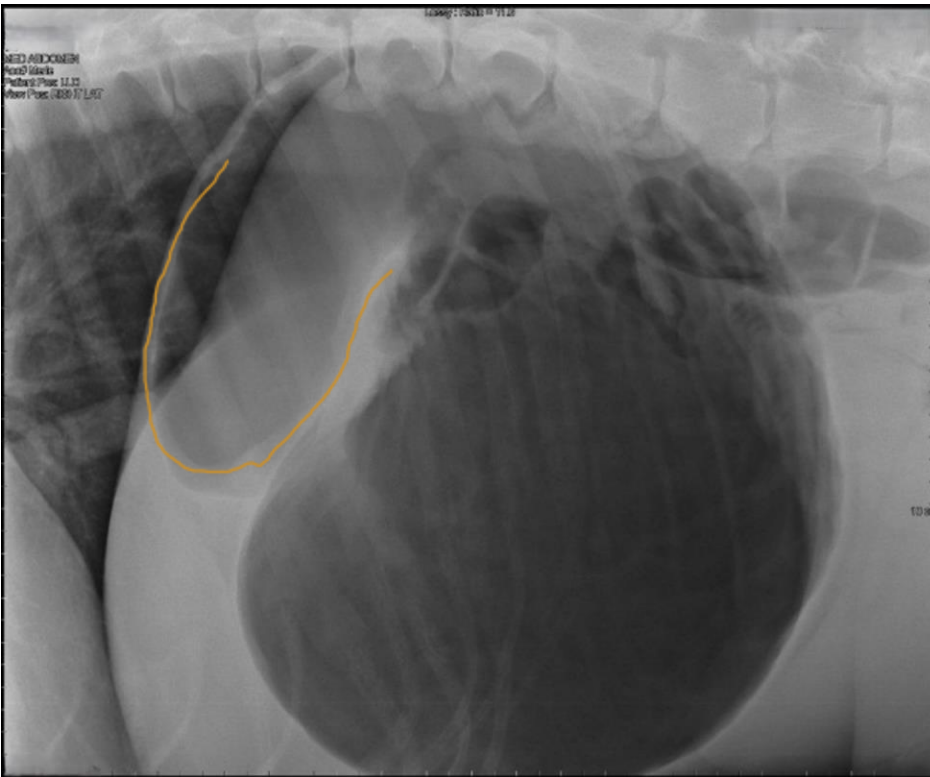


Connecting what you DO know,
to what you DON'T know

- Another powerful exercise is to connect something you know from one species to the animal in front of you
- Say you are an expert on cats. You know everything there is to know about FeLV.
But on the farm, you are lost
- With a Q about a cow with possible leukosis, use what you remember about FeLV retroviruses

Vet med is **full** of connections

- GDV in dogs vs: bovine bloat



Lateral abdominal radiograph demonstrating GDV (pylorus outlined)

Image courtesy of Jen Mahon, DVM, DACVECC

Vet med is **full** of connections



- Parvo in puppies vs: parvo in pigs vs: parvo in cats (feline panleukopenia)

Pop quiz: Key lab finding in a parvo puppy?
Moderate to severe leukopenia (like cats!)

Connection Question

A snake is presented because the owner says it spends a lot of time in its water bowl. A piece of white paper yields numerous small, white, oval-shaped organisms. Under the microscope,

What is the appropriate treatment?

Correct



This is a classic presentation for the [common snake mite](#) (*Ophionyssus natricis*); treat the snake with a permethrin.

Mites can be found around the eyes, in gluttal folds, or in any other skin indentation. The mites transmit disease and mechanically transmit *Aeromonas hydrophila*.

Hyperimmune bovine colostrum is an effective Tx of [cryptosporidiosis](#) in reptiles.

Praziquantel is a Tx for [pentasomes](#).

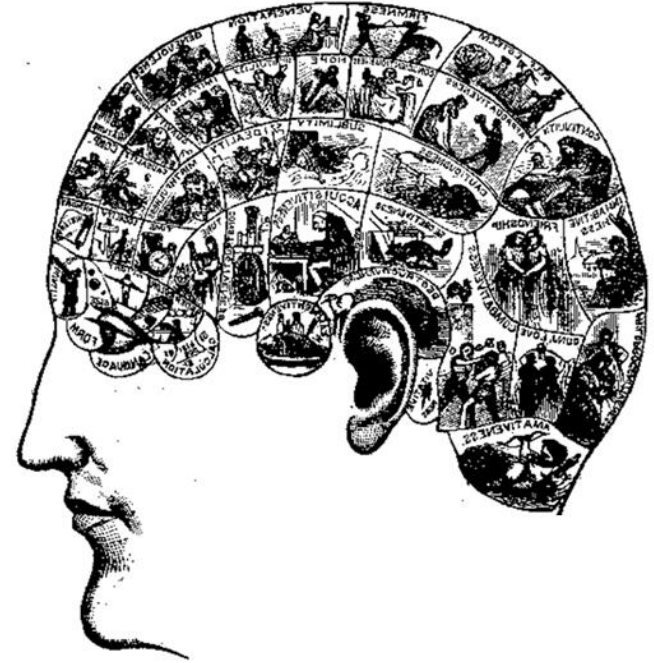
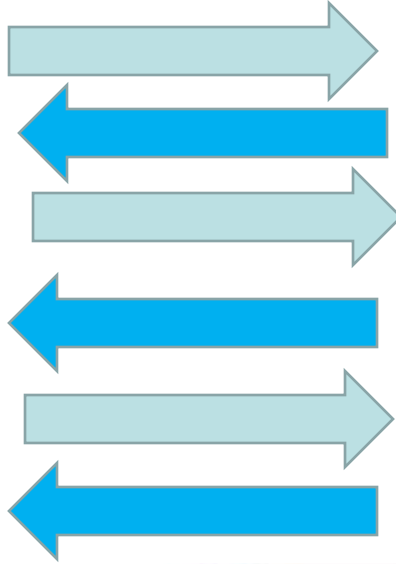
Image courtesy of [wgliftboy](#).

You know more than you think you do

Connect what you **DO** know,
to what you **DON'T** know

- Like a muscle, you can strengthen your ability to access prior knowledge with retrieval practice
- Just practice pulling useful **bite-sized** pieces of information OUT of your brain over and over.
- By test day, this is easier and more familiar.
- When you see a Q you don't know,
retrieve something you DO know **and compare**

How We Really Learn: Working Memory



**Imagine that facts are lego bricks,
and your brain is full of them**



**How do you get
information out?**

One brick at a time



One brick at a time



You can only recall a few facts in your head at a time

Start with one brick
“Classic Case”



Add another brick
“Test of Choice”



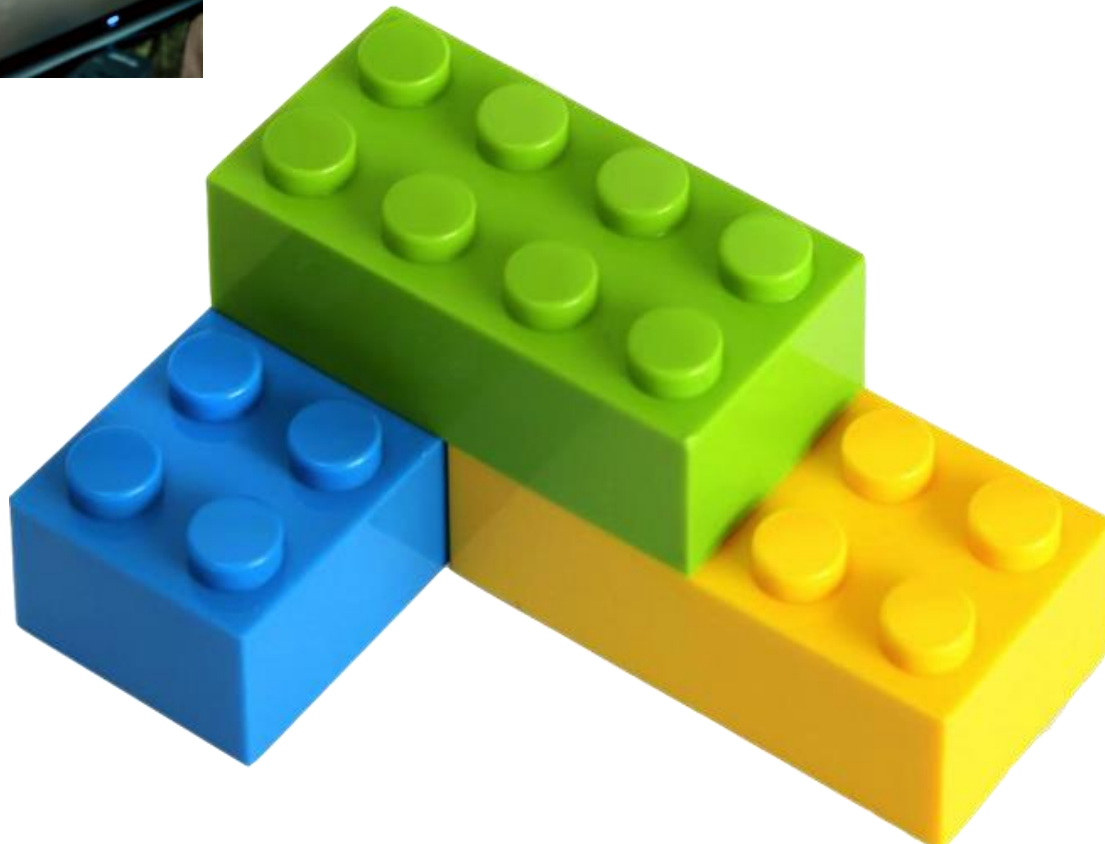
Add one more brick
“Tx of Choice”



Now we're getting somewhere

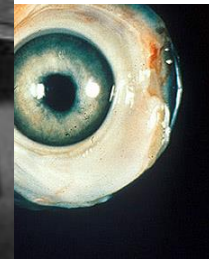


You may not know everything,
but you are standing on a
solid foundation



Accessing prior knowledge

- Set yourself up for success
- Organize key topics into small, bite-sized pieces and
- **Write. It. Down.** (It's old school, but it works)



No Zebras: Prioritize topics, triage information



If you hear hoofbeats, think horse – not zebra.
(Unless you are in Botswana)

Image courtesy of [John Storr](#)

Pop Quiz , YAY!



What do you do when you see this pattern on the ECG of a racehorse?



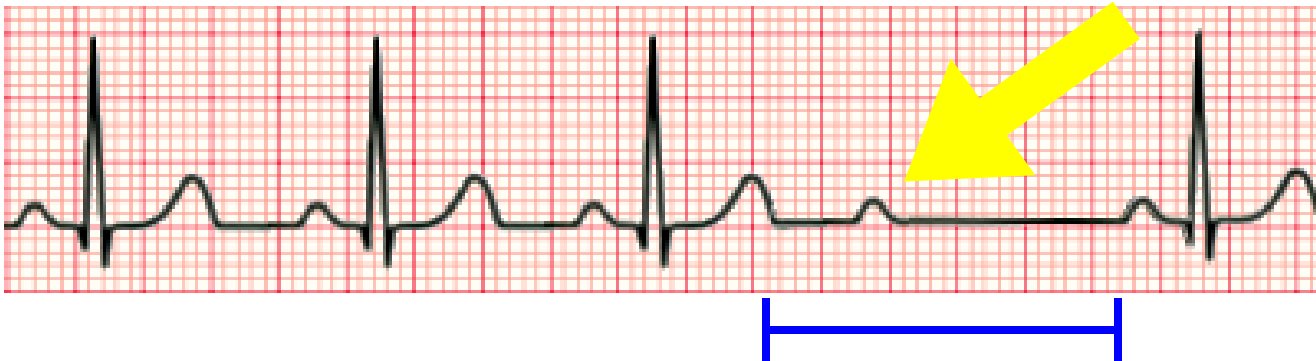
- A. Run around waving your arms
- B. Weep
- C. Check your electrode placement
- D. Help the vet administer oxygen
- E. Set up to place an I.V. STAT!
- F. Yawn

What do you do when you see this pattern on the ECG of a racehorse?

Yawn...

An occasional dropped beat in an athletic horse is ok

Horses are prone to a normal arrhythmia called
second-degree AV block



Thank you and good luck!



**“I have never let my schooling
interfere with my education.”**

–Mark Twain



Selected references:

Good summaries

Retrieval practice resources online <https://www.retrievalpractice.org/>

“To Really Learn, Quit Studying and Take a Test”, New York Times, Jan 20, 2011, P. Belluck
<http://www.nytimes.com/2011/01/21/science/21memory.html>

Do You Suffer From Decision Fatigue? New York Times, Aug 17, 2011, J. Tierney
<http://www.nytimes.com/2011/08/21/magazine/do-you-suffer-from-decision-fatigue.html?hpw>

Books and Peer-reviewed papers

Retrieval-Based Learning: A Decade of Progress (2017), Karpicke, JD in
Learning and Memory: A Comprehensive Reference, 2nd ed., John H. Byrne, editor. Vol. 2, pp. 487-514.
<http://dx.doi.org/10.1016/B978-0-12-809324-5.21055-9>

Make it Stick: The Science of Successful Learning (2014). Brown, Roediger and McDaniel
<https://www.retrievalpractice.org/make-it-stick>

Karpicke, J. D., & Blunt, J. R. (2011). *Retrieval practice produces more learning than elaborative studying with concept mapping*. Science, 331, 772-775.
<http://www.sciencemag.org/content/331/6018/772.full.pdf?keytype=ref&siteid=sci&ijkey=mESdLR0p25r8k>

Roediger, H. L., & Karpicke, J. D. (2006). *Test-enhanced learning: Taking memory tests improves long-term retention*. Psychological Science, 17, 249-255.
http://memory.psych.purdue.edu/downloads/2006_Roediger_Karpicke_PsychSci.pdf

Roediger, H. L. & Karpicke, J. D. (2006). *The power of testing memory: Basic research and implications for educational practice*. Perspectives on Psychological Science, 1, 181-210.
http://memory.psych.purdue.edu/downloads/2006_Roediger_Karpicke_Review.pdf

Carrier and Pashler: *The Influence of Retrieval on Retention, Memory and Cognition*, 1992, 20 (6) 633-642
http://laplab.ucsd.edu/articles/Carrier_Pashler_MemCog1992.pdf