



Study, Are You Up For It?



How Do You Study ? A Check-Off List

- I read the text before lecture
- I read the text after lecture
- I read the text over and over
- I do the practice problems at the end of the chapter
- I do flash cards
- If available I always use the textbook's website
- I hate to read (a check here → check out of college)
- I like to study with the book closed

Your Own Study

What is the Goal? **Building Knowledge** in **Myself**

My Study: Is it efficient ? Does it result in A's ?

Can I remember material from last semester's courses ?

Especially prerequisite courses that are required before registration to upper level courses. Success in these courses ACTUALLY depends on my knowledge and problem solving ability of the prerequisite courses.

Does my study result in shallow knowledge or deep knowledge?

HAS ANYONE BOTHERED TO STUDY EFFECTIVE LEARNING? How to get to 100%

The Study of Studying

Experimental Setup: 4 Groups of Students (Purdue University and Washington University) study 40 Swahili/English word pairs with eight rounds of study/testing.

<u>Group</u>	<u>Study / Test Modality</u>
S T	Study all words, Test all words.
S _N T	Study only pairs missed on previous Test, Test all words.
S T _N	Study all words, Test only missed words on previous test.
S _N T _N	Study only pairs missed on previous Test, Test only words missed on the previous Test

Tests given after study session interrupted by a short "distracter task" verifying multiplication problems.

Ref: Karpicke, J and H.L. Roediger III, 2008. The Critical Importance of Retrieval for Learning. *SCIENCE* 319:966-968 (Feb 15, 2008)

The Learning Curve

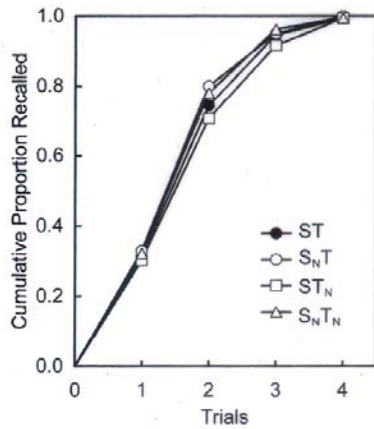


Fig. 1. Cumulative performance during the learning phase.

1. Learning enhanced by repeated intervals of studying and testing.
2. No significant difference in Study Modality for learning curve.
3. Four study/test sessions were required to get to 100%
4. No difference in the speed of learning, but what about the speed of forgetting?

Longer Term Memory Greatly Affected by Study Modality = Recall Is The Most Important!

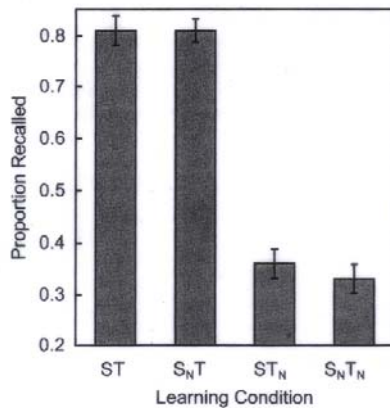


Fig. 2. Proportion recalled on the final test 1 week after learning. Error bars represent standard errors of the mean.

Test Results **a Week after** Study/Testing.

1. Repeated Testing All Words increases Longer Term Learning.
2. Studying missed words works as long as Testing All was used.
3. The difference between short term (shallow) memory and longer term (deep) memory are significant

Testing is Really Studying with the Book Closed

1. Many instructors know that they actually LEARN from testing – just consider the energy flow in a person taking an exam!
2. Testing is really a form of accountability: does the mind know what it has studied?
3. This form of “accountability” can be accomplished at textbook websites with practice tests (as long as they are done with the book closed), end of chapter problem sets or other serious self tests.
4. Accountable study sets the student up to be a better problem solver as well as removing exam anxiety.

Study Takes Time and Energy

TIME: everyone says study more. But that can be unproductive by itself UNLESS study uses testing (recall).

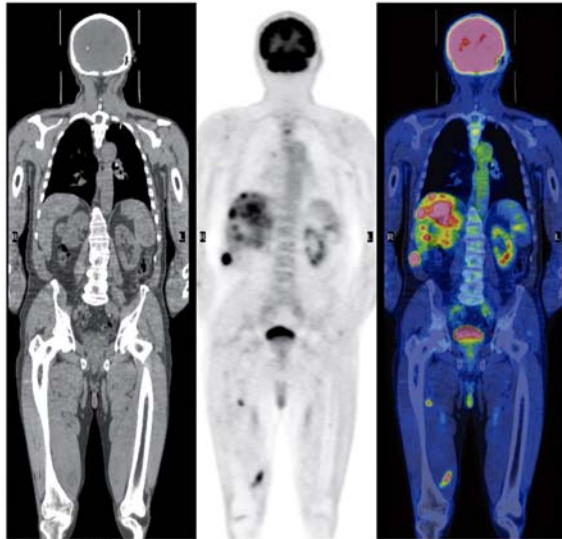
ENERGY: has anyone studied the brain using energy?

Get Ready for Positron Emission Tomography (PET).

Positron Emission Tomography

Left panel – CT scan.
 Middle panel - PET scan
 dark colors higher glucose use.
 Middle panel - panel PET
 scan superimposed on CT
 scan with false colors
 (green→red) increasing
 glucose utilization

Brain is normal and
 using glucose as fast
 as liver-spine cancer
 (malignant
 melanoma).



Box 14-1 figure 3
 Lehninger Principles of Biochemistry, Fifth Edition
 © 2008 W. H. Freeman and Company

Red then pink, highest
 rate of metabolism

Starvation

Ketone bodies

Normal diet

Glucose

Brain Uses Energy

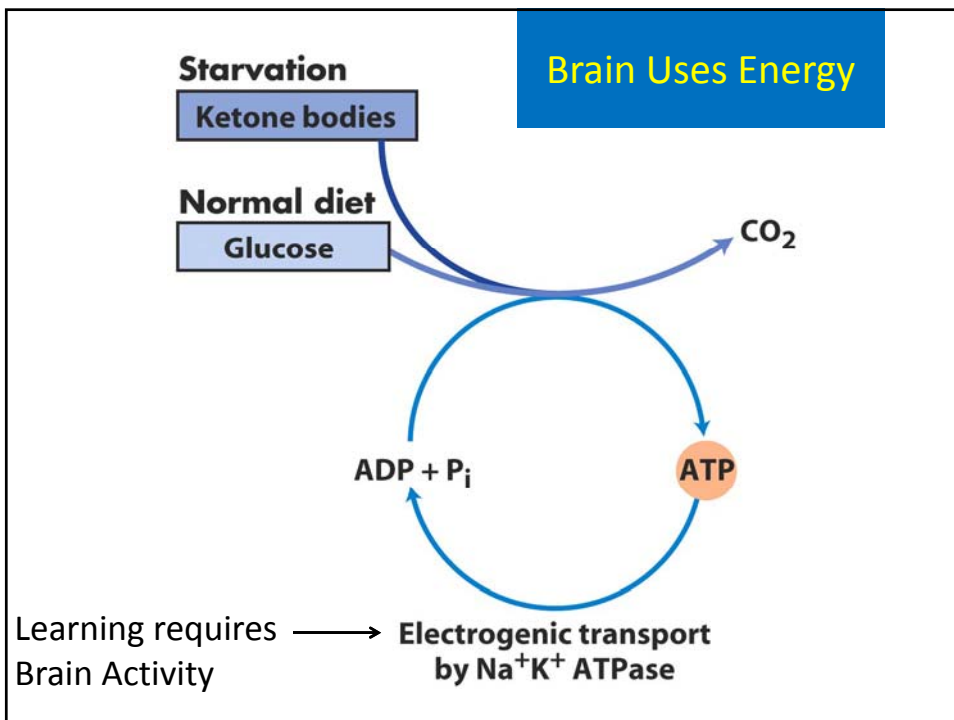
CO₂

ADP + P_i

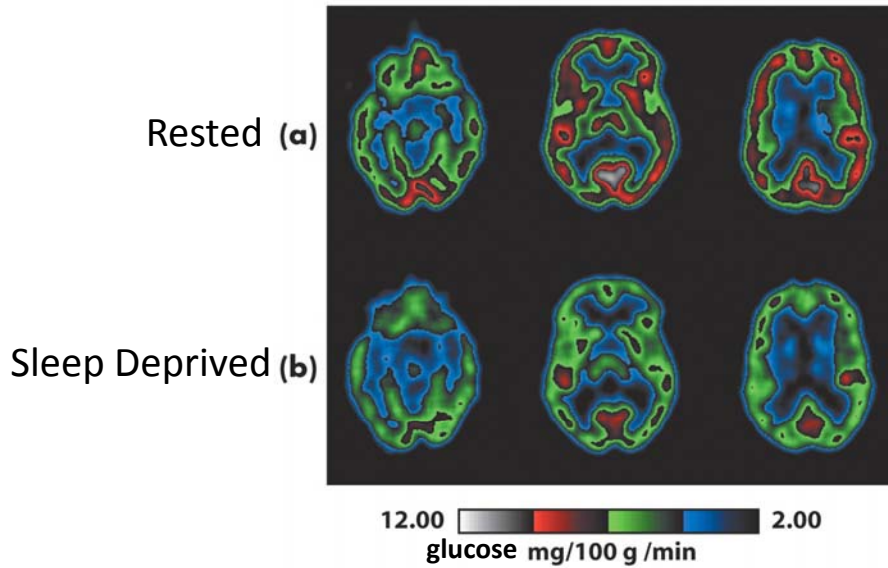
ATP

Learning requires
 Brain Activity

→ **Electrogenic transport
 by Na⁺K⁺ ATPase**



PET Brain Scans - Rate of Glucose Use



Accountable Study can not be done the "Night Before" the exam

Does Your Accountable Study Get You To Answer These? Before the Exam?

Bloom' sTaxonomy	Learning Skill	Question stems...
KNOWLEDGE	memorization and recall	What is....? Who, what, when, where, how, describe...?
COMPREHENSION	understanding	What would happen if...? What does.. illustrate about....? What is analogous to....?
APPLICATION	using knowledge	How could...be used to...? What is another example of...?
ANALYSIS	taking apart information	How does...affect...? What are differences...similarities...?
SYNTHESIS	reorganizing information	What is the solution of.....? Create or design a new....?
EVALUATION	making judgments	Why is....important? What is best for....? Do you agree/disagree that...?

Building Knowledge in You is Like Building a Car

Car manufacturers test and test and test some more before they submit cars to the ultimate test = being driven by the public.

They build cars and want them to be perfect.

You are building knowledge that you can use over and over. Do you want just enough to get by, or get the best possible grade and walk away from FIU with useful knowledge?

Consider this:

Do you want to be operated on by a physician that “got by” courses or really knows the material?

Now, How are you going to Study?

1. Check your schedule - Work out WHEN you can Study.
2. Pencil in times for Group Study, Individual Study (keep in mind: you take the test, not the group).
3. ACCOUNTABILITY is only important to YOU.
4. If you planned your time well and **studied early** and **often** with the BOOK CLOSED...you can walk into an exam with a rested, active brain and with CONFIDENCE that *your knowledge* will produce accurate and thoughtful answers to the exam.

GO FOR IT !!!