

**Organizing Information to Enhance Recall and to
Facilitate its Use in Clinical Decision Making
Part II: Active Reading and Note Taking**

Part I discussed the theory behind organizing information and gave examples of organizational strategies. Part II will discuss some practical aspects of studying by using categories. This is geared specifically toward medical students but the principles would still apply to residents or any other learner.

- I) **Organizing Content:** How do you decide what information to study? Consider studying to be like a pyramid. You start the process by creating a foundation, and then add more information as you go up. If you have a poor foundation and begin filing “zebras” your building will not be very strong.
- A) **What to study:**
- 1) At the base of the pyramid are:
 - a. Common diseases (Myocardial Infarction)
 - b. Common presenting symptoms (Vomiting, Headache, etc)
 - c. Common presenting signs (Hepatomegaly, Shock, etc)
 - 2) Farther up the pyramid add:
 - a. Diseases that are less common but very important possibly because they are dangerous (Meningitis)
 - b. Diseases that are less common but still frequent enough that the primary care doctor is reasonably likely to see them
 - c. Classic diseases (Cystic Fibrosis) which have a high teaching value
- B) Many of the clerkships give you a curriculum. This is often VERY helpful in showing you what the clerkship director feels is important. Look at this at the start of a rotation and then weekly. Use this to plan your reading for the week.
- C) **How to organize the material you are studying:** This is crucial! You are not only organizing this on paper, you are also organizing this in your head. You are deciding how your brain is going to handle or store this information. You are deciding how your brain is going to make connections. This will be vital for both recall and for synthesizing information.
- 1) At the base of the pyramid:
 - a. **Organize your thinking into Categories :** For example, when studying about weakness there might be a number of ways of categorizing:
 - i. What are the **anatomically relevant areas:** (brain, anterior horn cell, peripheral nerve, neuromuscular junction, muscle).
 - ii. **VINDICATE:**
 - Vascular
 - Infectious
 - Neoplastic
 - Drug
 - Iatrogenic
 - Congenital
 - Allergic or Autoimmune
 - Trauma or Toxin
 - Endocrine
 - iii. **SYSTEMS** (Neuro, Cardiac, Musculoskeletal, etc)

There is not *one* right way of categorizing disease. You may find that one of these methods works best for certain presenting symptoms and a different categorization scheme may work better for another symptom. If you try one and it doesn't seem to get you where you want to be, try another.

2) Farther up the pyramid **study one prototypical disease in each category**. For example if we categorized “weakness” anatomically:

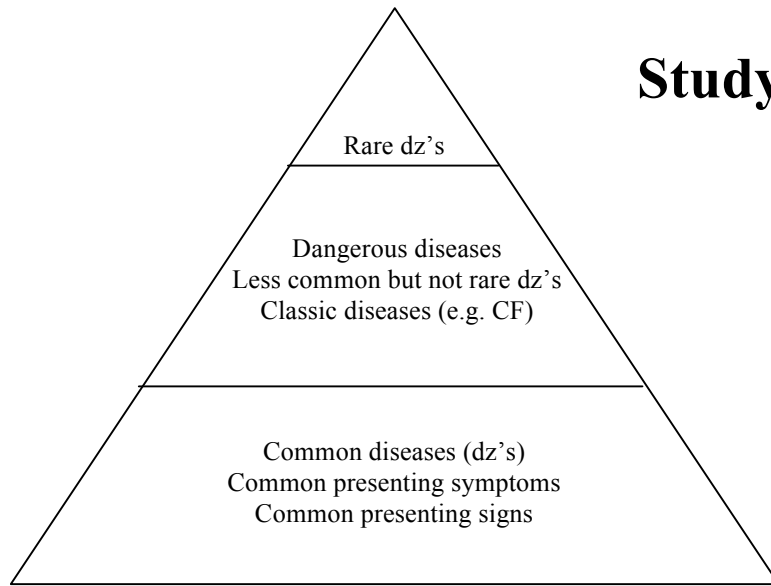
- a. Brain → **Stroke**
- b. Anterior Horn Cell → **Amyotrophic Lateral Sclerosis**
- c. Neuropathy → **Guillain Barre Syndrome**
- d. Neuromuscular Junction → **Myasthenia Gravis**
- e. Myopathy → **Duchenne Muscular Dystrophy**

The goal here is to have an “anchor” for each category; a hook. In other words, you want to know one disease in each category and you want to know it well! You should have a deep understanding of this one disease (in each category) because you will use it as a representative of that category. Thus, the next time you see a patient with weakness, you will compare and contrast this new patient with your disease representatives. That way you will figure out which category of disease that patient is having problems with, even if you have never seen that disease before and don't know a thing about it.

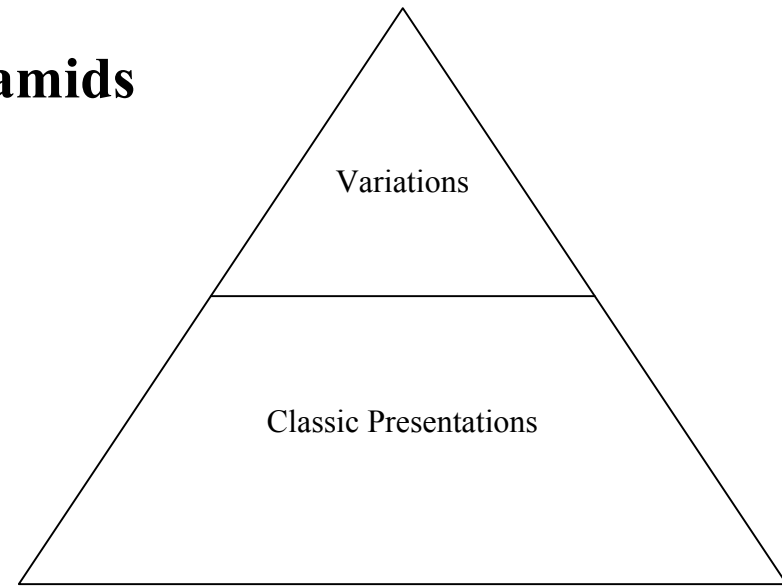
3) Study Pyramid: See next page

- a. Pyramid “A”: specific diseases, signs, or symptoms.
- b. Pyramid “B”: Categories or Classification of Disease
- c. Pyramid “C”: Classic Presentation (heuristic) to Variations

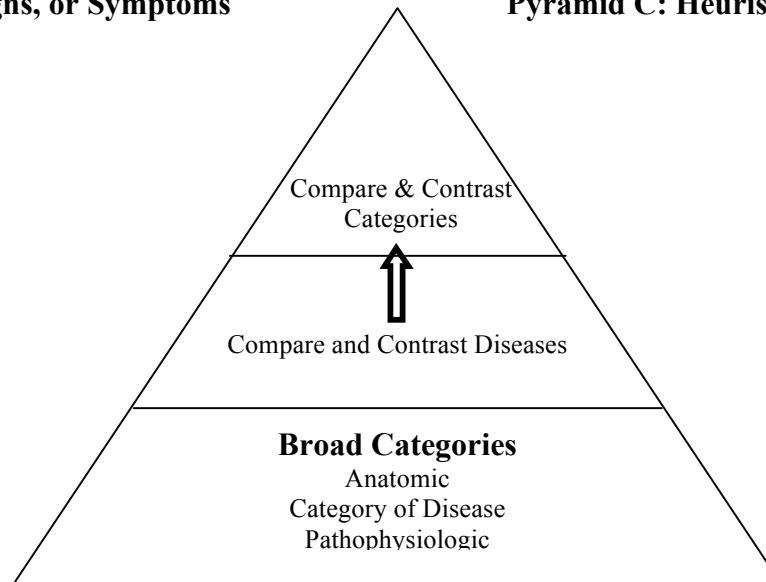
Study Pyramids



Pyramid A: Specific Diseases, Signs, or Symptoms



Pyramid C: Heuristic to Variations



Pyramid B: Classification of Dz

II) **Reading Strategies:** If you “passively read” an article, understanding and retention are not usually very good. Passive reading may work with novels but not with specialized text such as medical articles. You should actively look for patterns. Figure out how to best organize the material.

A) **Less is more:** Do *not* try and learn everything about the diseases you are reading about. Having a “deep” understanding does *not* mean that you should know everything. As you read, constantly ask yourself, “Is this clinically relevant?” “Does this help me take care of this patient?” If the answer is no, you probably don’t need to know it. Ask yourself, “What do I need to know in order to diagnose or manage this patient?”

B) **“Active” reading strategies:**

1) Write one prototypical illness for each category to act as your anchor. You don’t need to know all the diseases in a category. For example, when learning about weakness:

Anatomic Site	Disease Prototype
Brain	Stroke
Anterior Horn Cell disease	ALS
Peripheral Nerve disease	Guillain Barre Syndrome
Neuromuscular Junction	Myasthenia Gravis
Muscle	Duchenne Muscular Dystrophy

2) Study enough of the pathophysiology to help you understand or predict the History, PE, or Treatment.

3) Write the **classical description** of each of those diseases (the Heuristic)

4) Write **how to distinguish** between a Brain vs Anterior Horn Cell disease vs peripheral nerve disease etc. Compare and contrast these areas. How does the standard history (cardinal 7) help you distinguish between conditions? For example, helpful hints for distinguishing among conditions:

a. **Location:** Guillain Barre Syndrome presents with distal weakness progressing to proximal whereas Duchenne’s presents with proximal weakness > distal.

b. Find **signs and symptoms that are sensitive or specific**. These are the signs or symptoms that help you distinguish between the conditions on your list. For example, pseudohypertrophy of calf in Duchenne.

c. **Relevant Epidemiology:** The operative word is relevant; that which helps me diagnose or manage the patient. Ask yourself, “Does this help me to diagnose or manage this patient?” For example, if the female:male ratio is 2:1 that does not really help me. I’m not going to rule out a male on this basis. However, since the female to male ratio for lupus is 10:1 that’s a significant difference. Lupus is uncommon to begin with, and in males it’s 10 times more uncommon, I will lower lupus on my differential. What this means is that I want more features of lupus in a male than a female before I strongly consider this diagnosis. Or put another way, I will test for other diseases in the male than in the female before I test for lupus. Thus knowing the epidemiology in this case affects my approach to the patient and is therefore relevant.

5) **Prioritization:** Focus on what’s important. Focus on “high yield” information. You will never be able to learn everything. “Less is more”.

- a. Always ask yourself as you read:
 - i. Is this clinically relevant?
 - ii. Does this help me take care of this patient?
 - iii. What do I need to know in order to diagnose or manage this patient?

III) Methods of Studying

- A) Pre-reading works. This can be done:
 - 1) Prior to a rotation
 - 2) During a rotation, e.g.
 - a. Make a list of conditions you know are important. At night, or during down time, read about it even if you have not yet seen a patient with that condition.
 - b. If you know you will be admitting a patient with disease “x” then read for 5-10 minutes on that disease before you see the patient. 5 Minute consult, UpToDate, or emedicine might be good sources for this.
- B) Write a brief, one or two page, summary of the articles you read. The purpose of this summary is to:
 - a. Help focus you
 - b. Help organize your thoughts
 - c. Make connections
 - d. Help you study, review, and retain the information. You should have ready access to this material and read it next time you see a patient with this condition. You should be able to read this summary in less than 5 minutes so that it’s practical and you can read it before seeing the patient.
- C) Engage in **active retrieval** of the information. Passive re-reading of information is not enough to ensure retention.
 - 1) Retrieval is the key to long-term retention. Information that we don’t use is easily and frequently forgotten. In order to promote retention, people need to “practice” retrieving the information in order to strengthen that memory trace.
 - 2) Thus, before reading your notes on disease “X” when a patient with disease “X” presents, first try to remember what you already know about the disease. Then read your notes and see what you had forgotten. If you have time, highlight the information you had forgotten. The highlighted portion now becomes a priority of future studies. In order to be an efficient learner you cannot always read material (including your notes) from beginning to end. You need to prioritize what you are studying based on importance/utility of information as well as your existing knowledge base (i.e., don’t decide to read your notes on topics you already know well. Start with your knowledge gaps.
 - 3) Use charts often especially to compare and contrast:

Distinguishing between Upper and lower motor neuron weakness

Lower motor neuron weakness	Upper motor neuron weakness
Flaccid	Spasticity
Decreased tone	Increased tone
Decreased muscle stretch reflexes	Increased muscle stretch reflexes
Fasciculations present	Fasciculations absent
May have sensory disturbances	May have associated sensory disturbances