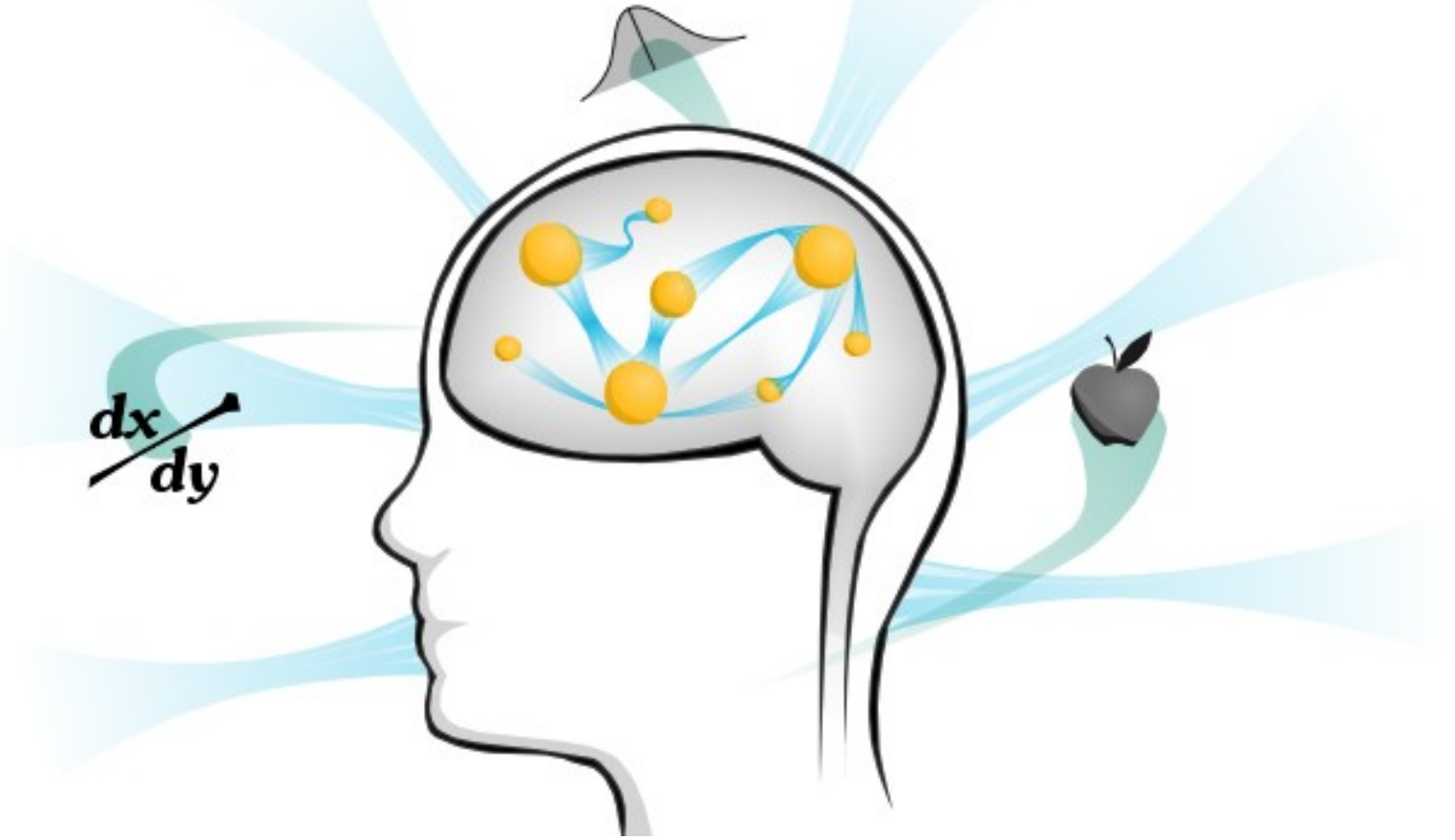
Learn More,

Study Less!



"If you understand something in only one way, then you don't really understand it at all. The secret of what anything means to us depends on how we've connected it to all other things we know. Well-connected representations let you turn ideas around in your mind, to envision things from many perspectives until you find one that works for you. And that's what we mean by thinking!"

-Marvin Minsky

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Introduction

What makes somebody smart?

Is it raw brainpower? Accumulated knowledge? Is it just academic learning or does it also include your experiences, people skills and intuition?

Intelligence is difficult to define. Although IQ tests and various exams try to measure it, deciding what makes somebody smart is hard to do. I prefer to avoid universal definitions and focus on a more practical one:

Being smart means being able to *learn quickly*, *remember a large amount of information* and be able to *sort that information in a way that achieves your goals.*

This is a much more personal definition. Learning goals can differ from person to person. You might just want to get A's in all your courses. John might want to become a master at computer programming. Susan might want to retain more from

the books she reads in her spare time. Another person might want to be able to apply concepts to business situations.

It's up to *you* to decide what being smart means.

This book isn't about reaching an arbitrary definition of intelligence. Rather, it's about giving you a strategy for learning. From this strategy, called holistic learning, I'll provide a set of different tools to put that theory into practice.

Some of these tools won't fit your learning style or goals. That's fine. My hopes is to provide a large assortment of tools that, with the backing of the holistic learning strategy, you can use to tailor your own approach. With practice many of these techniques can become powerful weapons in your learning arsenal.

This book has two major goals. First, the holistic learning strategy should give you a model for how to learn better. Without an easily understandable theory of learning, it is difficult to make improvements. By seeing the holistic learning strategy you have a basis for identifying your weaknesses and improving the way you learn.

The second objective of this book is to provide a variety of learning techniques. Throughout the book I'll explain what these techniques are and how they fit within the holistic learning strategy. Included with this book are exercise printouts so you can

practice these methods.

I wish you the best of luck in all your learning efforts and hope you enjoy the book. It took a great deal of effort, tweaking and experimentation to write. Hopefully that effort has been well invested and you can improve the way you think.

My Story

I've always been able to learn quickly. Getting A's and A+'s with little studying before tests wasn't a challenge for me throughout school. While in University, I've maintained an average that sits between A and A+. Despite this, I don't spend more than the average person on homework. In fact, I might even spend less.

Once, I wrote an inter-provincial test (I'm Canadian) for chemistry. The only problem: I didn't know I was supposed to write the test until a pencil and bubble sheet were sitting in front of me. On top of this, the test was on material I wasn't familiar with and topics that were never covered in my class. I was given an hour and a half to write the exam. I left after forty minutes because I wanted to eat lunch.

I won first place and received a check for $400.

Self-learning has also occupied my time. I've taught myself several programming languages, business and writing skills and my bookshelf has hundreds of books I've read

in just the past two years. I've also dabbled in graphic design, musical composition and anything I could get my hands on.

Learning has always come easily to me.

Up until this point, I'd just be another smart kid. "Gifted" might fit as well, although there are people whose mental feats would put my small achievements to shame. I'd be just another kid who got a more favorable genetic cocktail, had pushy parents or some sort of glandular accident.

And if you read this far, you could probably slap on arrogant and boastful.

Until recently I probably would have agreed with you. But then something strange happened. I began to notice something different about myself and people even smarter than me. It wasn't just that smart people learned better or faster.

They learned *differently*.

Smarts requires a different strategy. Smart people had picked up different tactics,

sometimes intentionally but usually completely without awareness of them. It was these different strategies that made the difference in understanding.

That different strategy I called **holistic learning**. I call it holistic learning because it challenges you to view learning as a comprehensive whole, instead of a list of memorized facts. Smart people tend to make fewer distinctions between branches of knowledge and can easily relate one set of understandings to another.

By learning holistically, smart people are able to quickly integrate new information. More importantly, this information sticks. They actually "get" the concepts and see how the concepts relate to far more than just the problems given.

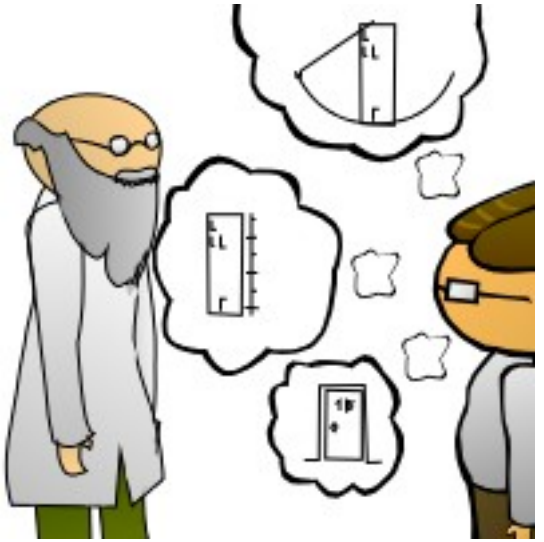
Once I was told a story that demonstrates this point perfectly:

Once upon a time, a student was in a physics class. He had achieved an otherwise perfect score, but the marker had graded him poorly on one question. The question had asked him how he would measure the height of a building using a barometer.

The student had written down, "Go to the top of the building. Drop the barometer and count the seconds until it smashes on the sidewalk below. Then use the formula for

acceleration by gravity to determine the height of the building."

Of course, having referenced a barometer, the tester expected the student to use air pressure as a tool for measuring height. Since this answer did not demonstrate that the student knew how to solve questions about air pressure, he couldn't pass that portion of the test.



When the student brought up that his answer did solve the question being asked, the professor made a compromise. He said that he would let the student answer the question again with a different method. And if the student solved the problem again, he would award him the marks for the question.

Immediately the student responded that he would use the barometer to bang on the door of the landlord in the building. When the landlord answered the door, he would ask, "How tall is this building?"

At once, the professor saw what the student was doing. He asked him if he knew of any other methods to reach the answer. The student said that he did.

He recommended tying a long string to the barometer and measuring the length of the string. Or swinging the string as a pendulum and inferring the height by the motion it created.

The professor decided to award the student the marks. As the story goes, the student was a young Niels Bohr, later becoming the famous physicist and discovering the nature of electrons inside atoms.

This student didn't just know how to get the answer. He also understood the entire scope for which the problem existed. Instead of seeing the problem in the same terms he had been taught, he could easily view it a number of ways.

The goal of holistic learning is to replicate this process with the information you want to learn.

How to Use This Book

This book isn't designed to be read once, instantly making you a superior learner. Instead, think of it as a handbook. While the broader concepts of holistic learning might be understood the in the first reading, all techniques require practice. Expecting to master these techniques immediately is like trying to hit a bulls-eye with an arrow, when you've never held a bow before.

That is why, I've included with this book supplemental exercises and printouts. They can provide starting points the types of learning challenges these techniques are meant to solve.

Initially adopting these techniques may slow your learning down. Any transition to a new method will have an adjustment period. But once you become comfortable with these techniques you can learn more effectively without wasting as much time trying to relearn material you didn't understand the first time.

These techniques can't rest just within an academic setting. Holistic learning needs to encompass anything you want to understand. The more broadly you can apply these

methods, the better they function as a tool for increasing your understanding.

So the next time you pick up a book, attend a class or learn something new, think about the strategy of holistic learning. Ask yourself how you can apply it and what techniques you want to use. As the techniques become habits, it will be easier to permanently integrate any new idea.

Quick Tip!

Holistic learning introduces many new concepts and techniques. You'll get the best results if you focus on learning only one skill at a time. Throughout the second half of the book, you will see Mind Challenges. These challenges are set up specifically to help you adopt these new learning methods.

◦ Part I ◦

The Holistic Learning Strategy

What is Holistic Learning?

Holistic learning is the *opposite* of **rote memorization**.

Rote memorization involves repeating information enough times with the hopes that it will stick. Trying to remember a physics formula by repeating it to yourself dozens of times is learning by rote. This also a poor way to learn.

If you read the story about the student from the last section, you can probably see that smart people don't learn by rote. Do you think Niels Borh, as a young physics student, had formulas memorized in his head? Coming up with so many unique ways to solve a physics problem, it was the opposite. He understood what every symbol in the formula meant, and knew why it was there. He knew the rules so he knew how to break them.

Holistic learning is a theory for learning that more accurately describes how your brain works. Your brain isn't the same as a computer filing system. Computer files are stored in strips of 1's and 0's in locations on a hard drive. Your brain stores information

as associations between billions of neurons.

Rote memorization might work if we had computer brains. All it would take is an accurate copy of information and you could memorize anything. Unfortunately, we don't have computer brains and that is why rote memorization is a less effective way to learn.

Holistic learning takes a different approach. Instead of trying to memorize information by making a perfect copy in your brain, it uses the web of neurons you have. Holistic learning creates webs of information. One idea relates to another idea. That interrelating of ideas allows you to easily navigate through complete understandings.

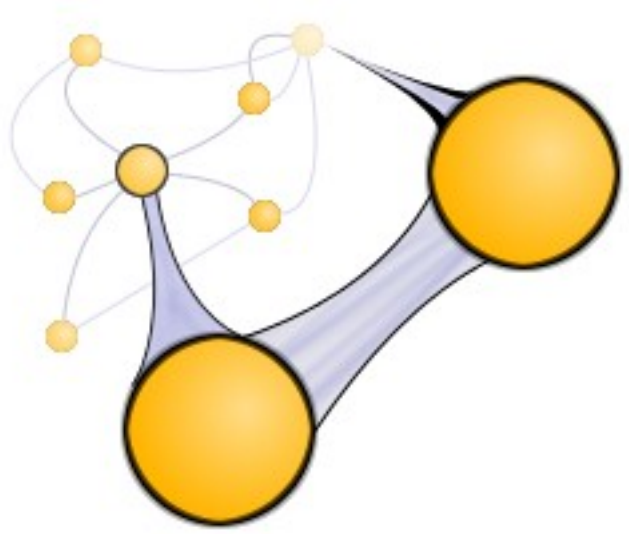
With holistic learning, ideas aren't learned in isolation. If you follow holistic learning closely enough, you'll soon realize that it is impossible to learn an idea in isolation. Learning anything requires associations. The more associations you can create and the stronger those associations are, the better.

Rote memorization would suggest learning fits into neat little boxes. A box for math containing algebra, arithmetic and calculus. Your calculus box contains more

boxes for how to find the derivative of a function, and a few common applications of those rules. Nowhere does your calculus box contain information on biology, history or the plot of a science fiction movie.

But learning doesn't fit into boxes. Learning fits into webs.

A holistic learner wouldn't take such an organized approach to storing information (which might explain why so many smart people have horrible organization skills). Instead holistic learners connect everything. A derivative isn't just a formula, it's a feeling, an image and you can relate it to flying a supersonic jet.



Rote memorization seems to make sense when you can't see the alternative. When you don't know the steps learning should follow and lack techniques to move through those steps, simply pounding information in your skull seems to work. This is like a caveman using a rock to hunt mammoths instead of a rifle. Until you understand the steps and techniques for learning, rote memorization is

crude and inefficient, but it still works better than nothing.

How You Store Information

Holistic learning is my hypothesis for how learning actually works. I say hypothesis because holistic learning is less scientific fact and more practical metaphor. Science still has a long way to go to discover the physical connections in the mind. Holistic learning simply suggests one way of viewing how smart people manage to learn.

Whether electrons actually exist as billiard balls or violin strings jumping around a cloud of protons is less important than the implications of these metaphors. Holistic learning, similarly, is about providing an easily accessible theory that seems to fit how information is stored, rather than a description of the biological processes buried in your mind.

Holistic learning is based on three main ideas:

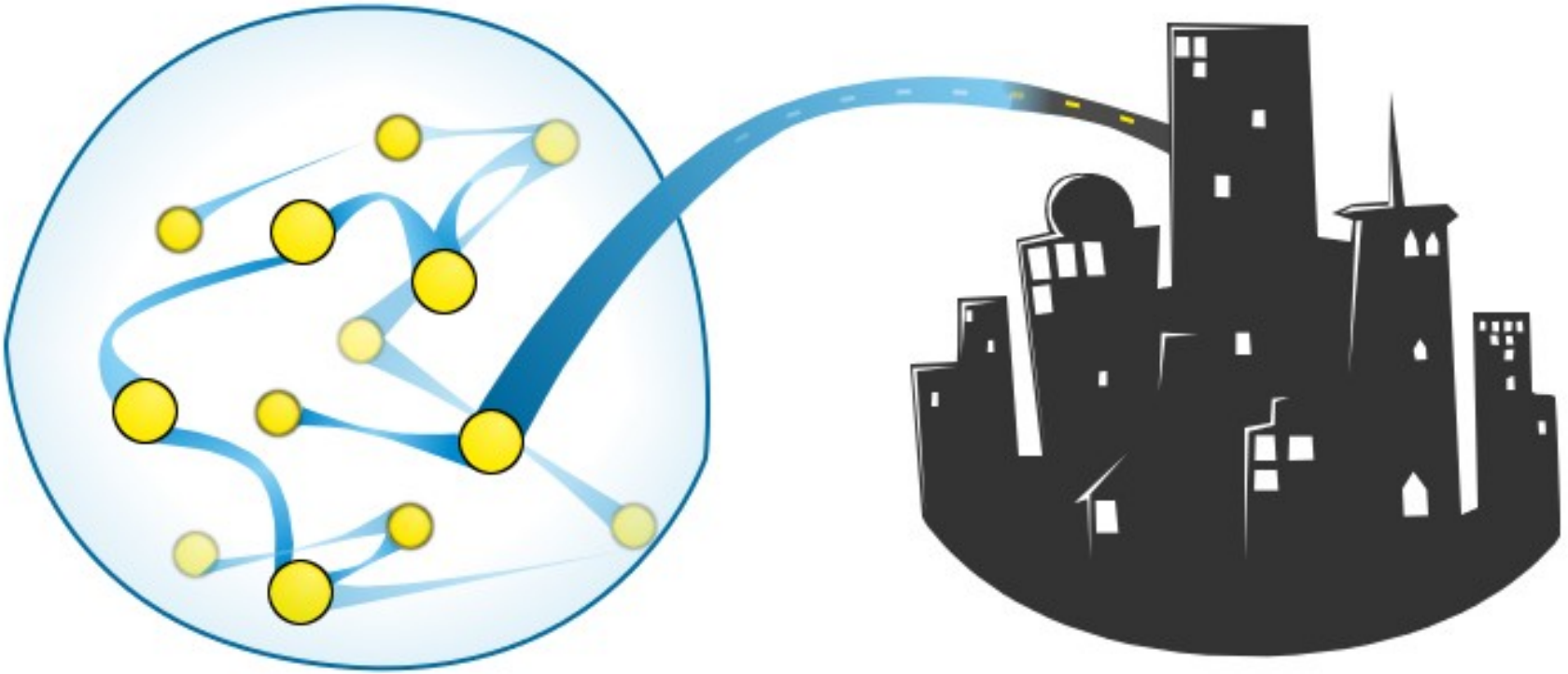
1) Constructs
2) Models
3) Highways

As I'll explain, seeing how these three elements fit together makes applying the holistic learning strategy easier. Just as knowing the different chess plays is useless without knowing that a bishop moves diagonally, knowing the holistic learning strategy is useless unless we both operate from the same points of reference.

Quick Tip!

Holistic learning is based on linking ideas as a way of remembering and applying them. The best techniques to start learning are metaphor, visceralization, flow-based notetaking and diagraming. These methods form the foundation of holistic learning.

Constructs



Constructs

A construct defines a set of tightly interlinked understandings. For example, if you've tried your hand at learning to create programs with C++, you probably have a C++ construct. This construct defines all your knowledge about C++ and is the sum total of all the interconnected ideas about C++.

Think of a construct as being like a city in your mind. Within a city you have thousands of buildings you can travel between. Some are big and important and are linked by roads to hundreds of other buildings in your city. Others are less important and only have a few dirt paths leading to them.

In the landscape of your knowledge, your mind is full of these cities. Your basic math and language skills are probably large, efficient cities. You have no problem navigating from 3+4-10 to 10*3+7. These questions are easy because your constructs for basic math are highly developed.

Understanding is the result of a highly developed construct.

Are there certain subjects you just "get"? These subjects are easy for you to understand and seem obvious. Chances are this is because those subjects lie within

highly developed constructs. They are like cities where the roads are clean and free of traffic congestions. The buildings are maintained and rarely are entire pathways blocked off.

In contrast, are there certain subjects you have difficulty understanding. These would be like newly constructed or poorly designed cities. The roads don't lead to many places. It is easy to get lost and there are many buildings which need to exist but either haven't been built yet or have been lost in the maze of roads and wrong directions.

Ask yourself this question: In a city which building would be the easiest to locate?

A) One that is connected to many other buildings through hundreds of roads, or
B) One that has a single dirt path connecting it to only one other building.

The building in A would be much easier to find. If you got going down the wrong path, you wouldn't have much trouble eventually reaching your destination. With the situation in B, you are relying on chance that you stumble upon the only building that connects with your final location.

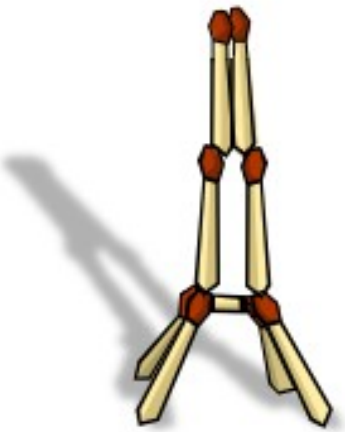
When building constructs, your goal is to create as many possible interconnections as possible between ideas. Smart people tend to do this process naturally. As each concept comes up, it is automatically linked with other ideas.

You probably use this process already, but perhaps not as effectively as people who learn effortlessly. The holistic learning strategy has many different techniques for manually linking ideas. Once those methods become habits, it doesn't take long before new connections are made.

Quick Tip!

Your constructs weren't built in a day. There is no magical technique to immediately "get" any subject. Having a powerful construct comes from linking concepts together, one idea at a time.

Models



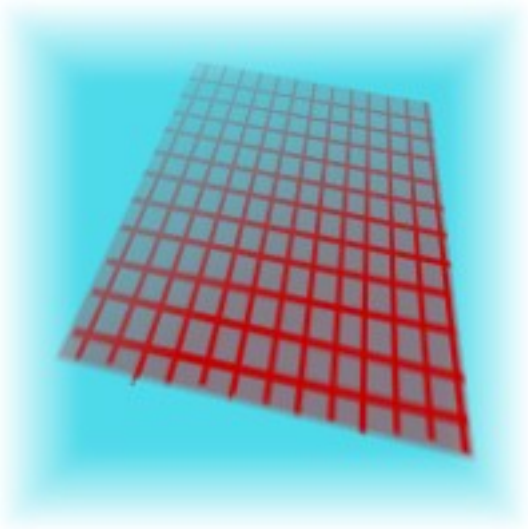
Models

If constructs are the door to holistic learning, then models are the key. Models are simplified constructs. They are snapshots of larger understandings designed to be portable and easy to store. Models are essential when trying to learn new concepts quickly.

To understand what a model is, think about this book. A model for this book would be the table of contents. In a few pages, they summarize the thousands of words contained in the book. If you wanted to describe the contents of this book quickly, you would probably start there instead of reading the entire book word-for-word.

Models can take a variety of forms. The goal, however, is always the same: compressing information. By taking several core concepts and linking them together into one form, you create a model. Models are essential when you are just starting to build a construct or making large additions to current constructs.

I used a model when I was first learning what a subspace was. A subspace is a mathematical term defining a portion of a larger vector space. An example of a vector space might be three dimensions. A subspace within that vector space could be a two dimensional plane.



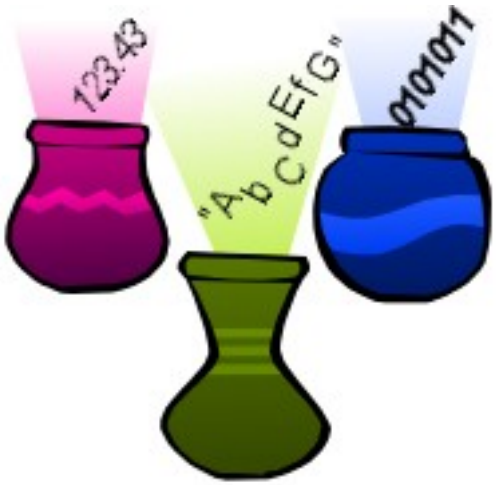
The model I used to represent this subspace was a bright, blue infinite background. This was the three dimensional vector space. Then I visualized a red translucent grid slicing through the background. This was my subspace.

This model only represents some possibilities for subspaces. A subspace could also be a line within a plane, or a section of an entire matrix of numbers. Models do not need to have perfect accuracy, they only need to combine several ideas to make them more manageable. As my understanding of subspaces grew, I made adjustments to my previous model and created new models. Once I had a construct, I could build out that understanding and correct any errors.

Another time I used a model was when teaching myself computer programming. Programming languages make use of a concept known as a variable. Variables are used to store information that might change throughout the running of a program. A username, counter or key could all be stored with variables.

I created a clear image of the variables as being types of jars, and the concept made sense. Since most variables are broken into various types (some store numbers, others

words or letters) I could imagine different jars with different openings for holding different types of data.



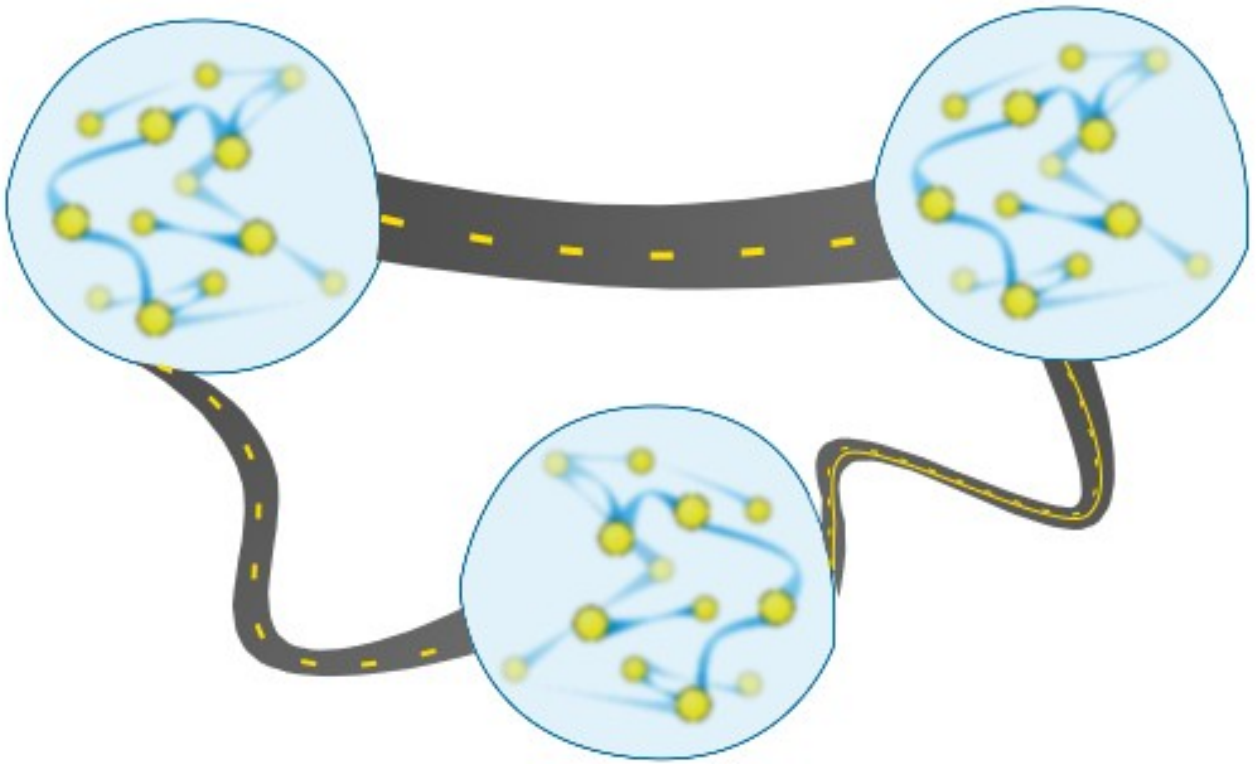
This model for variables stored several key ideas into one image or concept. This compression formed the seed for which future understandings could be linked and refined.

A model doesn't need to be an image. It only needs to be an existing understanding that compresses several key ideas into one. There are many ways to generate and expand models which I'll discuss later in the book. Visualization is only one method.

When I learned about functions in computer programming, I imagined them working like a pencil sharpener. Dull pencils go in, and a casing concealing the machinery sharpens the pencil. Sharp pencils come out. This model doesn't need to rest on a specific image, but just the general concept of how a pencil sharpener works. One construct lending tools to build models for another.

The takeaway point about models is that they act like seeds for constructs. Like a small group of pioneers with compact building materials heading to fresh ground to start a new settlement. A compressed set of key ideas that can be expanded.

Highways



Highways

Constructs are built on roads linking buildings with one another. While having hundreds of intercity roads is useful, it doesn't make use of the real power of your holistic brain. In order to do that, you need to add highways: linkages between isolated constructs.

A highway is a reference that links two completely different ideas. If you were reading a biology textbook and made comparisons from evolution to business courses you are taking, that would be a highway.

The benefit of a highways isn't an immediately obvious one. If you want to succeed in school, most instructors will emphasize having well defined constructs, not having a brain full of highways.

However, highways help with creativity. Thinking "outside the box" might as well describe people who think outside of constructs. Highways allow them to do this by making connections between areas that they didn't previously think were connected. Creativity can be seen as being able to utilize these highways to build new constructs in territories that were previously empty.

An example of when I've used a highway before was when I was reading The Prince, by Nicolo Machiavelli. This book outlines Machiavelli's principles for governing

a state, ruling people and conquering other nations. Today it's largely seen as either a work of a devious genius or a psychopath.

When learning about the ideas Machiavelli presents in his book, I needed a basis to compare them to. As a result, I created my own highways between Machiavelli's advice on statecraft and my personal experience with relationships, social settings and management. Although some of his ideas may have flaws, this approach allowed me to completely understand the ideas before deciding which I would accept or reject.

Building highways offers you more flexibility as a learner. Normally, if you don't understand the way an instructor teaches a subject, you're completely lost. With highways, you can import your own understandings from different subjects.

Familiar Constructs

There are several constructs most people possess in a highly developed form. These familiar constructs are so ingrained, that they serve as an invaluable resource for models, highways and learning new subjects. There are probably many more you possess, but here are a few likely candidates:

Sensory Constructs

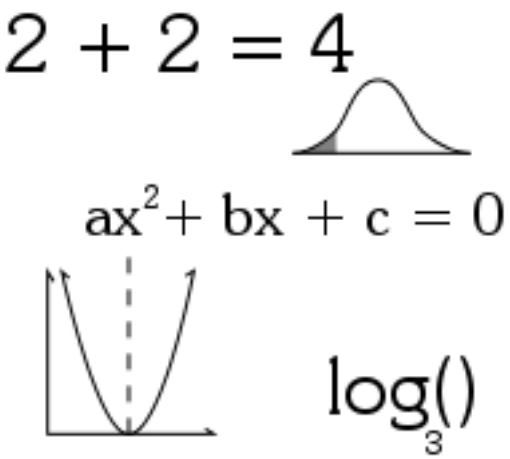
These are probably your best developed sets of understandings. You have hundreds of images, sounds and feelings linked together through experience. You might even want to consider sensations to be the root construct that all others are built on.

Relationship Constructs

Stories, people and interactions define most of our existence. Is it any wonder then that stories make new subjects easier to learn? Saying that halogen compounds have one less electron than noble gases is different than saying they're neighbors on the periodic table.

Basic Math Constructs

Depending on your math background, you may find anything from arithmetic to advanced calculus to be painfully obvious. These can be used as the basis for building further math constructs or you can use them to simplify linkages in other subjects.



I'll reference these and other familiar constructs when offering suggestions for implementing various techniques. Think of these as your capital cities which smaller settlements can be modeled after.

Constructs, Models and Highways, Oh My!

All of this talk about constructs and models may seem abstract to start with. Don't worry. The reason I bring them up is because they form the backbone of holistic learning.

Many books strive to teach different learning techniques. These are similar to the techniques I'll describe. The difference with holistic learning is you have a background theory which explains why these techniques should work, and give you a better sense for modifying and creating your own.

By providing the background of how information is stored in your brain, hopefully it will lead you to adopt approaches that make sense within this strategy. You wouldn't try to save computer files by telling the computer a story or typing them out twenty times. That doesn't make sense given how we understand computers store information. Understand how your brain stores information and you can enhance the way you learn.

The Sequence of Holistic Learning

Up until this point I've described what information looks like when it is stored in your head. But the real question is, *how does it get there in the first place?*

I've divided up almost all learning tasks into several unique steps. Often you won't need to complete all the steps to understand enough to pass a test. The steps might not always follow in the same order. You may go back to the first step after completing the second before moving onto the third.

What is important is that each of these steps represents key activities involved in learning. When you repeatedly miss a step in the process, or finish it poorly, the information won't be stored properly. Learning fails and the information doesn't make it into your holistic web.

By examining each step and seeing how it fits into our holistic learning theory, we can have a strategy for learning. With this strategy, you can use specific tactics to fix holes in your current technique. You can also develop new methods to replace inefficient ones you have for various steps along the holistic learning process.

The sequence of holistic learning is:

1) Acquire
2) Understand
3) Explore
4) Debug
5) Apply

A final step which exists outside the sequence but applies to every step is Test. Testing is checking to see how well you are executing each of these steps. Without rigorous self-testing (by the time you reach the exam room, you're too late) you may not realize a step was poorly executed.

Here are the six steps:

1) **Acquire** - The point at which information enters through your eyes and ears. Reading, taking notes in a class or personal experiences are all part of the Acquire Phase. The goal here is to get accurate information in the most compressed form.

2) **Understand** - Understanding means taking raw information and giving it a context. This would be the most basic interlinking you would need to perform in order to learn.

3) **Explore** - The Explore Phase is really where holistic learning takes full force. Here you form the models, highways and broader connections needed for well defined constructs.

4) **Debug** - The Debug Phase looks for errors in your models and highways. This phase prunes back your connections so invalid ones won't remain, or will be constrained to the area they work.

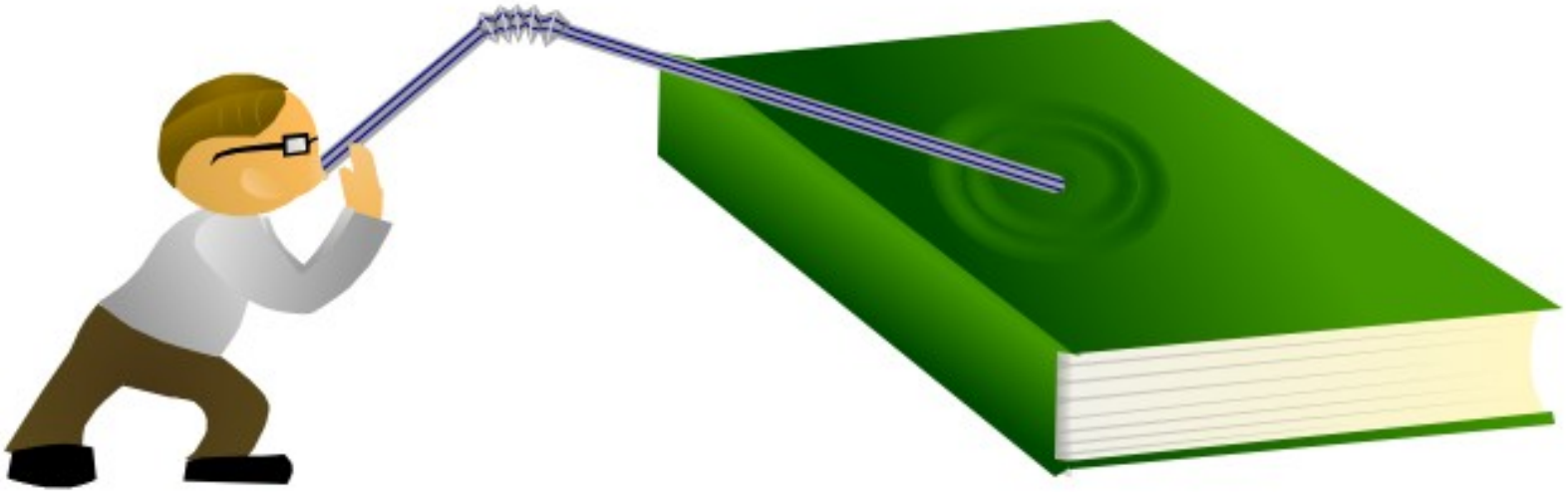
5) **Apply** - The Apply Phase takes debugging to the final level by making adjustments compared to how this information operates in reality. Having a set of understandings is useless if they aren't tailored to the real world. Failure on this step could be an example of people who have book-smarts but can't seem to use them outside the class.

6) **Test** - Continuously you should be testing your methods and learning throughout all six stages. This will help you quickly identify problems in the system you use for learning, and help you develop new techniques to combat weaknesses.

Quick Tip!

The different techniques in the second half of this book are suited towards different stages in the sequence. Speed reading can help in acquiring ideas, flow-based notetaking and metaphor can help in exploring ideas. Model debugging and project-based learning can help you debug and apply ideas.

The Acquire Phase



The Acquire Phase

This phase represents the path information takes to enter your brain. Your ability to handle different formats of information and to eliminate clutter are essential here. Here are a few things to consider when evaluating how well you perform in this phase:

- How long does it take you to read a page of material with 90% comprehension?
- How much of your lectures do you actual pay attention to?

In all cases, your ability to handle a medium of information forms the first filter which can enhance or destroy your learning efforts. Any information lost here is gone forever. No amount of holistic learning techniques can make up for a failure to acquire the important ideas.

When acquiring information, you have three major goals:

1) Simplicity
2) Volume
3) Speed

Acquiring for Simplicity

Read the following words:

"I am. I am. I am. I am. I am. I am."

What is the point of reading all these words? There is a lot of redundancy as many words are repeated. You could have simply read: "I am. x6" and that would have contained exactly the same information.

Reading requires that you consume the purest information possible. While most authors and lectures don't fill space with dead air, they will often give you information you don't need to form models and constructs. A professor that breaks down the meaning of a formula may be giving a lot of redundancy if you can determine how the formula is created on your own.

Simplicity means you acquire the information with the lowest amount of redundancy. Supporting examples are important to the degree that they help you form models. When you don't need them, don't bother acquiring them.

Acquiring for Volume

As long as you account for simplicity, your should be trying to get the most information possible. Reading one sentence from this book offers far less understanding than reading every page. The more information you can process, the more you will understand. Someone who reads a 100 books a year will usually have more knowledge than someone who reads only 2 or 3.

Acquiring for Speed

The final goal of acquiring information is speed. All things being equal, reading a book in thirty minutes is better than taking an hour. Speed tends to work against volume and simplicity. The faster you go, generally the less information you can absorb and the less discriminating you can be in determining what to acquire.

The Acquire Phase can be enhanced by adopting better reading and listening methods. Even at this early stage, most people have significant room for improvements. I'll discuss some of these methods in Part II of this book.

The Understand Phase

The Understand Phase

Input is nothing without comprehension. If you don't understand the surface of what a book is trying to say, the chances of remembering it for an exam or applying it in real life are almost nonexistent. Most people intuitively feel the Understand Phase. The information makes sense even if it still isn't firmly rooted into your brain.

The holistic learning sequence could be seen as taking three layers, each expanding the degree of understanding. The Understand Phase forms the first layer, followed by Explore and finally Apply. Each provides more depth to the information you come across.

With the Understand Phase, you are getting at the surface of information. As an example, say you are learning a new mathematical formula. You know the basics of what the symbols in the formula stand for, and possible problems that could be solved using this formula. If you repeat the formula enough times, you might even remember it. Learning by rote is learning with only the Understand Phase.

The Understand Phase, is where most people stop and smart people go beyond. Simply reaching this phase shows that you have linked the information enough so you can understand the context. The formula isn't just random squiggles and letters.

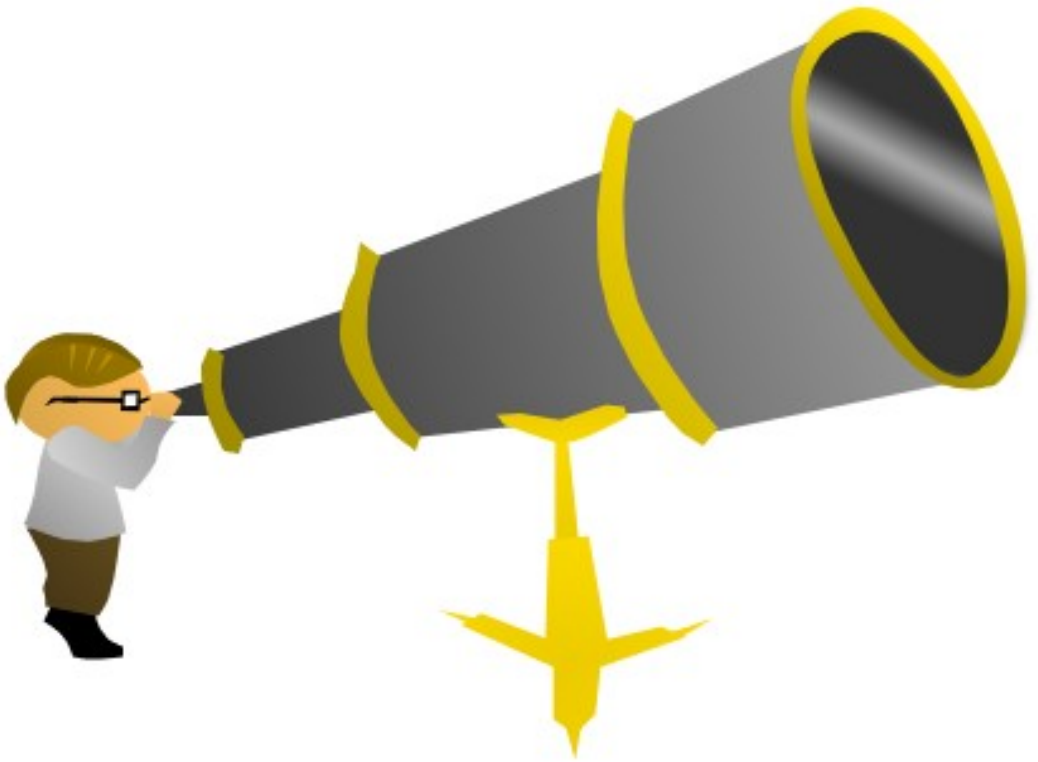
Unfortunately, it isn't much more. You might not be able to determine how the formula was derived, how it relates to other formulas or how it can be applied to problems outside what you've been taught.

Despite the limitations of stopping at this phase, it is the most critical. Unless you can acquire and understand the surface of information, you have no chance of building depth.

Quick Tip!

Not being able to understand something instantly, isn't a sign you aren't learning holistically. My suggestion, when you encounter a tricky subject is to break it into components. Narrow down specifically what you don't understand so you can use further reading to fill the gaps.

The Explore Phase



The Explore Phase

Exploration is really the start of holistic learning. With your basic understanding that covers the surface of information, you now try to link that information to other concepts. Here you would start using models to simplify and expand your constructs. You would also broaden your understanding of not only how the information is derived, but what it is related to.

A holistic learner would take the formula I mentioned in the last phase, and explore it. Where does it come from? What do the different components of the formula represent? What elements of the formula can be altered and how does that change results? What other formulas are similar to this in function or form?

Answering these questions may take a bit of time if you aren't used to them. But once you make these methods a habit, exploration will naturally take over. Understanding won't be enough because curiosity will drive you to connect it to new material.

There are three major ways you can explore ideas: depth, lateral and vertical exploration.

Depth Exploration

Information comes from somewhere. Where does a formula come from? How was a discovery made? Why are things the way they are?

Depth exploration requires that you create links into information. Instead of just understanding a formula, you understand its proof. You understand why the proof was developed and by whom. Now, through depth exploration, your formula becomes supported underneath a foundation of other linked ideas.

The disadvantage with depth exploration is that it usually requires additional research. Some classes will provide some depth, but rarely the amount necessary to explore an idea. Depth exploration is probably the best method to lock an idea in place, but also the most time consuming.

Lateral Exploration

Information doesn't stand alone. What formulas are similar to this one in function or design? What other discoveries were made at the same time, by the same person or in the same field? What other facts surround this one?

Lateral exploration requires that you create links around information. Usually this means that you take models and link information between them. Relating one event that occurred in Ancient Greece with another event that took place in Ancient China.

Lateral exploration requires less research than depth exploration, but more creativity. It requires that you see connections that might not be present initially. Your professors might not show you all the possible similarities and comparisons one formula has to another.

Vertical Exploration

Information follows patterns, those patterns can be found in other information. Can I compare this formula to a natural event, like water flowing or driving a car? How does this discovery relate to a completely different historical event? How is this idea similar to completely different ideas.

Vertical exploration is the most difficult, but also the most creative way to learn. But, if used properly, it can be done with greater speed than the background research required in depth exploration. Vertical exploration is the biggest subject of the techniques in this book as methods such as metaphor and visceralization work well within vertical exploration.

Vertical exploration involves building those highways between constructs. This benefits your creative thinking and can give you amazing powers to understand information.

All of these three methods are equally valid. The techniques in this book can apply to any of the different types of exploration. The key is to practice and recognize what type of linking you are trying to create. Are you trying to build a foundation beneath an idea? Link an idea around similar ideas? Or create highways that bridge your idea and completely different ones?

Quick Tip!

Creating diagrams can help with vertical, lateral and depth exploration. Metaphor and visceralization both work best with vertical exploration. However, holistic learning doesn't need to be fancy, just by getting curious and asking questions you can explore an idea.

The Debug Phase

The Debug Phase

Learning is not error free. The problem with interlinking, is that a wrong connection can create false understandings. This happens when you believe you understand an idea, but the relationship it is based on is faulty.

Let's say you create a link between how corporations improve with the process of evolution. This may be a useful metaphor, but it might lack accuracy. Natural selection takes place over thousands of generations with relatively low error rates when replicating. Corporations can change completely over just a few generations with incredibly high error rates. Unless you understand places the metaphor doesn't apply, you might make reasoning errors.[1]

Debugging can be seen as pruning back the holistic web. Adding exceptions and breaking connection that don't exist in reality. This isn't a perfect process, but it is necessary to seek information that will clean up the desire to find patterns.

Debugging can take many forms, from reading books from authors that oppose your points of view (and can point out errors in your reasoning) to testing your information

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1. Eliezer Yudkowsky, "No Evolutions for Corporations or Nanodevices" http://www.overcomingbias.com/2007/11/no-evolution-fo.html

in the world and seeing where it doesn't apply.

I mentioned earlier in the book how I understood what a subspace was by using a model which combined a 3-D background and red grid. Unfortunately, this is only one form of a subspace. There are many others and the grid analogy might lead to incorrect conclusions. Debugging would help me fix this glitch.

Quick Tip!

The only way to debug is to practice. You can cut down on practicing time if you form a solid foundation in the first three steps. For more suggestions on debugging, read the section on Model Debugging.

The Apply Phase

The Apply Phase

Application is where learning becomes complete. Being able to apply information makes it more likely to match the real world. You would learn tax law better if you had to apply it to your own business than just hypothetical examples. You would understand statistics better if you designed your own experiments.

Little information will actually get to reach this phase. But the more you can carry to this final stage, the more you will completely understand. Application is part practice and part creativity as you take theories and force them onto the real world.

A certain amount of all information is subconscious. That subconscious portion might not be developed if you fail to apply. Someone who has read a library of business books may understand concepts, but someone who has run a business can feel them.

Finding creative ways you can apply what you learn to your own life is the final step of holistic learning.

The Test Phase

The Test Phase

Each one of these five phases needs to be accompanied by testing. As you go through the techniques in the latter half of this e-book, you will be trying out ways of learning that might dramatically differ from your current methods. Whenever you try new methods, information might get lost or absorbed differently. Testing allows you to track what your weaknesses are, so improvements can be made.

Testing should determine what level of understanding you have for any idea. Here's the questions you need to ask yourself:

Acquire Test - Have I seen/listened to the idea before?
Understand Test - Do I get (at a surface level) what this idea means?
Explore Test - Do I understand where this idea comes from, what it is related to and what outside ideas can be connected with it?
Debug Test - Have I removed inappropriate links between this idea and others? Have I removed false conclusions based on connections that don't actually exist?
Apply Test - Have I used this idea in my practical life?

Answering “no” to any of these points should give a clear idea of what level your understanding is with this particular idea. You might have heard the information, understood it at a basic level and connected it with other ideas – but failed to search through and delete false connections. Therefore your current level of understanding is just beyond exploration.

Testing isn’t a complicated process, but it requires a lot of self-awareness. Read over the description of the five phases again as you go through the techniques. That way you can better understand where you sit with any new idea you encounter.

Summary of Holistic Learning Sequence

All of this talk about holistic learning theory may sound a bit overwhelming. Just how am I supposed to vertically explore, create models or build constructs? At this point you may want to flip to Part II of the book. That section covers the techniques which are built on this theory.

The sequence of holistic learning isn't really a sequence at all. Instead it is a cycle that constantly jumps between steps. Understanding information goes back to Acquiring and then onto Exploration and Application before Debugging. Try to avoid seeing these steps as linear but as part of an ongoing cycle to create understandings.

Pinpointing Weaknesses in the Sequence

What are your weak links in the chain of holistic learning? Identifying weak points is a matter of regular testing. More broadly, you need to pinpoint where your chronic weaknesses are. Everyone has different strengths and weaknesses when it comes to learning. Perhaps you are great at acquiring and understanding but poor at exploring. Or perhaps you can connect ideas easily, but make too many false connections.

Finding your chronic weak points can tell you what techniques you need to master. I can't tell you what your weaknesses are. There are no concrete rules.

But here are a few guidelines you can use to see what you might need to work on:

If Your Weakness is…

…Acquiring

Poor acquisition tends to manifest itself in one of two ways:

1) Reading or listening takes you a long time.
2) You need to re-read textbooks/notes to get all of the basic information.

Some common problems that can result in poor acquiring are:

1) **You have bad reading/study habits.** If you're constantly reading when distracted, or don't follow reading techniques I describe in Part II of this book, you're going to take much longer to read or require multiple reads of the same material.

2) **You have bad note taking habits.** This can be through taking too many notes or taking too few. Too many notes prevents you from thinking while the professor talks.

Too few/poor quality notes might prevent recapturing information not properly understood the first time.

3) **You don't understand the basic terminology or the English language.** If English isn't your first language (or whatever language you're studying in) you will make errors in interpretation. If you lack the basic terminology of your field, you may get confused.

The solution to poor acquisition is to improve your study, reading and note taking habits. I have suggestions in Part II for how to do this. Acquiring isn't the most important phase of learning, so I wouldn't worry if you aren't perfect.

...Understanding

Poor understanding tends to be shown when:

1) You're reading but have no idea what the author is talking about.
2) Your notes (which are perfectly legible) don't make any sense to you.

Getting to the surface understanding can't be done through magic. My suggestion, if this is your stumbling block, is to seek as many well-written explanations as possible. Advanced techniques such as metaphor or visceralization can only work if the foundation of understanding is already there.

Even if you feel you can't understand your subjects, I've found that this is rarely the main problem. Usually most people can understand the basics of an idea. It is the cross application and linking required to remember ideas that most people stumble on.

When you don't understand, slow down and ask for different explanations. Often I'm struck by a new idea for awhile before I can fully understand it. The power I've made is being able to take the understanding, once formed, and rapidly grow that idea so that I can use it easily.

...Exploration

Poor exploration is shown by inflexibility. It happens when you get the gist of an idea, but can't relate it to other things you have learned. If you are asked to use the idea to solve a non-routine problem, you're screwed.

People who can do math problems but can't do word problems using the same techniques usually have a weakness in exploring. They understand how they've been taught to use the formula and the steps to solve the problem, but can't apply it in a different setting.

Not being able to apply ideas to different problems is a weakness in the Explore Phase, not Apply Phase. I'll make the distinction clearer by using an example:

Suppose Johnny is in a basic statistics course. He understands the basics of the formulas and remembers the examples his professor gave when solving mathematical problems.

Now Johnny is given a problem on the test which requires him to use the formula in a slightly different way than he was taught. He can't do it – the problem is in exploration.

However, if Johnny breezed through the test, chances are his exploration is strong. But, let's say, he is later confronted with a problem with a statistics problem in his life. Will he make use of the principles he learned during the course and apply them? Or will they not be able to make the jump from classroom to real-life? If he can't – that's a problem in application.

...Debugging

Poor debugging is shown by inaccurate connections. I find this is less common in the classroom, and more common in the outside world. In classes, most people do too little exploration. As a result, there is little that needs debugging, if anything.

In the outside world, superstitions aren't just the domain of religion and rituals. People have all sorts of wacky associations they've made but failed to test. Believing cheering causes a sports team to win just because cheering matches up with winning is a good example.

A sign you don't do enough debugging is if you don't regularly find yourself to be wrong on a major belief or issue. If you always think you are correct, chances are you aren't doing enough critical examination of the connections you make.

...Applying

As I mentioned with weaknesses in exploring, applying errors are caused when you can't act on ideas in the real world. Having brilliant theories is useless if you can't use them anywhere. Schools, in my opinion, fail to look at this critical aspect of learning.

People who have “book smarts” but lack common sense are usually people who fail at applying. Solving this phase is less technique and more practice. Get out there, run controlled experiments and give your ideas a test.

Identifying Your Weak Points

Shouldn’t you focus on your strengths and ignore your weaknesses? Normally I’d agree with you, but this is an area where each step is crucial and can’t be outsourced. If you’re running a business, being the best programmer in the world isn’t necessary if you can hire a programmer. As a learner, however, you can’t hire someone to explore or apply ideas. You have only one brain, so you need to focus on fixing weak points in the sequence.

Once you recognize weak points, you can practice techniques to strengthen them. Initially, adopting new techniques adds a bit of time. But as you master them, they become integrated into your natural strategy for learning.

Information Structure

The process of learning is similar for most subjects. Whether it's chemistry, history or computer programming, you'll still go through the stages of acquiring, understanding, exploring, debugging and finally applying.

The problem is that all information isn't the same. You might need to remember a list of dates for a history class, and need to know how polymorphism works in a computer science class. The information in each case has a different structure. Although the process for learning is similar, it is important to take into account the structure of information.

If you eat a hamburger or a bowl of alfalfa sprouts, the process is the same. You chew the food, it is broken down in your stomach, nutrients are absorbed in your intestines and it leaves the body as waste. However a hamburger and bowl of alfalfa sprouts have very different structures. As a result you must chew, digest and absorb them in different ways to get the nutrients and remove the waste.

You can't digest information with different structures the same way. Learning must

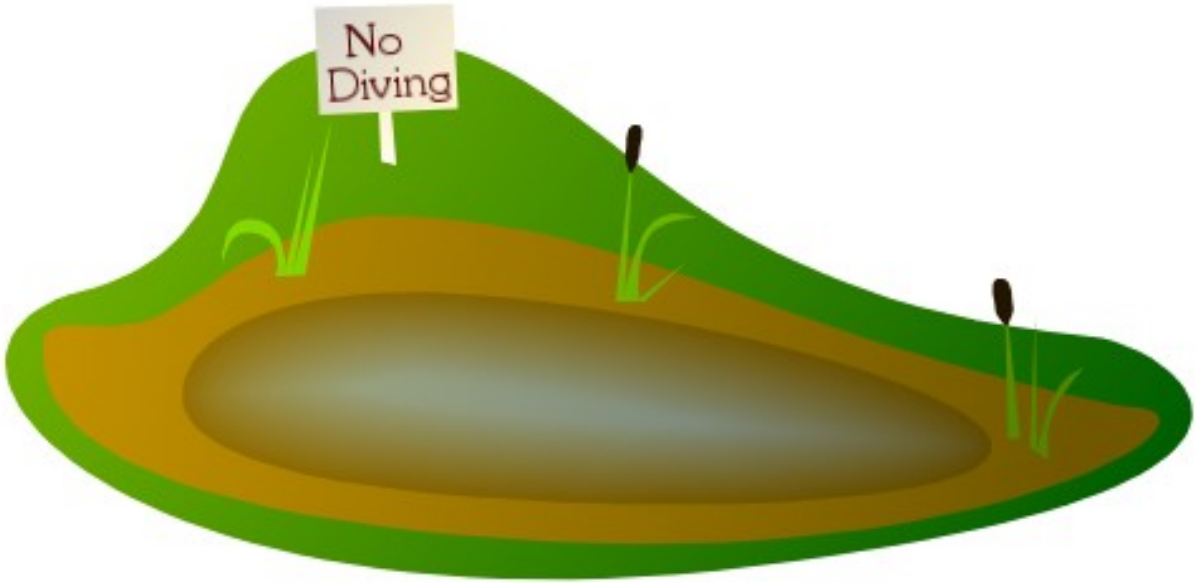
adjust for the difference between knowing the definition of a hundred terms versus being able to argue a thesis statement.

Coming up with a solution for every type of information structure is impossible. You'll have to tweak the methods in the second half of this book towards whatever information structures you encounter. But I've come up with a few simple categories that can help you decide what structure your learning tasks fit in:

1. Arbitrary
2. Opinion
3. Process
4. Concrete
5. Abstract

These five categories define the basic information structures I've noticed in most school and real-life settings. Some information sits in-between categories: physics can often move between concrete and abstract. Biology can go between arbitrary and concrete. In fact, most topics have elements of each structure.

Arbitrary



Arbitrary Information

Arbitrary information is a set of facts, dates, definitions or rules that have no logical grouping. This type of information is often encountered in schools and less frequently in the real world. I've heard from many new medical students complain about the amount of definitions they need to memorize in anatomy class.

Methods to Use With Arbitrary Information

Your first goal with arbitrary information is to make it less arbitrary. If there is a logical pattern in the information, try to find that first. Otherwise the job of remembering and using the information becomes more difficult.

If that can't be accomplished, these methods also work well:

Linking
Pegging
Compression

Challenges with Arbitrary Information

The one benefit of arbitrary information is that it is relatively easy to understand. Knowing how a heart pumps blood requires far more intelligence than simply remembering what the different parts of a heart are called.

But this upside is also a curse. Since there is little understanding required, there is also little exploration that can be done. Therefore, this type of information is the most likely to be forgotten without sheer rote memorization. Linking, pegging and compression can help, but they can't entirely compensate for the tricky nature of this structure.

Quick Tip!

Arbitrary information is the hardest to learn holistically. If you need to remember a lot of arbitrary information for your classes, the Link, Peg and Information Compression methods can help make the process easier.

Opinion

Opinion Information

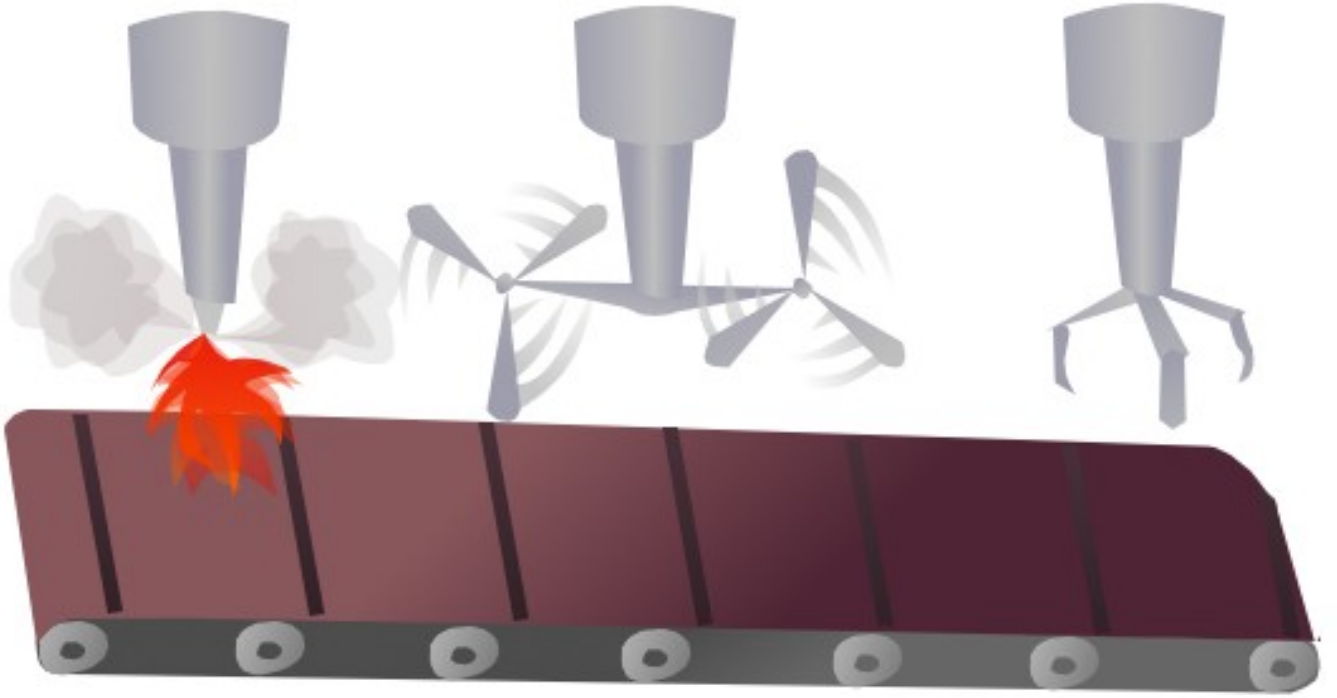
Opinion information is information you need to argue. Arguing whether Theravada Buddhism is superior to Mahayana Buddhism would require learning opinion information. This type of information is common in essays and presentations in school. This type of information is also important when making decisions where there isn't a consensus (what foods are healthy, what business opportunities are good, etc.).

Challenges With Opinion Information

With opinion information, your biggest problem is the acquiring phase. You need to examine a large volume of information and look for patterns, rather than memorize specific details. Speed reading techniques are a great asset in gathering information.

Diagraming is also a useful method with opinion information. It can help you distill your key ideas after reading.

Process



Process Information

Process information is information you need to act upon. Writing a computer program, building a house and designing a prototype are all based on process information. Practice is the most important element to learning any idea you need to act upon repeatedly, but creating the right background concepts is also crucial for saving time.

Methods to Use With Process Information

Most process information relies on having the right models. While a construct can be formed slowly with practice, having the right models can speed up learning. Here are some techniques to improve your models:

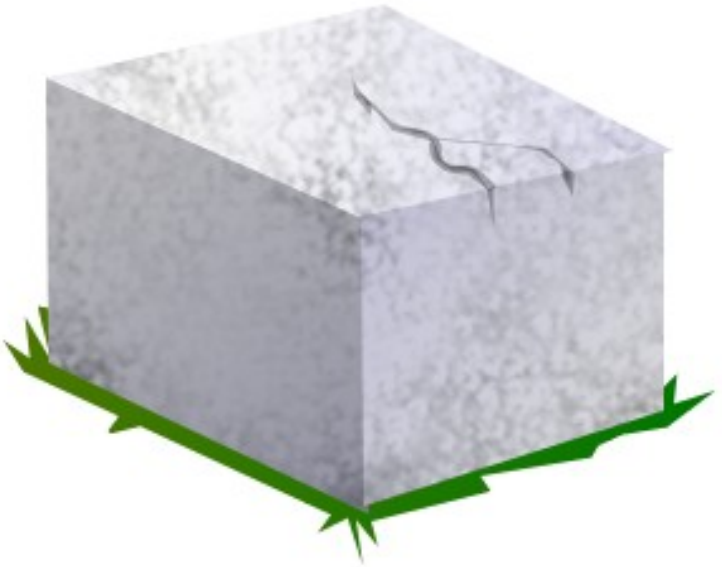
Visceralization
Metaphor
Diagraming
Model Debugging

Challenges With Process Information

The biggest challenge with process information is that you need to actually put in the practice time. It doesn't matter how well you understand the concepts, until you physically perform the actions, you won't fully learn the subject material. Get the right background models and then practice the methods you've been taught.

The benefit of process information is that, if you do practice, it tends to stick with you much longer than almost any other form of information. Practice fuses the models with your construct.

Concrete



Concrete Information

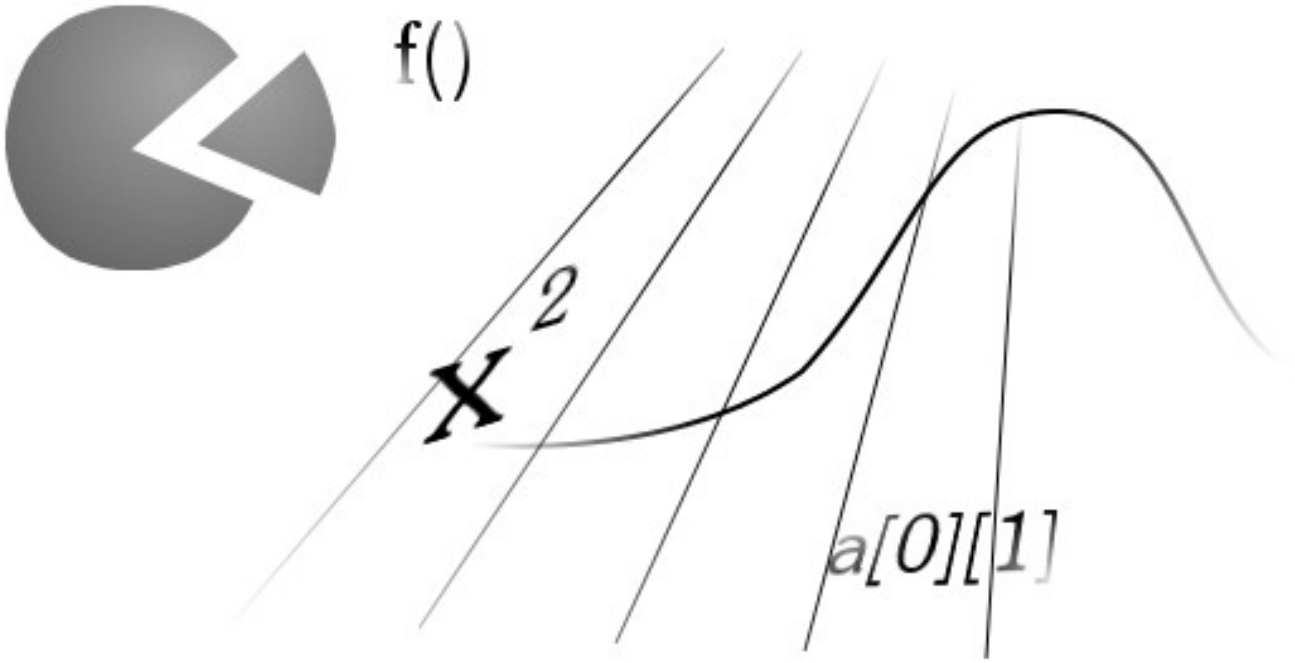
The next two categories of information, concrete and abstract, deal with the majority of information you learn in a school setting. Concrete information deals with ideas you can interact with tangibly. Most information sits on a spectrum between abstract and concrete, the difference can often be based more on the way it is presented than the content itself.

For example, biology can be a concrete subject because you have physical diagrams that represent the information. You don't need to do much work visualizing these ideas because artists and nature have done the job for you. But it can also be an abstract subject when trying to imagine enzymes, neurons or chemical reactions.

Methods to Use With Concrete Information

Most of the techniques listed in the second half of the book will work well with concrete information. Visceralization can be helpful if you want to put information into more than one of your senses. For example, you may see a diagram of a heart pumping blood, but could then translate this picture into a feeling or sound.

Abstract



Abstract Information

Abstract information is like concrete information, but it lacks the obvious connection with the senses. Mathematics, physics, psychology, computer science and chemistry are all fields that rely heavily on abstract information. Quantum physics or calculus all depend on abstract models that may not be easy to picture immediately.

Abstract information is the complete opposite of arbitrary information. Very difficult to understand but the pattern is highly logical. While arbitrary information may be incredibly shallow, abstract information can seem like diving to the bottom of an ocean.

Methods to Use With Abstract Information

When dealing with abstract information, you need to move it to a concrete level. Holistic learners usually excel in classes with arbitrary information. This is because they can understand the subject well in advance of other students who can never seem to wrap their heads around the complex ideas.

Visceralization and metaphor are essential to bring complex ideas down to a basic level. Model debugging plays prominent role because your initial attempts to model an idea may have unintended errors.

Challenges With Abstract Information

The understanding and exploring phases here can be brutal. If you feel that you don't understand a subject, slow the information stream down slightly and begin exploring the information you've been given. Since most of these courses tend to pile one idea on top of another, setting the right foundation is critical.

Quick Tip!

Abstract information is an area where holistic learning can excel over other methods. By converting information into a format that is easier to imagine, you are more likely to form links surrounding that idea. Visceralization and metaphor are both great ways to do this.

How to Use the Five Information Categories

When you need to learn a new topic, decide what major category or categories your information fits within. Deciding which category you need to learn can help you determine what techniques to use when learning and what obstacles you might face in remembering.

Weak and Strong Structures

A bridge made out of straw isn't a strong structure. A bridge with steel and careful engineering can be incredibly strong. Information structures can also be weak or

strong. You should always try to use strong structures when possible.

An arbitrary structure is the weakest structure for information. It is the hardest to learn holistically, takes the longest to learn effectively and has little value outside its specific application. If possible, try to find patterns that make arbitrary information more logical. This will help in remembering.

For example, if you have a list of definitions you need to memorize, go beyond the list. Even if the textbook offers no logical pattern, try to look for one. Maybe certain groups share a common Latin root word? Only if you can't link together logically should you try using arbitrary linking techniques such as Pegging or Compression.

Concrete and process structures are the strongest structures of information. Both of them create tangible experiences that help you link any new ideas through your senses. Creating a computer program combines concrete and process information structures. Because you can get immediate feedback through your senses about the effect of any changes, concepts quickly get wired into your brain.

You can convert a weaker structure of information into a stronger form by practicing many of the methods later in the book.

Why Your Classes are Boring

Why do you find some topics fascinating and others boring? You probably are keenly aware of which subjects interest you and which don't. But do you know why?

There are many possible reasons why you might enjoy literature over physics or computer science over accounting. You might have a natural aptitude for one subject over another. You might be able to use one subject in your daily life. One subject may even have a more interesting teacher, who can connect the abstract ideas to something you're passionate about.

The question is, are *you* in control over which subjects you like and dislike? Can you make a boring class more interesting? If you take control over how you learn, I've found you can electrify almost any subject.

Holistic learning and your interest in a class are tightly linked. The more

interesting you find the class, the easier it is to learn holistically. Do you find it easy to relate your favorite subjects, but hard to relate to boring subjects? This relationship works both ways. You can make a boring class interesting by learning more holistically.

We all have things we need to learn that initially seem boring. Maybe it's the statistics course you need to take in order to earn your degree in marketing. Maybe it's the tax law you need to learn in order to run your business. The people who can brighten these dull topics will make studying easier while learning more.

The next time you "have" to take a boring class, don't be so quick to blame the class. The problem might just be that you haven't been taught the subject in a way you can relate to. Using holistic learning methods you can connect to the ideas in a way that interests you.

When you think of computer science, do you think of dull lines of text or a secret code of the universe? When you think of accounting, do you see income statements and balance sheets, or a map charting the beating heart of a business? When you learn history do you see dates and facts, or the epic story of millions of people?

One of the best side-effects of holistic learning is that it forces you to look at subjects in a different light. Any set of ideas can be transformed from abstract principles into powerful images and stories that connect with what is most important to you.

Goals for Learning

Up until this point I've assumed your goal is to learn information completely enough to pass almost any test in a subject. But just passing tests and getting good grades isn't enough. Why do you actually want to learn this material? What usefulness can it have in your life?

Ironically, people who ask themselves questions like those are more likely to get better grades than the people who just want to pass with an A. Since they have a motivation to go beyond what is necessary to pass, they will understand the information more deeply than students who do not.

When I was starting to learn computer programming, I was fascinated by it. I went far beyond the simple lessons they taught and tried to apply the information to programs I wanted to write. I've made several decently-sized computer games as a result of this interest for programming.

When I went through an accounting class, I immediately saw ways I could apply the principles to organize my own small business. Although these methods weren't

necessary for my small business, applying some of the concepts to my records helped me both in life and in the class.

When I went through a statistics class, I found the methods for determining significance and conducting tests to be valuable for my own experiments. Now, as I conduct business and personal experiments I use these mathematical principles for getting better information.

When I went through a class teaching about vector spaces, I saw how the concepts of subspaces and vector spaces could be applied to my philosophy of life. Borrowing the concepts helped clarify ideas I had and gave me excellent metaphors for understanding.

Why so many examples? Because I want to point out that going beyond your subject doesn't need to be an issue of passion. Finding ways to use a subject (even if it currently bores you to tears) can give it new meaning.

The ultimate step in holistic learning is to take the information you have learned and give it practical value. Almost any subject can have practical value if you choose to look for it. Giving a subject value in your daily life creates a far greater connection within your mental web than any technique I can possibly describe in Part II.

Does your learning have a purpose? I don't care much about grades. I strive to do well in my courses, but the difference between a B+ and A+ doesn't really bother me.

What I do care about is having the asset of knowledge. Investing in learning can create tremendous rewards in your life if you actually use the concepts you're spending so much time learning. Learning without a practical purpose is a waste of your time.

Quick Tip!

Holistic learning can make your classes more valuable. By linking ideas together, almost any idea can become useful. Try linking some of your course material to other ideas that interest you. Every idea you learn can be used as a building block for self-improvement.

◦ Part II ◦

Holistic Learning Techniques

Holistic Learning Methods

So far you've learned the holistic learning strategy. This is my strategy for learning new concepts and how I believe learning actually works best. It is based on linking ideas together, using models, building constructs and understanding different types of information. The second half of this book is devoted to specific techniques that work within the holistic learning framework.

A good way of viewing the information of this book would be like playing chess. In order to play chess you first need to know the rules and basic objective of the game. The first half of this book could be seen as a similar set of rules and objectives when learning.

Once you understand the rules of chess, you then move onwards to specific strategies and plays to win the game. This is like the second half of the book which is devoted to different strategies I've found helpful within the rules of holistic learning.[1]

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1. Of course, holistic learning doesn't offer rules as precise as chess. Rather, a set of guidelines that can help.

Understanding the framework of holistic learning is the most important step in improving how you learn. Simply having techniques without the framework would make it impossible to adapt to different challenges, just as knowing chess plays without knowing the rules of the game.

All of these techniques won't work for everyone or in every circumstance. Therefore it is important to apply the holistic learning theory to isolate where your weaknesses are before deciding which techniques to use. These techniques come from a combination of my research into different learning methods and my own experiments. Therefore, you might want to modify them to suit your particular learning style.

List of Techniques

I want to stress that this is simply a starting point for improving study habits. I've read many great sources on improving learning habits with different techniques, and there are many good ideas.

Here is a list of the techniques covered in Part II:

A) Acquiring Ideas

1) Speed Reading
2) Flow-Based Notetaking

B) Linking Ideas

1) Metaphor
2) Visceralization
3) Diagraming

C) Handling the Arbitrary

1) Linking
2) Pegging
3) Information Compression

D) Extending Ideas

1) Practical Usage
2) Model Debugging
3) Project-Based Learning

Acquiring Ideas

The first step in learning information is to acquire it. This means actually passing the information from a textbook through your eyes, optic nerve and brain. If you never see the information in the first place, or acquire it too slowly, that will put a stop to any efforts in learning.

With acquiring information I've found two methods helpful, speed reading and flow-based notetaking.

Speed Reading

Speed Reading

If you can read faster, you can acquire more information. That's just common sense. But speed reading is more than just speed. Simply trying to read faster usually results in lost comprehension. But by practicing with different reading techniques and changing how you read, you can read faster with better understanding.

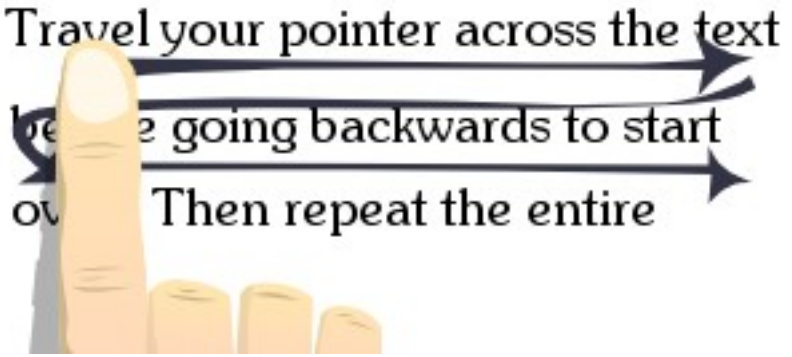
Speed reading could easily be divided up into enough techniques to fill another entire book (and indeed it has: **Breakthrough Rapid Reading** is one of my favorites). But I'm going to focus on three main sub-techniques you might want to try:

1) Using a pointer.
2) Practice reading.
3) Active reading.

Using a Pointer

Your eye doesn't actually stay in one place on the page as you read. Instead, it constantly makes tiny movements that slow your reading speed. Using a pointer can

improve your reading rate simply by focusing your eye onto one part of the page–the part you want to read.



A pointer has the added benefit of allowing you to control your speed by changing the speed you move the pointer. Speed reading involves more than just reading fast, as sometimes you will want to slow down to carefully examine one section, and skim over another that is less important.

To start using a pointer, grab a book and place your index finger right below the line you want to read. Move it across the line as you read before going to the next line. Although some speed reading experts advocate using a pointer everywhere, I tend to only use it for books. Online articles and short sections of print don't usually benefit from the extra control a pointer offers.

Using a pointer will feel uncomfortable for the first two weeks. Until you get into the habit of reading with a pointer it will probably seem slow and awkward. However, once you adapt to using your finger to scroll through the page, it will make sense. The extra control and focus it provides when reading is invaluable to boost your reading rate.

Practice Reading

Another aspect of speed reading is practice reading. Practice reading isn't the same as reading in the same way jogging on the spot isn't running. When you practice read, you expect to absorb almost none of the material you are reading. The only purpose of practice reading is to train yourself to comprehend at a faster rate.

1) You can practice read by getting a book you haven't read before. Mark a point in the book and set a timer for three minutes. Then read through the book (with your pointer) slightly faster than you can understand all of the material. When the timer goes off, mark the line you finished on.

2) Count the number of lines you read and multiply that by the average words per line on the first paragraph and divide by three. This should give you your approximate words per minute (assuming you read for three minutes).

3) This exercise can test your flexibility with improving your speed of reading.

Another exercise is directed towards improving your comprehension. Similar to the above exercise, read for three minutes using your pointer. When you are completed, start a paper writing down every major or important idea you read in the

last three minutes (without looking back at the book).

Write as many ideas as you can think of that come directly from the book. Next, go through the book again and make a second list of important ideas. Take the number of ideas you correctly wrote down after the three minute session and subtract the ones you remembered incorrectly. Then divide this number by the total meaningful ideas you gathered in your more detailed search.

$$\frac{\left(\begin{array}{c}\text{facts}\\ \text{remembered}\\ \text{correctly}\end{array}\right) - \left(\begin{array}{c}\text{facts}\\ \text{remembered}\\ \text{incorrectly}\end{array}\right)}{\begin{array}{c}\text{total facts found}\\ \text{on complete search}\end{array}}$$

This number represents your comprehension ability at that reading speed for that type of book. By practice reading you can aim to improve your comprehension at various words per minute, giving you greater speed and flexibility with reading.

Active Reading

Although I'm grouping active reading under the category of speed reading, it could be described as the opposite of speed reading. Active reading slows down your reading rate while greatly increasing your comprehension ability. Active reading goes beyond simply highlighting your textbook and writing small notes in the margins, but fully integrating ideas as they hit you.

To start active reading, begin with your book and a notepad. On the notepad write the heading for the chapter and any subheadings for the section you are reading. After finishing reading a subsection (using your pointer!), turn to your notepad and make a few notes.

During your active reading you should note down:

1) What the major points are from the section.
2) How I can remember the major points from the section.
3) How I can extend or apply the major points from this section.

The first question simply gets you to acquire the information fully. The second

question forces you to link, visualize or metaphor the information. The third question gets you to move beyond this and apply the information in a different context. These three questions force you to move each major point through the understanding, explore and finally application phase of holistic learning.

For example, let's say I just finished reading a chapter in psychology about classical conditioning. The major points might be:

- Discovered by Ivan Pavlov
- Connects a stimulus with a response

I might remember this by:

- Picturing Pavlov's dogs which drooled at the sound of a bell.

I might extend this by:

- Remembering how I feel compelled to answer the phone if I hear a similar ringtone on a television program.

Clearly if you did this entire active reading process on every idea in your textbook, you might become overwhelmed. Once you become familiar with it, I strive to use active reading only on sections I have trouble understanding or remembering.

Mastering Speed Reading

Speed reading, like holistic learning, is a skill. That means reading this book has no benefit to you unless you practice. Throughout this book there will be dozens of opportunities to practice and build new skills. My suggestion is to pick only one or two of these Mind Challenges at a time and practice them for a few weeks before taking on another.

Quick Tip!

Don't forget to make use of the Speed Reading bonus material. The printout can make it easier to track your practice reading trials.

Mind Challenge!

The goal of this Mind Challenge is to make you comfortable with speed reading techniques and increase your reading speed and comprehension. After you've completed this mind challenge, pick another in the book and attempt it.

1) Buy one or two books that are similar to the type of material you want to be able to speed read. These will be your books for practice reading.

2) Commit for at least 3 weeks to practice either speed or comprehension exercises (as outlined in Practice Reading) for fifteen minutes a day on your practice books.

3) Also commit to using your finger as a pointer for the next two weeks on all written material on paper.

4) Practice active reading with at least one of your textbooks once a week.

Flow-Based Notetaking

Flow-Based Notetaking

I'm not a fan of taking detailed and intricate notes. I'm a believer in the "learn it once" principle, which means you should be listening and processing the information as your instructor is teaching–not just transcribing it on a piece of paper to learn later.

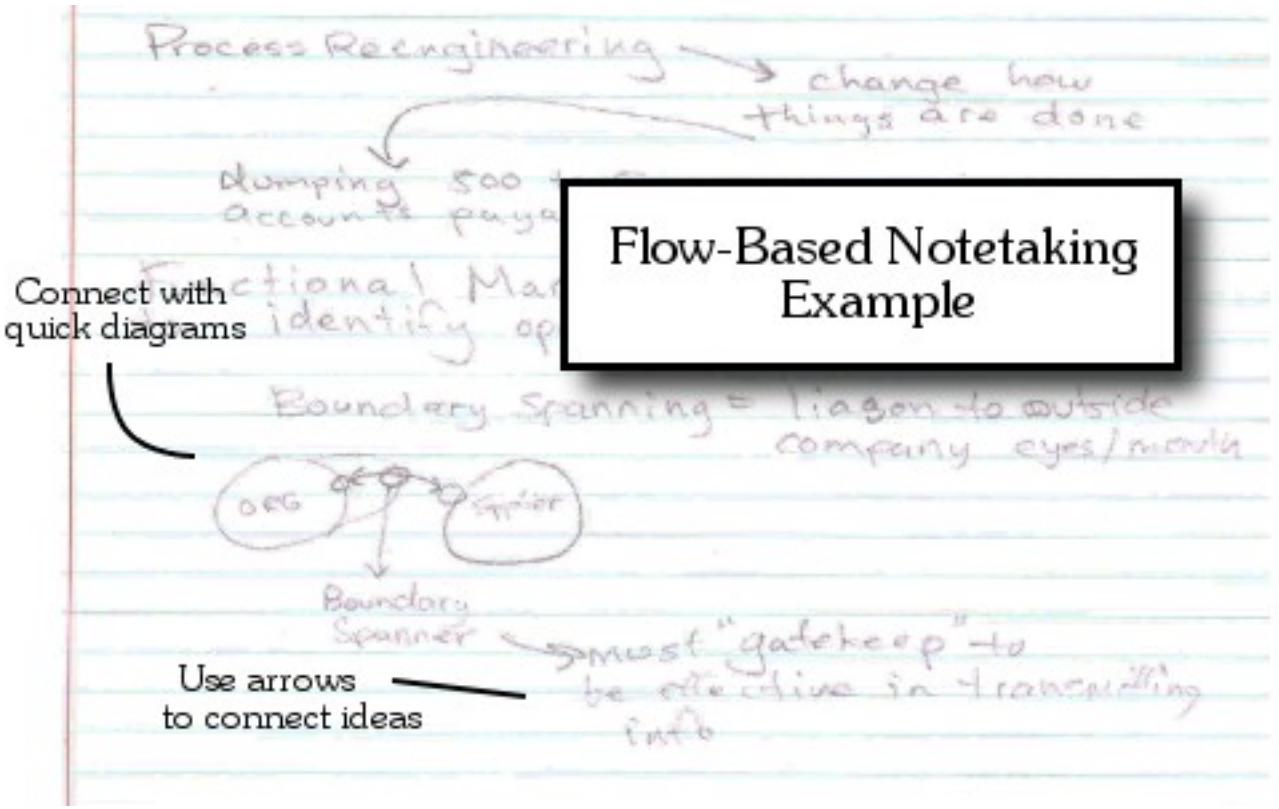
One technique I use during classes where there is a lot of information is flow-based notetaking. The goal with flow-based notetaking is providing a surface for connecting and linking ideas as they are reaching you. The linear, bullet-point style of notes that most people use is replaced with a much more fluid (although messier) format.

With flow-based note-taking you start by only writing out the major ideas. This means using a few words at most instead of entire sentences. This can reduce readability later, but it enhances learning during the lecture. Facts, dates, details and descriptions are reduced to just a few words, not lengthy paragraphs.

Once you get an idea written down, your next step is drawing a few arrows to connect it to other ideas. Instead of an ordered hierarchy of ideas, you want to represent the ideas as being interrelated components. This process more closely mirrors the actual holistic learning strategy, where ideas are linked into a web.

I tend to use flow-based notetaking as a method for using other techniques as well. Metaphor, diagraming and information compression are methods that can be used in conjunction with flow-based notetaking to enhance your understanding. This way you can write out major ideas and connect them to small pictures, diagrams or references to other subjects.

Remember that notes are only an intermediate step towards understanding. Having a beautiful set of perfectly written notes is useless if you don't understand the subject you are trying to learn. Flow-based notetaking, therefore is messier approach to taking notes, but one I believe is more effective at helping to understand the material.

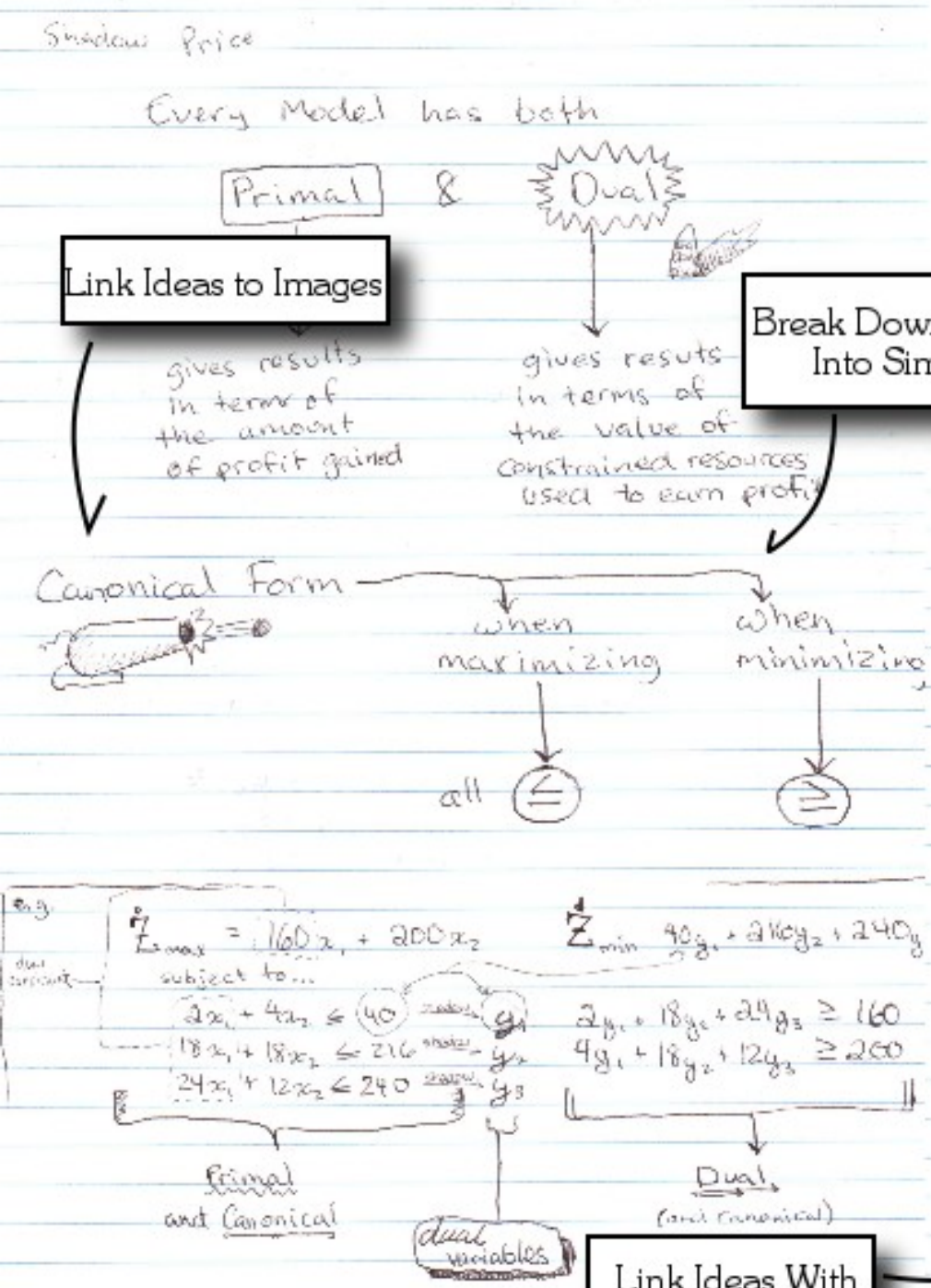


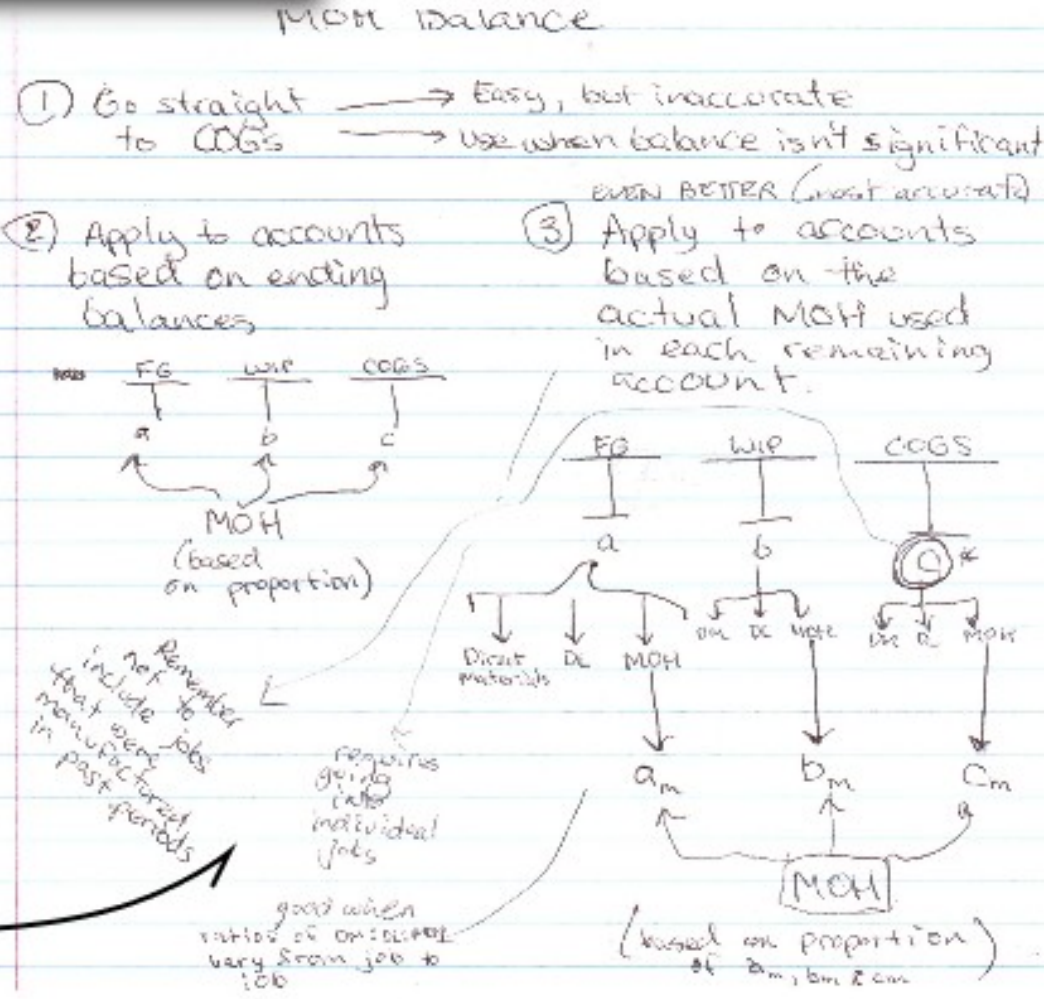
Here are a few examples of flow-based notes I took from two business courses. I took these during my class but you can retake your normal notes in a flow format after the class.

Link Ideas to Images

Break Down Long Explanations Into Simple Diagrams

Link Ideas With Arrows





Hybrid Flow-Based Notetaking

Flow-based notetaking involves a trade-off between recording and exploration. With regular, linear notetaking, you can create an almost perfect record of what was said in a class. This method is useful if you need to review that information multiple times in order to learn it properly.

With flow-based notetaking you are sacrificing some later readability, for current understanding. By reducing the content of your notes and adding links or diagrams, the material can be learned more holistically. However, if the class has a high information density or you plan to review notes thoroughly later, there are hybrid strategies you can pursue.

Flow-Based Afternotes

The first hybrid strategy for flow-based notetaking is to take regular notes first and then recopy them into a flow-based format. If you are having trouble keeping up with the pace in a class, this strategy can give you more time to properly digest the information. Although it takes longer than a purely flow-based or linear notetaking style, it gives both readability and understanding.

I suggest starting with flow-based afternotes for the first month of trying this new notetaking style. This will ensure that you have a copy of your clearly organized notes in case you need to study them later.

Flow-Based Commenting

Some classes have an extremely high information density. When you are writing frantically just to get everything on paper, flow-based notetaking is almost impossible. Flow-based notetaking assumes that you can record all the critical information in a class in less time than it takes to teach. Most good teachers will give plenty explanation room and examples. During that time you can create the connections, metaphors and diagrams you need to learn holistically.

However, in cases when information density goes faster than you can record, flow-based commenting is an alternative strategy. Basically it involves writing down the key information and inserting links into your notes when there is a break. If a professor puts up a few dozen formulas you need to record, you could write all these down first. Following that, you could add more connections when the professor starts giving examples of how the formulas are used.

Recognizing Critical Information

The key ability with flow-based notetaking is to know what is important. What is the core information taught here? If you write down everything said in a lecture with equal emphasis, then you'll spend your entire class transcribing instead of thinking. Instinctively writing down every word written on an overhead transparency or Powerpoint slide is useless if you don't actually think about what you are writing.

With flow-based notetaking I cut down the amount of information I transcribe and emphasize on connecting and sorting that information in a way I understand.

Quick Tip!

Get comfortable writing your ideas in a flow-based format, before trying to do it during class. Flow-based notetaking works best when you have already mastered the Diagraming and Metaphor techniques in the next section.

Mind Challenge!

The purpose of this mind challenge is to get practice with flow-based notetaking, before deciding whether to use it instead of your current method for taking notes.

1) Buy a separate note-book and write "Flow-Based Notetaking Practice" at the top.

2) Commit for two weeks that once per day, you will take your existing notes (written during a class) and transcribe them in a flow-based style. That means taking ideas and writing them down, drawing connections between different ideas.

3) As additional practice, you may want to implement some of the other techniques into your flow-based notetaking style.

Linking Ideas

After you acquire information, the next step is to understand and explore those ideas. Understanding only the surface of information, often isn't enough to make it stick. Going beyond that can take a bit of extra time. But hopefully, as some of these methods become habits, you can use them automatically when you need to.

These techniques aren't necessary for every piece of information you learn. Many of the ideas I tackle in a class, I don't go through the entire formal process of finding metaphors, visceralizing or creating a diagram. Attempting to do so would mean all my time was wasted studying.

Instead, I use these methods selectively on information that falls into two categories:

1) Difficult information
2) Critical information

Difficult information could be a list of dates, or a series of ten steps which don't logically follow each other. Difficult information may be abstract, arbitrary, or simply be from a subject that you don't have many models to draw from. In these cases, applying linking methods can ensure those ideas aren't forgotten.

Critical information is like the foundation of a building. It forms the base from which you construct many other ideas from. A beginner learning about matrices would find that determinants and row reduction are both extremely crucial topics. Failing to understand these ideas (even slightly) could ruin any possibility of learning hundreds of other ideas from which they are based.

Information that isn't particularly crucial or difficult, doesn't warrant special techniques. Since much of the learning process is subconscious, you will probably form enough associations and models for it to stick without the intervention of a special technique.

Using Linking Methods to Form Models

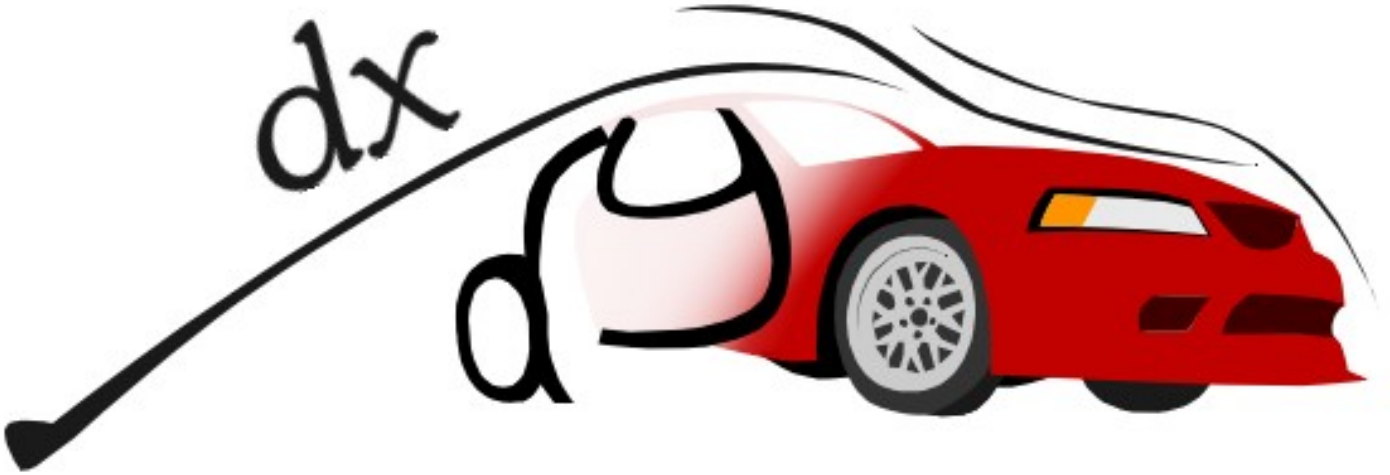
Earlier in the book I pointed out how models formed the basis of constructs. Simplified images and concepts that can be used to describe new information. These

linking methods are the primary ways to create models in holistic learning. Most of the time I create a model, I would use either metaphor, visceralization or diagrams.

Practice, Practice, *Practice!*

Like all the methods in this book, these techniques require practice to use effectively. If you aren't used to using them it can take 2-3 times as long to apply them. Furthermore, when you are beginning with these techniques, I suggest making use of a pen and paper. I don't write out metaphors and diagrams if I can imagine them clearly, but if you aren't used to these techniques, paper is the best way to practice.

Metaphor



Metaphor

Metaphors are a literary tool that describe an object by relating it to something that it isn't actually associated with. Saying a woman has an hourglass figure, doesn't mean that she is made of glass and sand falls from the top of her body to a lower half. Instead, it is a metaphor comparing the curves of her figure to the curves of an hourglass.

Similes are another tool in literature which are almost identical to metaphors. Similes involve comparing two unrelated things with "like" or "as". The man was built like an ox. My grandfather is wise as an owl. The wind felt like frozen knives piercing my skin. All of these are similes.

Metaphors work in stories by stealing common experiences and attaching them to uncommon ones. If a story said that the character John "had a bulldog face" then you could easily visualize him. Here the metaphor serves its purpose by linking the character John, who you have no mental basis to draw a description from, and relates it to a bulldog, which you have probably seen before.

The purpose of metaphors in holistic learning is similar. You want to create a bridge between an unfamiliar idea and a familiar one. While metaphors in literature are often used to provide visual descriptions, metaphors in holistic learning are more often used to connect similar processes, events or ordering of information.

For example, let's say you were in a psychology lecture learning about classical conditioning. Classical conditioning is the process of associating a stimulus and a response and was made famous by Pavlov's dogs. Pavlov noticed that by conditioning the dogs to associate a ringing bell with the arrival of food, the dogs would salivate when he rang a bell. After several times, the dogs would salivated when hearing a bell, even if he didn't bring food.

How could you use metaphor to learn this? The first step in metaphor is to look for something in your experience that models this process. As I grew up with Canadian winters, the first metaphor I imagined was walking through snow.

When you first walk through snow, every possible path is equal because they are all densely filled with powder. But after several walks through the snow, the first path you chose will become easier to walk through. This is because the compacting of snow under your feet creates a trail. Soon it is far easier to walk through one path than any other.

I can link this concept of walking through snow to classical conditioning by seeing the associations in the dogs brain. Initially, the bell could cause the dog to salivate or not (representing the expanse of snow with no trails). But after conditioning the bell with the arrival of food, the path from bell to food inevitably creates a trail through the snow. Eventually the dog will drool at the sound of the bell because that path has been so strongly conditioned.

Like most metaphors this one isn't perfect, but it can be a useful example. Coming up with a metaphor is a matter of following three simple steps:

1) Identify the information you want to better understand or remember. In our case it was classical conditioning.

2) Find something in your experience that matches part of the idea you want to understand. Perfect matches are often impossible, so compromise with a couple imperfect metaphors instead of a complete match. In our case we used walking through snow as an example.

3) Repeat this process and check for circumstances where the metaphor doesn't apply. With this example, walking through snow is a linear process, whereas brain neural connections have many different impulses running at the same time.

Sometimes a metaphor doesn't easily drop into your lap and requires more creative effort. Our snow-walking example fit snugly within the idea of classical conditioning. But, often metaphors require more effort in constructing.

Let's say you were taking basic calculus and needed to understand derivative. A derivative is the result of differentiating a function and has many useful properties in mathematics.

A derivative will measure the slope at any part of the parent function. So if you have a function that rises in a straight line upwards, the derivative will be flat as the slope is the same throughout the parent function. In a curved line, the derivative will have a shape that models how the slope changes at every position on the parent function.

The problem with this explanation of a derivative is that it might be hard to remember what a derivative represents. Creating a metaphor can help because it will connect the principles of differentiation to a common experience.

A metaphor you might come up with is driving a car. On the dashboard you have the odometer and speedometer. The odometer measures how far your vehicle has traveled and the speedometer measures how fast you are going. If you graphed your odometer and speedometer over time, the speedometer should be the derivative of the odometer. The slope of your position graph would be the speed graph.

Tips for Improving Your Metaphors

The problem with both of the examples in the last section is that they are based on previous metaphors I've already constructed. When you are given an idea, you might have few starting points in creating a metaphor. How can you improve the speed and quality of the metaphors you make?

1) Start by asking for a metaphor.

Unless you ask yourself what a good metaphor would be to describe an idea, you probably won't find one. Keep the concept of metaphors in mind the next time you encounter an idea you have difficulty relating to.

2) Pick the first thing that comes to mind.

Finding metaphors is a process of creative experimentation. This means you'll probably have to go through several incorrect metaphors before finding one that seems to model your topic. I can usually go through 4-6 incorrect metaphors in a minute or two before finding one that seems to work.

My suggestion is to not inhibit the creative process by claiming you can't find a good metaphor. Instead, just grab the first thing that comes to mind. Look for where it fits and where it doesn't fit. If it doesn't fit, discard part of it and try again.

3) Refine and test your metaphors.

Often you'll find a metaphor that works as a description for some parts of your idea, but not all. My suggestion then is to collect multiple metaphors that each explore the idea from a different angle. Not only does this reduce the chance of making an error in understanding, but it gives you a greater amount of links to a single idea, which improves the quality of your construct.

Mind Challenge!

The purpose of this Mind Challenge is to improve your ability with using metaphors to understand and remember abstract ideas:

1) Commit for at least two weeks to go over a subject you are studying once each day. After you read your textbook or notes, write out at least 3-5 major ideas.

2) With each idea, write out a possible metaphor that could be used to explain it.

3) If the metaphor isn't complete, try looking for one or two more metaphors that could also associate to the same idea.

4) Use the 10-Year Old Rule. Could you explain this metaphor to a ten year old child? If your metaphor is just as confusing as the original example, repeat it to yourself and rewrite it until you get something that is simple and easy to understand.

5) Repeat this process with the other 2-4 ideas in your textbook until you are satisfied that you understand them.

Visceralization

Visceralization (Visceral + Visualization)

You've probably heard of visualization. This is the process of creating a mental image. Visceralization is my word to describe imagining not only a mental picture, but sounds, sensations and emotions. Often a mental image will work, but connecting an idea to several senses and even emotional states can create a stronger link than a picture.

To visceralize an idea, the best way to start is simply with forming a mental picture. This works best when the idea is already fairly easy to imagine. Imagining the process of light entering your eyes, traveling through rods and cones in your retina, through your optic nerve and into your brain is a process easier to visualize than, let's say, different philosophies of ethics.

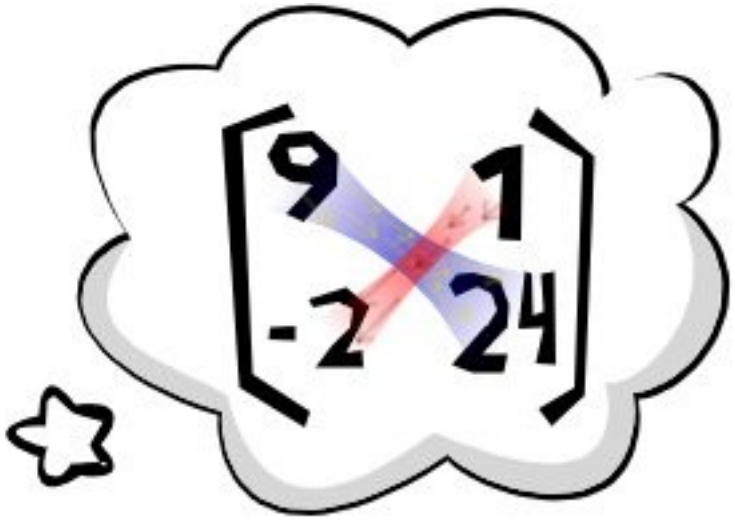
Visceralization works best with concrete information. I've found abstract information to be better suited for metaphors, although there is considerable gray area between the two.

After you have formed a mental picture, begin adding other sensations into the image. If you are trying to visualize the perception of light, imagine feeling the light enter your eyes. You might want to visualize a specific sound as it hits your retina and surges down the optic nerve.

When I started to learn about matrices, I had to learn how to calculate a

determinant. A determinant is found by multiplying the top left and bottom right numbers and subtracting from that the product of the top right and bottom left numbers. This abstract process would have been difficult to remember if I hadn't visceralized it first.

Visceralizing this process of calculating a determinant involved first imagining a 2x2 grid containing four numbers. I then imagined my right hand swiping through the top left and bottom right numbers. As I did this I imagined a blue streak and the feeling of added weight being formed in my hand. Then I imagined my left hand swiping through the top right and bottom left numbers. From that I imagined a red streak and weight being reduced in my right hand.

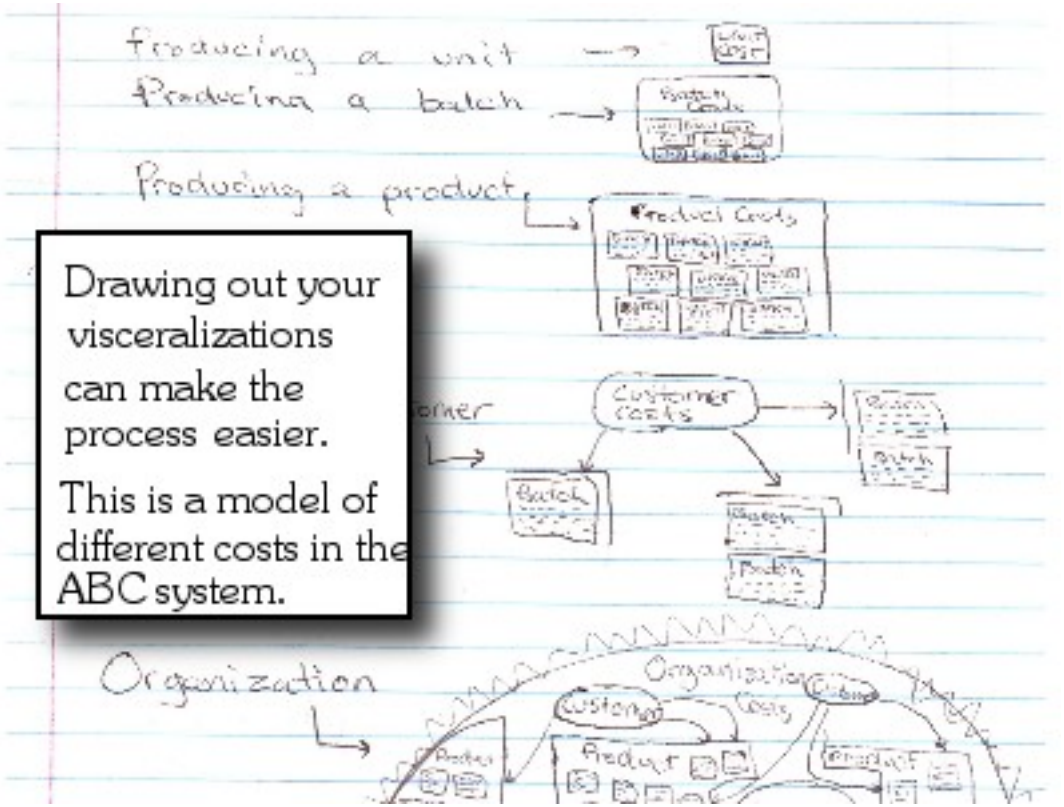


By connecting specific senses, sounds and kinesthetic actions to the original idea, it was easy to remember for future questions.

Some learning experts claim that there are three main types of learning styles present in people: visual, auditory and kinesthetic. Visual learners (I presume I'm a highly visual learner) require information to be presented in pictures to understand them. Auditory

listeners need to hear information in terms of sounds and instructions to understand. Kinesthetic learners need to feel physically involved by touching and manipulating in order to understand.

While I don't think labeling yourself as one learner or another is entirely constructive, it is useful to see that different people learn differently. Visceralization is an attempt to take information that isn't in your preferred format and translate it into a style that you can easily understand and relate with.



An added step to visceralization is giving ideas emotional impact. It is well-known by psychologists that memory is influenced by being in different emotional states. Connecting ideas to emotional impacts (even small ones) can make them more memorable than if they are completely dry.

How to Visceralize

1) **Identify the concept you want to visceralize**. This could be a process in biology, a function in computer programming or mathematical concept in calculus.

2) **Start by picking a mental image to base the idea from**. If you aren't used to visceralization, I suggest making a crude drawing of the idea on paper so it will be easier to hold for the duration of this exercise.

3) **Does the process move through time, or is it a static image?** Taking a determinant has several steps, so it flows through time. If your concept does flow through time, try to visualize it moving as if you were watching a movie.

4) **Now add another sensation to your image.** Try picking it up, acting upon it or feeling it as a sensation within your body. Link the sensation to the movement or feel of the mental image.

5) **Add other sensations or emotional impacts to the image.**

6) **Refine and repeat the image until you can bring it up in just a few seconds of thinking of it.**

Like metaphor, visceralization is a process of creative experimentation. You may not be able to come up with a great picture at first, so just pick something to get you started. You can always refine and discard parts of the picture that don't work until you get an image that is memorable and vivid.

I strongly suggest making the use of paper and pen when practicing this technique. Using paper can help you get practice with forming memorable images.

Metaphorisceralization

Alright, so perhaps blending three words together (metaphor, visceral and visualization) is a bit much. But metaphors can be combined with visceralization for abstract but important ideas you want to better understand and remember. The process is exactly the same as visceralization, except you use a metaphor to find a concrete description of your abstract idea first.

With our calculus example from the last section, this could mean you visceralize driving your car while watching the speedometer and odometer moving. Sometimes adding a visceralization to metaphor is overkill, but it can be helpful for tricky concepts that are hard to describe and imagine.

Mind Challenge!

The purpose of this mind challenge is to give you better flexibility and skill with your ability to form mental pictures and link in different sensations.

1) Get a few blank sheets of paper and a pencil for drawing.

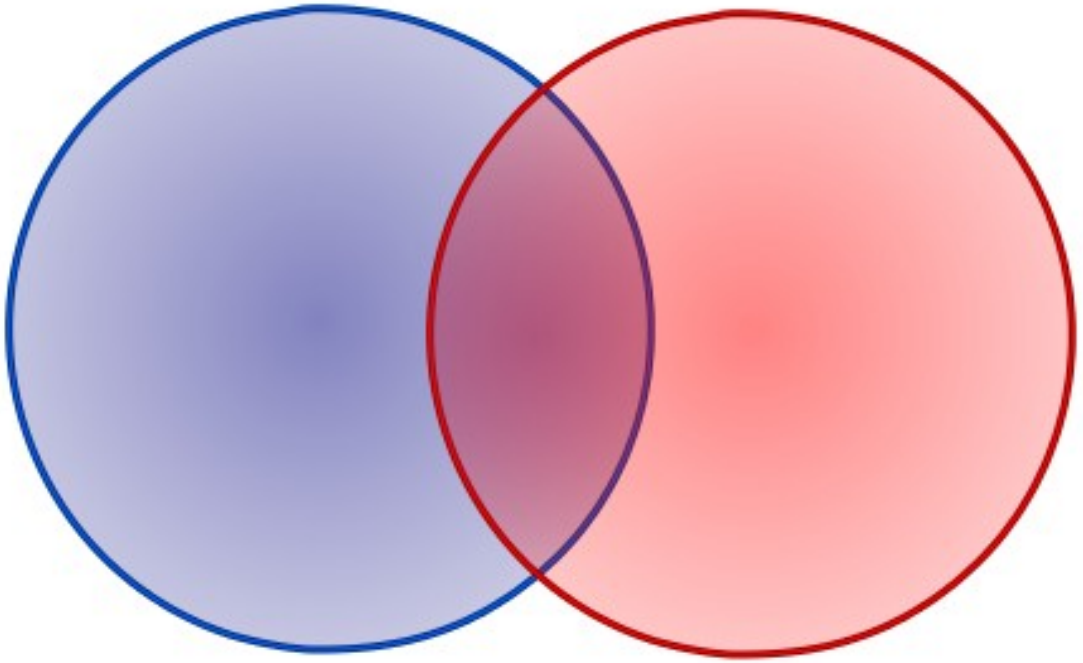
2) Pull open your textbook and pick a few key concepts or ideas. If you are just starting with visceralization, pick ideas that are easy for you to form mental images. Completely abstract ideas or incredibly complex ones might be too hard to start with.

3) Form a mental image, add sensations and emotions to your idea as the steps are for visceralization on the previous pages.

4) Quickly sketch a picture of the idea based on your mental image. (30-60 seconds max.)

5) Repeat this with several other ideas each day for a two weeks.

Diagraming



Diagraming

The final technique I have for exploring ideas is diagraming. Diagraming is a simpler form of visceralization. Creating diagrams takes more time than visualizing an image, but it is easier to do and can be used on fairly abstract ideas that would be hard to imagine otherwise. Diagraming can also be combined easily with flow-based notetaking and active reading while you are learning.

A diagram is a picture that compresses several ideas together in an easy source. The most common types of diagrams are charts. A scatterplot can compress hundreds of individual data points into a single graph. Flow-based diagrams can chart a complex series of interactions and steps onto one image that is easy to see.

Often books will come with premade diagrams to simplify the information they contain. Where they lack diagrams, constructing your own can be useful to chart the flow of ideas, picture different concepts or link different concepts together.

There are three main types of diagrams I'll cover here: flow, concept and image diagrams. Using some combination of these three types can help you understand almost any concept. The only disadvantage of diagraming is that it takes longer than metaphor or visceralization. However, with practice I've been able to speed up this process as well, so that I can quickly create a crude diagram in less than a minute.

Flow-Based Diagrams

A flow based diagram is useful for:

- Charting a sequence of steps. (How to do long division, the process of creating a cash-flow statement, etc.)
- Charting historical events, creating branches linking events together not only through causation but through the time period they rest.
- Mapping out a system. (e.g. How a function works in a computer program)

The basis of a flow-based diagram is that you start with a single element, and draw connecting arrows to different ideas as they relate to that element. I could have created a diagram for the steps I undertook to write this book. Starting with the initial idea, I could have drawn lines showing subsequent steps, branching off where there is more options.

The importance in a diagram must be for your understanding, not creating a pretty picture. It is easy to get caught up in making a tidy and beautiful picture and waste hours on a diagram which could have been built in just a few minutes. Simplify and be messy if you need to.

Concept-Based Diagrams

A concept based diagram links together ideas and is closely related to flow-based notetaking. Here the associations aren't necessarily different steps in a sequence or an order of dates, but relationships between ideas. Create arrows connecting different ideas, but include 1-3 word snippets on each arrow to note how the two ideas are related.

If I wanted to create a diagram of different financial accounting principles, I might start by writing down the four different statements: balance sheet, income, retained earnings and cash flow. From that I could then connect ideas together to form a web of information.

If I wanted to map out the characters in a novel, I could start with the protagonist in the center and map out different characters and relationships that character had. Mapping of this kind can help organize your thinking on a large quantity of information.

Start with the most important ideas and branch off into details and minor ideas.

Image Diagrams

Not technically a diagram, but image diagrams are important for diagraming so I'll include these here. An image diagram is any rough sketch or doodle used to represent an idea or the association of ideas. Here you can create a small image either by itself or within larger diagrams to make them more memorable.

I frequently make small images in my notes or diagrams as a reference for important ideas and to make them more clear inside my head. Drawing detailed images can be a waste of time if it takes too long, but a simple 10-20 second doodle can be valuable if it helps connect the ideas properly.

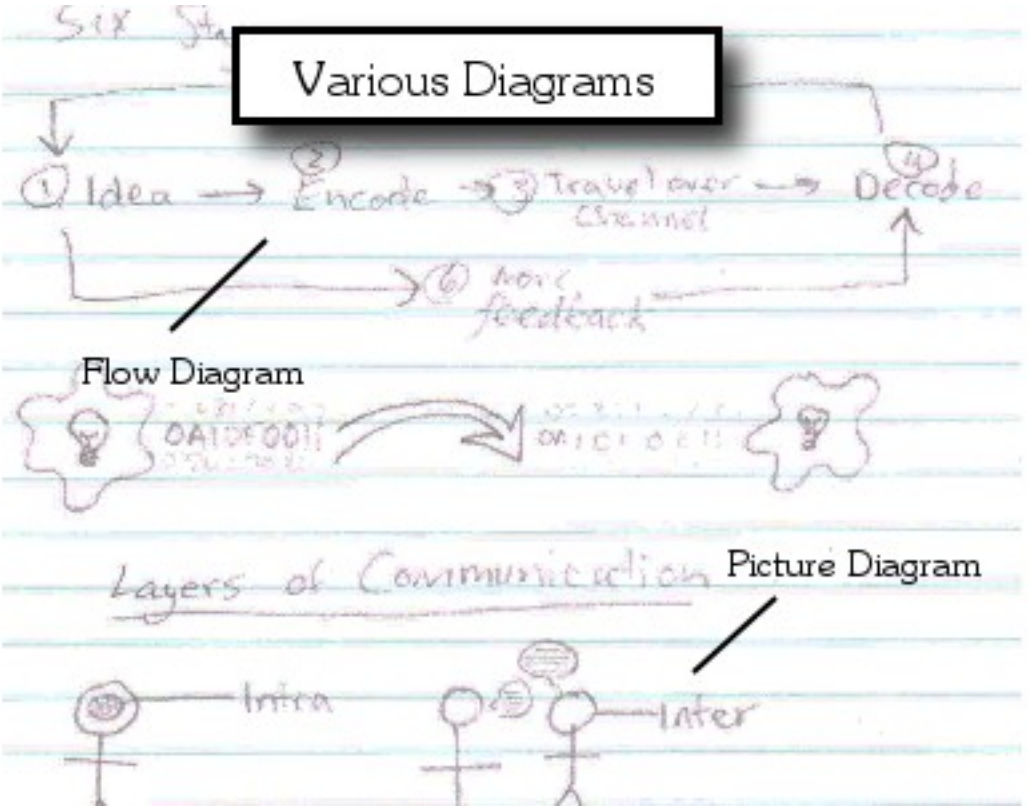
Combining Diagrams with Metaphor and Visceralization

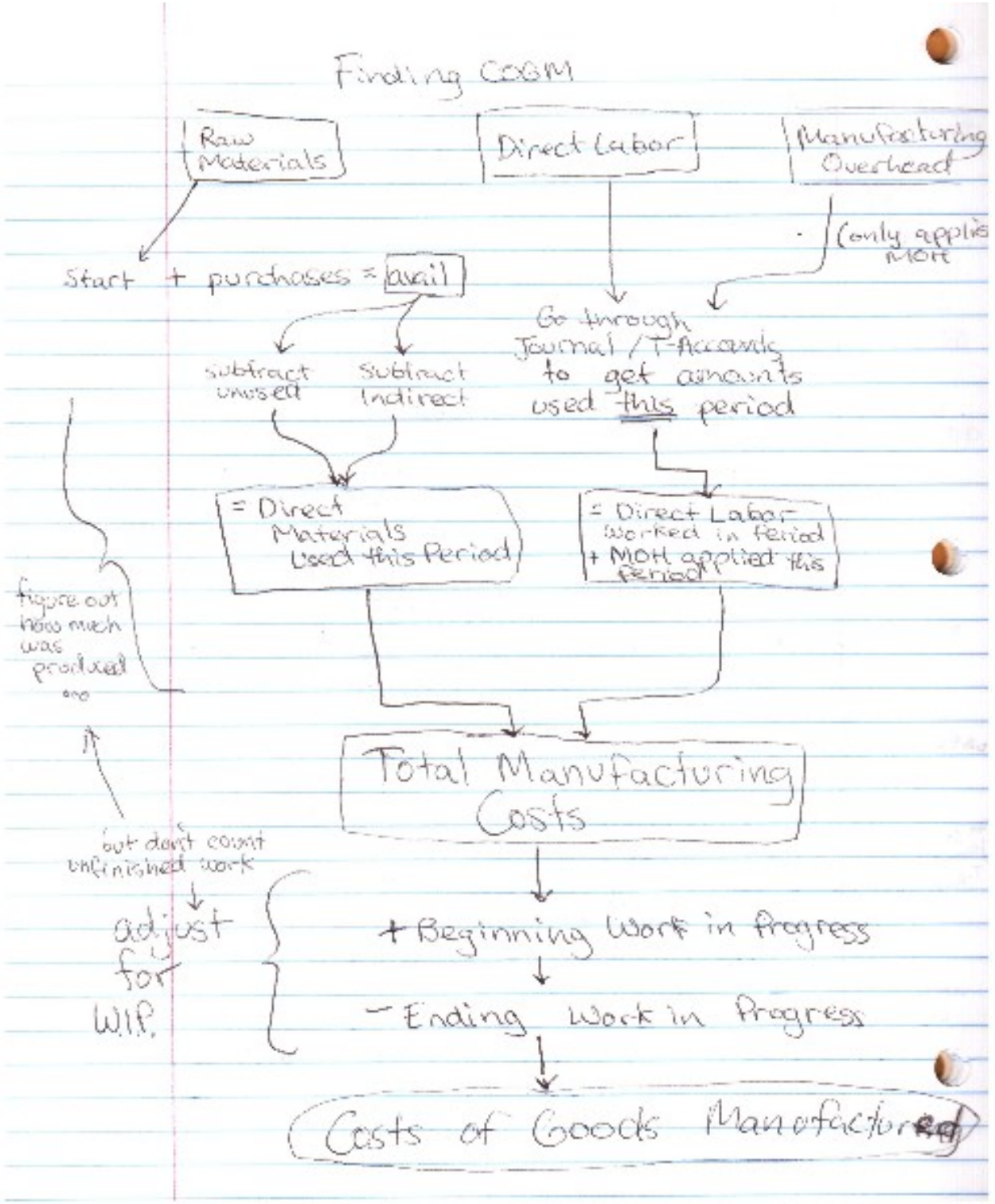
Diagrams can be mixed with the usage of metaphor and visceralization to improve your understanding of ideas. After you have found a metaphor or mental image to describe an idea, create a quick sketch, connecting different concepts together on paper.

With our calculus example from the previous section on metaphors, I could have drawn an image of a racecar and linked the odometer to a position graph and the

speedometer to a speed graph. I could have associated the two of those graphs with a symbol for differentiation making the relationship between all elements clear.

Adding a diagram to a metaphor or visceralized image may be unnecessary for many situations, but it can be helpful for remembering a complex idea.





Flow Diagram

Here is a diagram I made during a class in accounting.

Diagrams can make it easier to visualize abstract rules and relationships.

Mind Challenge!

The purpose of this challenge is to enhance your skill at making diagrams and increase your diagraming speed. Since diagraming is the slowest of the three linking techniques mentioned in this section, improving speed is important if you want it to become a useful technique for your daily studying without it becoming a burden on your time.

1) Get a sheet of paper and find an idea or set of concepts that could be made into a diagram.

2) Start a timer for no more than 2-5 minutes and begin creating a diagram using one or a combination of the different diagram types.

3) When the timer beeps, stop what you are doing and make a note of the amount

of information you've managed to store, the clarity of that information and how many different relationships or connections you were able to make.

4) Repeat this exercise once a day for two weeks until you're comfortable making quick diagrams of several different ideas.

Quick Tip!

Once you've mastered diagraming, try combining it with flow-based notetaking in classes or active reading for your textbooks.

Handling the Arbitrary

Arbitrary information can present a challenge when trying to learn holistically. Just how do you form links, metaphors or visceralizations with things such as:

- A list of dates.
- The scientific names of different parts of your anatomy.
- A series of steps.
- Rules and laws that have no clear basis, but still need to be followed.
- Scientific formulas that take hours to derive manually.

Normally these are situations that require memorization. Holistic learning strives to avoid rote memorization whenever possible. Instead, using metaphor, visceralization and diagraming to create models and eventually constructs is a better and faster way to use your brain. Unfortunately there are some cases where these tools won't work.

Information that is arbitrary, or too large and complex to understand fully requires different techniques. If you find that using the linking methods won't help you understand the material, or it simply takes too long for the amount of information you need to learn, arbitrary methods can come in handy.

These arbitrary methods hover the line between rote memorization and holistic learning. The link, peg and information compression methods may be seen as just another set of memorization techniques. However, they have been designed so that memorization can be done quickly and work the way the brain is set up to learn. If rote memorization is a blunt club and holistic learning is a scalpel, these techniques would fall somewhere around the range of a steak knife.

Even more so than the linking techniques, the arbitrary techniques require practice. There are two reasons more practice is required with these methods:

1) *You should use them infrequently.* I use the link and peg techniques sparingly, since the linking methods described in the last chapter produce a deeper understanding. Because they aren't being used constantly, practice is important to keep these tools sharp.

2) *They are more complex than linking methods.* Link, peg and information

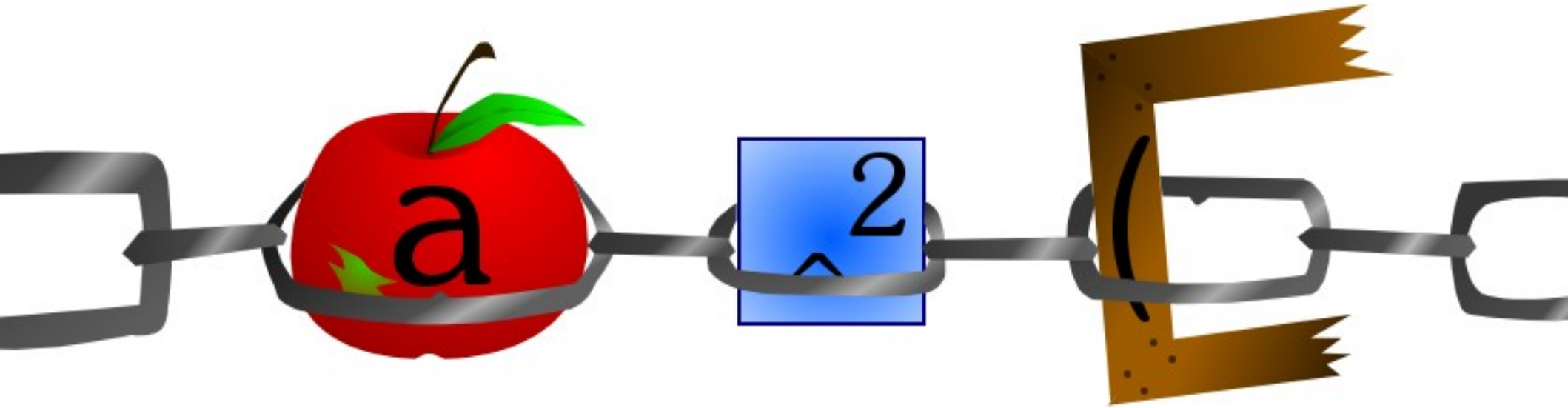
compression are less intuitive than the linking methods because they use a bit of mental trickery to get the job done. Because they are less intuitive, they require more practice to pull off successfully.

Quick Tip!

Arbitrary information has a weaker structure. Always try to shift information into a layer that is easier to learn:

Weak – Learning through repetition.
Better – Learning with linking, pegging or information compression.
Best – Learning with metaphor, visceralization or diagrams.

The Link Method



The Link Method

I didn't create the link method, as it is a memory trick that has been around for years. The link method is called that because it serves the purpose of linking a series of ideas together, like a chain. As long as you can access one link on the chain, you should be able to easily travel to any other link on the chain.

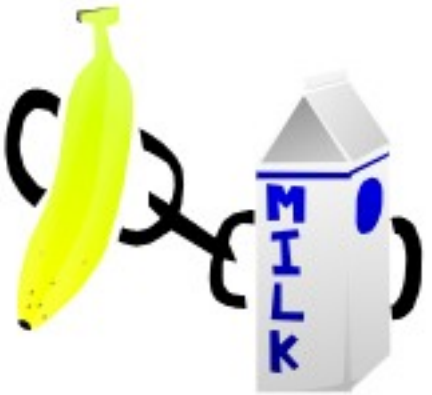
The link method works best for storing a sequence of arbitrary information. Steps in a process, sets of names or formulas written out in sequence all can be tackled using the link method. As you get practice with the link method you can chain together a series of several dozen ideas with only a few minutes of focus.

Quick Tip!

Despite the name (I didn't invent the technique) the Link Method has less to do with holistic learning and sits closer towards rote-memorization. It can be a useful method, but I would stick with metaphor, visceralization and diagraming where possible.

Steps to Use the Link Method

Step One: Create Your Sequence



Start by writing out on paper a sequence of information you want to store. Break apart the information into units you can immediately understand. It is important that the information be displayed in a linear list because that is the only way the link method can hold data.

A simple example might be linking together a grocery list:

1) Bananas
2) Milk

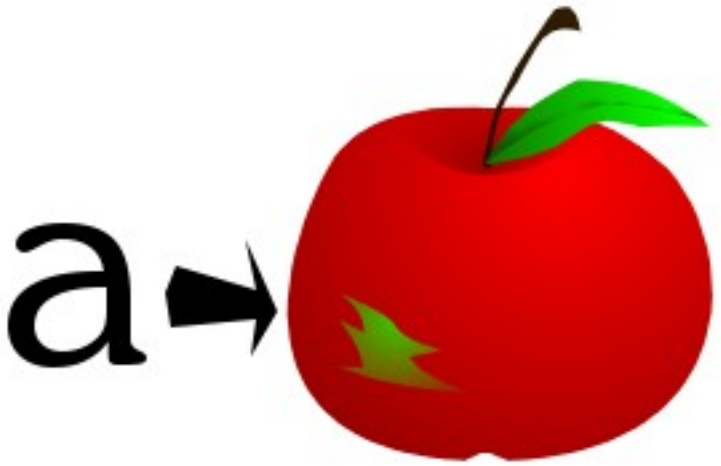
3) Baked Beans
4) Butter
5) Jam

While I'm sure few classes would get you to remember a grocery list, the principle remains the same.

Turning a formula into a sequence requires that you convert it into a form you might enter into a calculator. Therefore a formula such as V = 1+x/b could be written as V = 1 PLUS X DIVIDE B. V, =, 1, PLUS, X, DIVIDE and B would be your elements in the series. Complex formulas may take time to break down if you aren't used to this approach, but it can still be helpful if you are worried you might forget.

Step Two: Symbolize Each Object in the List

When dealing with an abstract list, you need to create an easily recognizable symbol for each item in the list. In a management course, I needed to remember Henry Fayol's ten principles of management. I used the link technique and created a symbol for each element. Division of labor became a knife and remuneration of



personnel became a carrot on a stick.

It is important that the symbol immediately helps you conjure the original concept. Picking symbols that don't give any significance to the original idea aren't useful, because the link method can only store visual symbols, not abstract ideas. Unless you feel confident you can convert your symbol back to the original idea, you can't use the link method.

With formulas, you can memorize elements of the formula by creating an object that starts with the same letter as the algebraic symbol and coming up with a shorthand for different mathematical symbols. The variable **a** in a formula could be symbolized by an apple and raising a term to the power of two could be visualized as a colored square.

Write out your symbols next to each item in your sequence. As you get better with linking, you might not need to write all these steps. When you start with the method, write them out so they become habits.

Step Three: Create Your Links

This step is the basis of the link method. What you want to do is create vivid and exaggerated mental images that associate two symbols in the sequence. This means you will need to create a mental image linking 1 and 2, 2 and 3, 3 and 4, etc.

With our grocery list we would have to first create a mental image that links bananas to milk. For this I might imagine a giant banana that has cow spots on it. I could also imagine a farmer milking a banana's udders instead of a cow.

These ridiculous mental images are important for creating the link. If the link isn't wildly exaggerated and vivid, it will be difficult to recall. Simply picturing an ordinary jug of milk next to a banana wouldn't be sufficient to create a strong link. But a cow-spotted banana or a banana being milked are both crazy enough to stick in memory.

After you create link between two items, make a link between the next two items. So for our grocery list that means you would need a link between milk and baked beans. Again, a cow-spotted bean or a giant bean wrestling a carton

of milk might be vivid enough to create a link.

Try continuing with our grocery list to create your own links between beans and butter and butter with jam.

After you are done created a list, go through all of your links to see that one easily follows into the next. If you can't find the next link after viewing one, you probably didn't associate a vivid enough picture to the resulting details.

Quick Tip!

One attribute the Link method shares with holistic learning methods is the need for imagination. Don't be shy, trying to pick only "reasonable" connections between ideas. Linking works best when the mental pictures are exaggerated and bizarre. Holistic learning works best with many, varied connections.

Challenges With the Link Method

Although the link method can be more time consuming than other techniques, it is reliable and your speed will improve with practice. There are a few other challenges that can arise with using the link technique you will need to be careful of when creating a list:

Repetition of Symbols

Lets say you want to remember the following formula sequence:

r, =, σ, (, Z, x, *, Z, y,), Divide, (, n, Minus, 1,)

Overall this formula is a good candidate for the link technique. Unfortunately there is the repetition of the "(" twice and the ")" twice. This means that you may inadvertently jump from the first "(" to the n, instead of the first Z.

When symbols are repeating and you are worried about confusing the order, I suggest labeling each with a color, so that all elements in the sequence are unique. This way your link between "σ" and "(" might use a blue bracket and the Division with "(" might use a red bracket.

Broken Links

One failing of the link technique is that if one link in the sequence is broken, you can't retrieve any of the following links. This is why I suggest keeping the sequences short to about 5-15 links maximum. Beyond that it is better to chunk the entire sequence into a series of smaller links.

This way you might have a formula broken into three parts. Those three major sections would form a linked list of three and each major section would begin a new linked list containing 7 or 8 elements. This mental re-stitching can take extra time, however, so using it for every possible formula might not be advisable.

Indecipherable Symbols

As I mentioned earlier, the symbols need to have a clear description that is immediately obvious. If your symbols lack clarity, the linked list will fail. Some people who master the linking system begin to create there own shorthand, using symbols to represent common ideas, phrases or even syllables of words.

Lost Triggers

In some lists, you may want to add one additional link, a link between the first item and a trigger. With our grocery store example, how can you remember your linked list if you can't think of the first object on that list? In this case you might want to associate the first object on the list with a trigger, say your bags you take the grocery store, or the storefront itself. On seeing the trigger you should be reminded of your first link and all the links following it.

The same method can be done with information for tests. Linking the fist item with an idea, say a formula with what it calculates or a list of principles with the theory they represent can be helpful in completing the linking process.

Mind Challenge!

Learning the link method will probably take more time to master than the methods of the previous section. Try committing for an entire month to practice using various lists from your textbook or notes.

1) Pick a formula, list, group or any set of ideas that can be expressed in an ordered sequence.

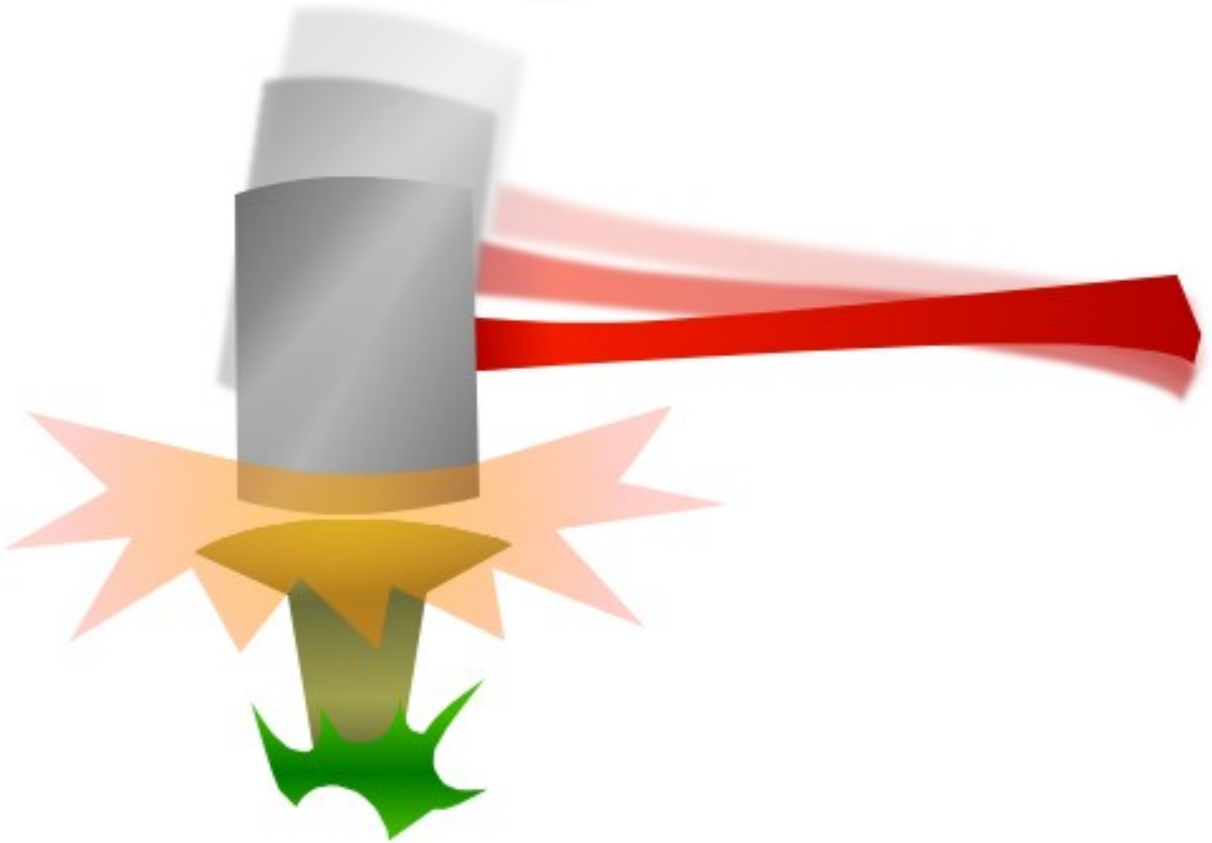
2) Go through the above steps for creating a linked sequence, breaking it into a list, creating symbols and forming the proper links. Review your linked list to ensure all the ideas are vivid, repetition of symbols is minimal and the symbols are easily decipherable.

3) After your first week of the mind challenge, pick a random list from the previous week or weeks and attempt to go through it until you can reform the original formula, group or list.

4) After the second week you may want to time yourself to improve your speed at using this method.

I am not a perfect master of the link method as I prefer the holistic linking methods of metaphor, visceralization and diagraming to these techniques where possible. Since other books have been written about the link technique, I recommend doing a Google or Amazon search to find more information if you want to go beyond the basics of linking.

The Peg Method



The Peg Method

The peg method is similar to the link method, except it expands upon the basic idea. With the peg system, you store information attached to numbers, so you can recall any of the ideas without needing them to be in a specific sequence. The peg system can also be useful for linking together a series of numbers as in dates.

With the peg system you aren't linking a series of ideas with each other but with a specific numbered slot. I only use the peg system to record no more than a dozen items, however advanced versions of the peg system can store hundreds of items independent of any specific sequence. I'll discuss these methods briefly, but I've found being able to store up to 12 items by pegging to be sufficient for learning most ideas.

The peg system is based off of creating symbols for the basic numbers. My implementation of the peg system uses rhyming words to easily store the numbers 0-12. These can then be used as empty slots for storing concepts or steps in a process.

0 - Hero
1 - Gun
2 - Shoe
3 - Tree

4 - Door
5 - Hive
6 - Sticks
7 - Heaven
8 - Plate
9 - Wine
10 - Pen
11 - Ribbon (I know, not *quite* a rhyme with
12 - Oven (similar sounding to dozen)

Once you get the numbers 0-12, you can then associate any symbols that you need to peg to one of these thirteen slots. Forming a picture of a large bottle of wine fighting a knife might cause me to associate the 9th slot with a knife (my symbol for Henry Fayol's principle of division of labor).

With this sense you operate exactly as you did with the link system, except you

associate each item not with the one before and after it in the sequence, but with a specific position on the numbers 0-12. This way if one link becomes broken, every other link can still be recalled easily. The only effort required is remembering your 0-12 rhyming symbols.

Using the Peg Method to Store Dates

I haven't taken too many subjects that required excessive date memorization, but from my brief experience, I've found the peg system to work well in storing numbers. Let's say you wanted to link Columbus's discover of America to the date 1492.

The first step would be to create your trigger that could store the event for the date in question. In our case this might be an image of a ship crashing onto a crudely drawn picture of North America.

The next step would be to link the number 1, 4, 9 and then 2, to the date in question. So for us this would

mean first linking a picture of a gun to the trigger image. Perhaps an oversized pistol holding up poor ol' Christopher as he crashes into North America? Next you would need to link gun and door, door with wine and finally wine with shoe. Then as you play back the sequence of links you could get the numbers 1, 4, 9 and 2 or 1492!

Advanced Pegging

An advanced form of using the peg technique involves associating a phonetic sound to each digit 0-9, rather than a rhyming image. You can then use the phonetic sound to form a series of words to store dozens, if not hundreds of numbers in a sequence instead of just a couple. I won't go into this form of pegging, simply because I've found it to be unnecessary for more than party tricks.

However, if you want to impress your friends with your ability to remember a string of hundreds of numbers, you might want to do a search looking for more information on this advanced form of the peg technique.

Mind Challenge!

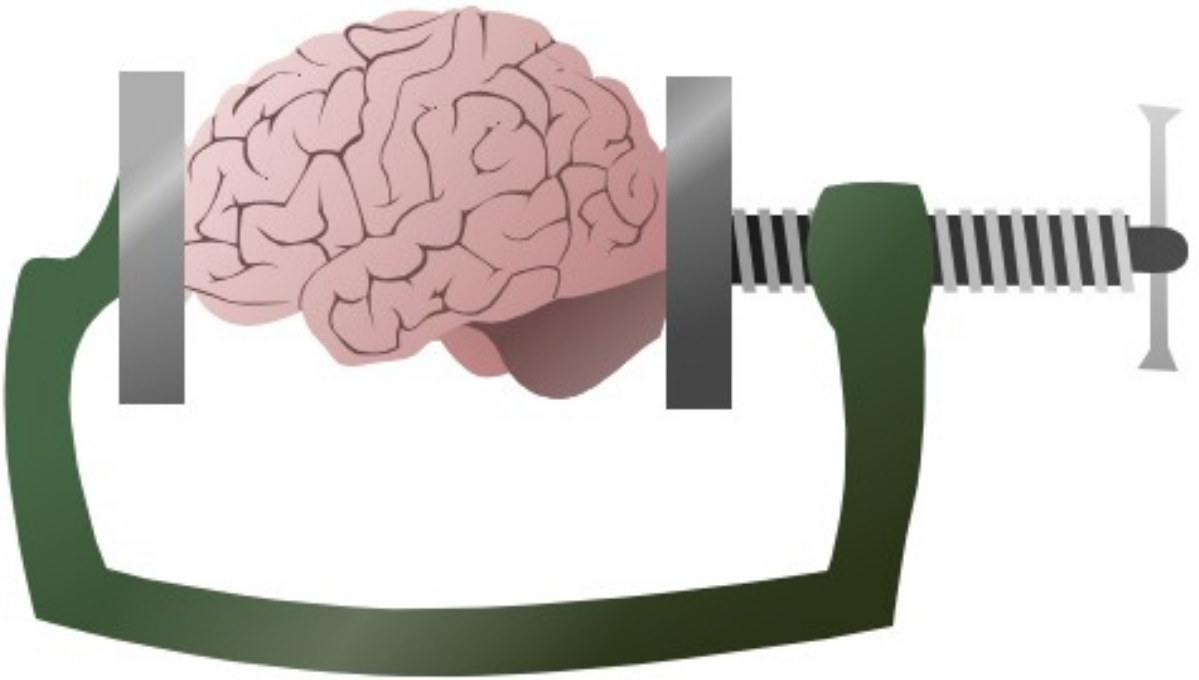
The peg method is built off of the link method, so do not start this Mind Challenge until you've completed the previous one for the link method. Here the goal is to familiarize yourself with the peg method and begin using it to store pegged lists of information and series of numeric information such as dates.

1) Pick a list, group or date suitable for using the link method. Make sure it has no more than 13 items if you are trying to store a pegged list.

2) Follow the steps for pegging until you can bring up any number in the list from 0-13 without needing to refer to the original source or other nodes on the list.

3) Repeat this exercise once a day for two weeks, after the first week spend some time trying to reform past dates or lists without referring to the source.

Information Compression



Information Compression

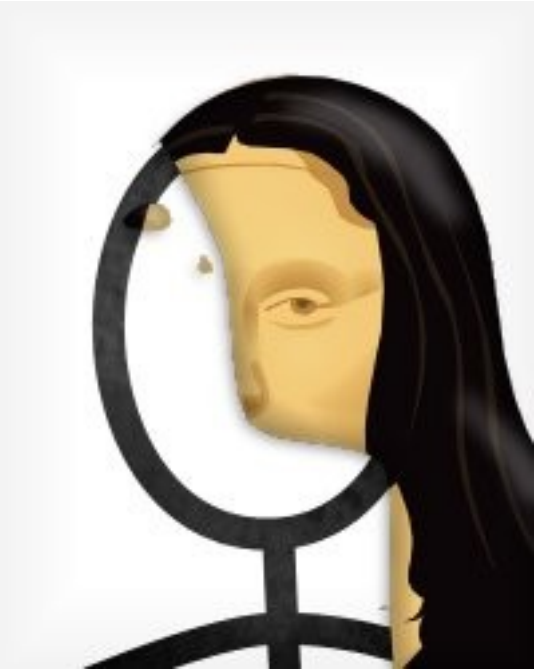
Information compression is another common method for storing large quantities of arbitrary information. The goal with information compression is to reduce the size of information so that it can be associated together in a logical way. I'll explore three main ways of doing this: mnemonics, picture linking and notes reduction.

Mnemonics

Mnemonics are devices that store several ideas together by using a phrase or word that can organize the information. In first aid, one mnemonic for treating a bleeding injury is RED. Rest the injured area, Elevate the injured area and apply Direct pressure. Similar mnemonics have been used for centuries to store information.

Using a mnemonic is as simple as collecting several ideas you want to compress together and picking a word or phrase you could use to organize them. Acronyms such as RED, NASA or USA are useful for storing several words or ideas under a single word.

The best mnemonics have an easily identifiable word to store the ideas.



Picture Linking

Picture linking can be seen as a cross between the link method and diagraming or visceralization. Here the goal is to link several ideas together by representing them in a single image, theme or concept. In my management class, I linked together the five forces model by creating a little doodle of the "five horsemen of the business apocalypse". Each visually connected the ideas with the different parts of the original theory.

Another way to use picture linking is to create one picture that combines several ideas together. Once you create a symbol to represent each idea, you put them all in the same vivid mental image.

I find picture linking works best if it is done on paper, creating small visual drawings to connect several ideas together at once. If done quickly, it can be faster than the link or peg method.

Notes Compression

Notes compression is a useful way to get a grasp of a lot of material. By itself, it isn't an entirely useful technique. But it can serve as the starting point for using other information compression techniques, linking, pegging or holistic learning methods. The idea behind notes compression is taking a huge quantity of information you need to learn, and reducing it to just a few pages of notes. Note compression allows for two things:

1) **It allows you to organize large amounts of information**. Normally, it is difficult to take the hundreds of facts, concepts and ideas over the duration of a course and sort it fully. But if that information is represented on just two or three pages, it becomes easier to organize the ideas at the highest level.

2) **It allows for easier connections than would be previously possible**. Looking at the entire structure of your subject can allow you to draw connections and link information that would be difficult to do from a zoomed-in perspective.

Steps to Compress Your Notes

1) **Give yourself several blank sheets of white paper**. Take all the notes for the particular course or sub-unit you want to compress. This exercise can take an hour or two, so make sure you have the time.

2) **Starting with the smallest writing you can use, write down a major idea from your notes**. Use as few words as possible.

3) **Next to that idea, write a related idea, formula, concept or definition**. Write the idea in small lettering and use few words as a description to save space.

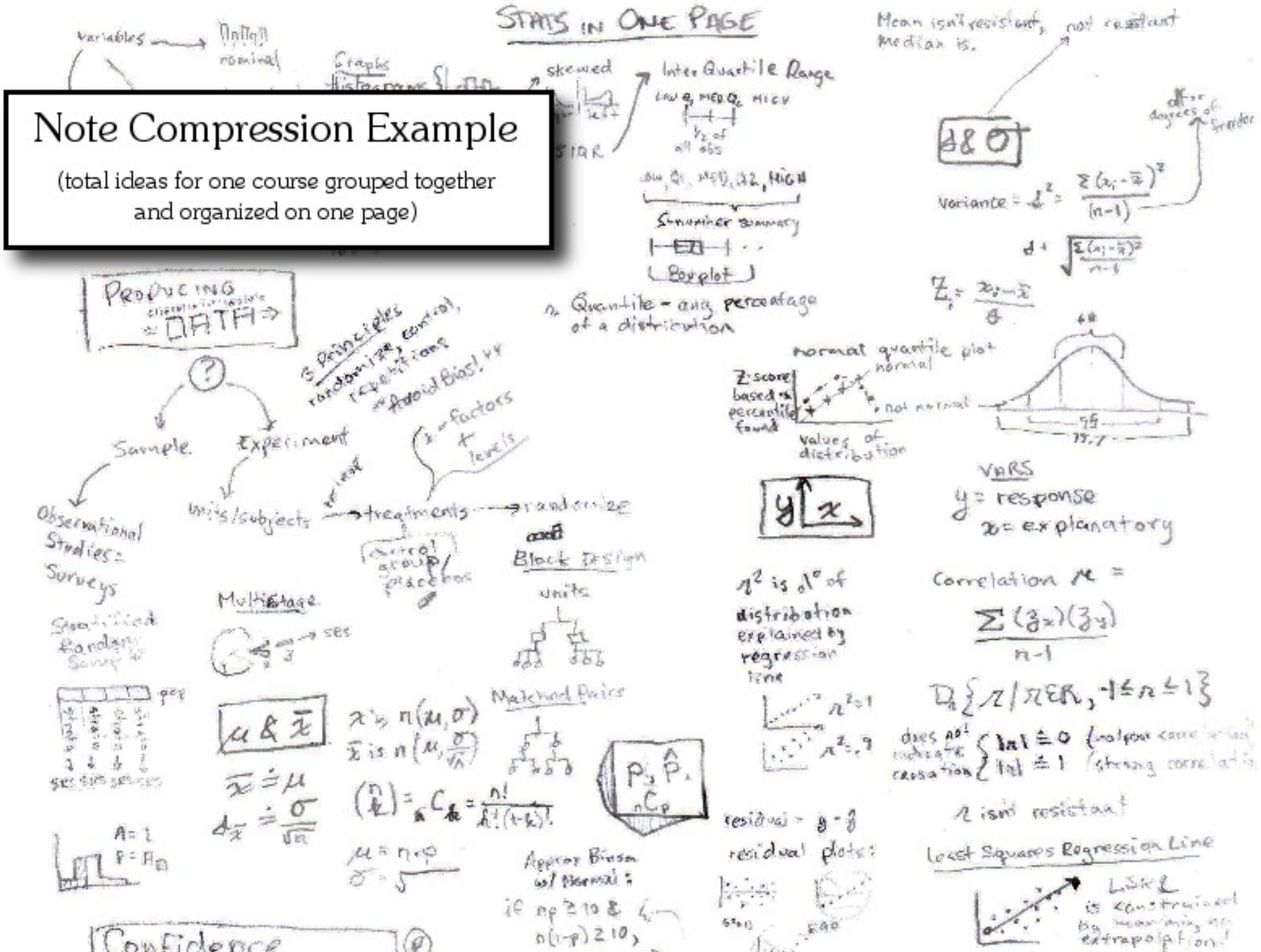
4) Continue this process of writing ideas in a loose format, **until you have written down, in reduced form, every major idea from your notes**. You should end up with a 1-3 sheets of paper with densely written information.

5) As an additional step, you may want to rewrite this page for better organization if your first attempt is difficult to sort through, or connections between the material are hard to see.

On the next page I have one half of a notes compression I did in a past course on statistics. This can help point out weaknesses and logically group ideas. Of course, you can compress notes from a fraction of a course or an entire topic, the scale is up to you.

Note Compression Example

(total ideas for one course grouped together and organized on one page)



Mind Challenge!

This mind challenge should get you used to using information compression methods.

1) Once per day, go through your textbook or notes and pick out a group of facts you would like to compress. Then create either a mnemonic or picture linking to group the ideas under one theme.

2) After doing this for two weeks, create a notes compression for the last two weeks of material, incorporating the various picture linking or mnemonics you used earlier.

3) Test yourself to see if you can remember the entire group of ideas after using one of these methods to compress several ideas together. Keep doing this process for four weeks (2 notes compressions) or until you feel comfortable with using these methods quickly and easily.

Extending Ideas

Just passing the test isn't enough. Having an A or A+ in your subjects isn't important if you can't use any of the information you've learned. The final stage in holistic learning is application. This is where you've not only understood and explored ideas, but you have tested, debugged and applied this knowledge.

Fully taking an idea from the acquiring to application stage isn't always necessary to get a good grade. But the further you can take an idea along the learning process, the more useful and memorable it becomes. None of these extension ideas are original, but they are easily forgotten. By extending ideas beyond what you need to get a grade, hopefully you can learn something worthwhile.

Practical Usage

Practical Usage

The best way to extend ideas you learn in courses is to apply the material in your practical life. This is rarely a problem with self-education or career-focused education. However, if you need to take many abstract courses to work towards a degree, some of the information may seem unnecessary or at least not applicable for years into the future. By making the ideas practical, they are more likely to stick.

Practical usage isn't a step-by-step technique. It is a creative process of looking for unusual ways you can apply the ideas you are ingesting. Although you might not be sure how you can use your history or calculus class in daily life, I'm sure you could find some uses if you spent ten minutes doing a brainstorm.

Instead of giving steps, I'd like to share some ways I've been able to use different ideas in courses I've studied. Some of these are highly practical solutions, others are strictly internal solutions by applying abstract course material to my own life.

1) **Statistics** - I used statistics courses to help decide the name of this book and the price to sell it at. Using Google AdWords, I ran an experiment testing a variety of names and prices. Statistics helped me pinpoint the significance of the sample size I found to see which should make it to the final product.

2) **Computer Science** - Aside from the obvious uses of programming, I've found computer science as a useful way of looking at problems. Debugging, algorithms, writing out procedures and organization are all useful skills that can be applied elsewhere.

3) **Accounting** - Taking accounting courses helped me sort out my personal finances and income statements. Applying the basic accounting principles to my finances made them easier to read and understand.

4) **Economics** - Economics helped me reevaluate how I look at money in society. By viewing it as a medium for exchanging value, I changed much of my philosophy for how money, the economy and world issues function.

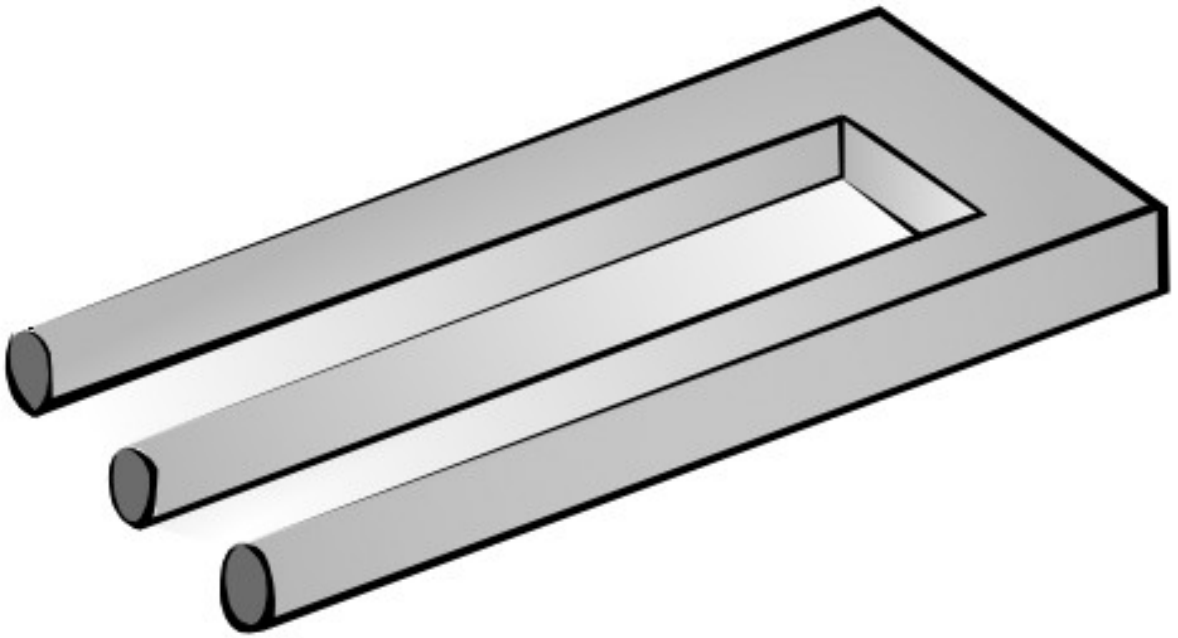
5) **History** - History can be a tool for understanding the present. Learning about ancient Asian history helped me when trying to look at issues facing modern China, India and Japan. History provides me with a context for understanding world issues.

These are just a few examples, but I strive to make use of anything I can learn in subjects. If a course has absolutely no merit in daily life, what is the point of taking it?

Mind Challenge!

Once a week for the next two months, pick one of your major courses. Spend at least 5-10 minutes creating a list of ways you can use this information in your daily life. Make sure the list has at least 20 ideas and don't censor yourself in letting them flow. After you're done this weekly exercise, pick one of those ideas and implement it.

Model Debugging



Model Debugging

Model debugging is a fancy name for a simple concept: practice. Practicing questions and testing yourself is the only way you can get rid of errors in the holistic learning process. You can't debug a computer program easily without actually running it and looking for errors. Similarly, you can't debug your brain without testing it against questions and homework from your studies.

If you do the holistic learning process well, spending hours each day debugging shouldn't be necessary. Just like a skilled programmer can write more code with fewer errors, having the right skills in place from the beginning should reduce the time you spend practicing. Still, perfection is impossible, so taking the time to practice and debug your understanding is always a good idea.

Since you probably already know how to set up and do practice questions and homework, I won't repeat the obvious. But here are a few tips for improving the model-debugging process:

1) Separate Typos From Concept Errors

I'm sure most computer programmers are used to occasionally failing to compile

because they mistyped a key word. Worse is spending twenty minutes tracking down a bug because you used the wrong variable in an innocent mistake. But if you don't understand how a fundamental concept or algorithm should work, this is a far more serious problem.

The same applies to your own model debugging. When you get questions wrong, you need to separate simple errors that can easily be fixed, from those that represent a failure to understand key ideas. In the case of simple errors, just repeat a new question and learn from it. In the case of concept errors, go back to your models, metaphors and visceralizations to see if you made mistakes in the reasoning process.

2) The Shotgun Approach

Spending hours repeating the same type of questions is no different from rote memorization. I prefer to spend my time debugging on a shotgun approach, which tackles a few questions of each type, but doesn't become repetitive. I feel if you must spend hours repeating a question, then do it. But a better solution is to use the holistic learning methods earlier, so remembering how to solve certain problems become easier.

3) Spread Practice Times Out

Split your practice sessions into daily intervals, rather than pre-test crash sessions. A quick refresh each day will be more likely to stick than a huge download into your brain the night before.

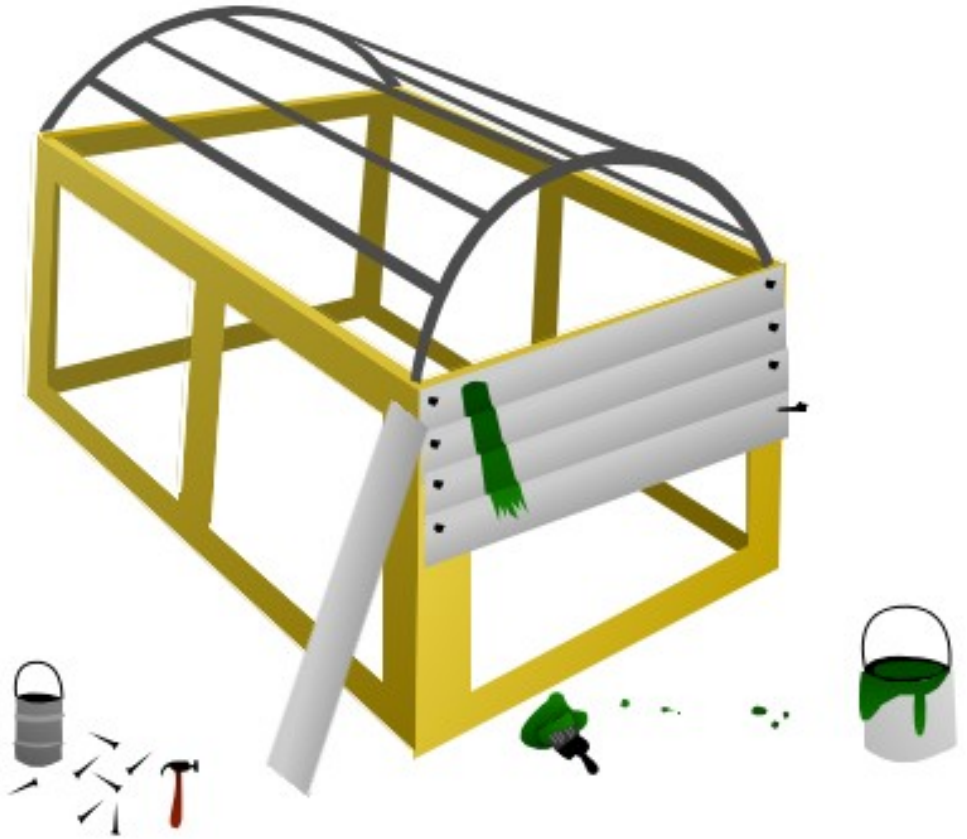
Quick Tip!

Practicing questions repeatedly is a slow way to learn. Model debugging is necessary, but if you need to do the same types of questions repeatedly, chances are you need more work on the exploring or understanding phases. If you feel you don't quite understand a topic, try going back and exploring the ideas.

Mind Challenge!

If you are already doing regular practice sessions for questions in your classes, continue with what you are doing. Try to implement some of these ideas for improving how you practice, but otherwise keep testing yourself. If you aren't doing regular practice sessions, or you are doing crash sessions before a test, try spreading your learning out over the entire term. Spend a few minutes each day instead of hours before the test.

Project-Based Learning



Project Based Learning

Project-based learning is my favorite technique for self-education. While going to this level of depth is probably unnecessary for most formal schooling, it can be useful when you don't have an instructor or a final exam.

Project-based learning simply means constructing a 1-3 month project that will force you to learn. In order to complete the project, you must know more than you do. Taking on a project will drive you to learn as you go, pushing any new ideas right through every step of the holistic learning process.

Taking on a 1-3 month project can be a little daunting, but if you are interested in really knowing a subject, I believe it is the best way to learn quickly. As with the last two methods for extending ideas, this one doesn't have a step-by-step formula. But here are some examples you might want to follow for learning different subjects:

1) **Computer Programming** - Design a project that will take you 1-3 months of work to complete. This could be a small application, a website or game.

2) **History** - Write a short e-book about the historical subject you want to study. Write one that will get you to do research as well as create your own thesis.

3) **Financial Accounting** - Pick several companies and do a complete analysis of their financial statements before deciding who you would invest money in.

Before you start designing a project to encourage your self-education, here are some tips I've found useful when running my own projects:

1) **Keep it Small**. A project should push your abilities forward, but massive, year-long adventures can start to drag after several months. If learning is your goal, keep the projects within a few months.

2) **Write it Down**. Commit to your project on paper, otherwise it won't last. I don't recommend committing to projects if you seriously doubt your motivation is strong enough to last. However, written documents can help you stay focused if you feel frustrated or bored by the next immediate activity.

3) **Create an Objective Outcome**. Just working on a project isn't always enough. I've found my learning efforts work best if there is a clear goal at the end of the project. If the project serves a function beyond just learning, you can boost your motivation towards continuing it.

Mind Challenge!

Design a project that you expect to take one month to accomplish. Examples could include:

-E-book
-Invention
-Design
-Program
-Website
-Blog

The project should be simple, but have a sharp learning curve. Write out your deadline for completion and schedule a bit of time each day to work on this project. After you've finished the project do a review of the project-based learning method and decide what other projects you might like to tackle.

Review of Holistic Learning Techniques

Theory and technique are equal parts to the holistic learning strategy. With just the theory, it is difficult to put holistic learning into practice. With just the techniques, any methods you use will be haphazard and random at best.

These techniques just represent a small minority of the total ways you can learn. I encourage you to find other methods and incorporate them into your approach. Use what works best for you and discard everything else until you find a pattern that works.

Practice is essential for making use of these holistic learning methods. That is why I have created a Mind Challenge for each of the different methods. The purpose of these challenges is to focus you on practicing one technique long enough for it to become a habit. Just reading about these ideas isn't enough if you can't use them automatically in your studies.

Completing all of the challenges would take close to two years and might not be feasible for the immediate future. I suggest that you pick only one challenge to work on in the next month or two. Base your decision on which method you would to turn into a habit. If your obstacles are in understanding concepts, you might want to practice metaphor. If you can't handle the volume of dates and definitions, linking or pegging might be a better method to master.

The holistic learning theory should help you pinpoint where you might want to improve. From that point, you can determine which techniques would improve on that weak point. By finally moving that technique from a tool, which requires effort to use, to a habit which happens automatically, you can improve the way you learn information.

Included with this e-book are several documents for practicing some of the techniques mentioned in the book. You can use these documents to help you get started with your practicing sessions.

◦ Part III ◦

Beyond Holistic Learning

The Productive Student

The Productive Student

Throughout this book I've emphasized "Learn More". Holistic learning expands your ability to handle difficult subjects, raising the upper limit for how well you can understand your classes. Learning holistically will help improve your grades and understanding, but it probably won't shave off huge amounts of studying time. The new methods can take a few weeks to master, so the time-saving benefits are long-term.

Now I'd like to focus on the other half of this books title, "Study Less". Becoming a productive student or self-learner is the art of cutting down the amount of time you spend in the books. During school, I have time to run this business, write as much as 7000 words each week, exercise and run a Toastmasters club on top of full-time classes. Despite this schedule, I still have time to spend time with friends and enjoy weekends.

Here are the key ideas for becoming more productive as a student:

1) Energy Management
2) Don't "Study"
3) End Procrastination
4) Batch
5) Get Organized

Productivity Tip #1
Manage Your Energy

I've seen the victims of poor energy management. These are the students completely burnt out from excess projects, requiring injections of caffeine just to function. Balancing courses and life isn't easy, especially if you have a full schedule.

Your body has fuel cells, both physically and mentally. You can't run on empty forever. If you try to cheat your body into giving a few extra hours today, it can mean a dozen lost hours next week. If you've been struggling to cope with burnout, stress and exhaustion, you haven't been managing your energy.

Better energy management has two steps:

1) Increase your energy capacity.

2) Switch your schedule from a linear format to a circular format.

Increasing Your Energy

Energy isn't just a genetic gift. There are many things you can do to boost the amount of force you can give towards your work. Here are a few things to consider:

1) **Do you exercise 3-5 times per week?** If the answer is no, you're undercutting your potential energy levels. Unless you're unable to exercise for medical reasons, there is no excuse for not getting your 40 minutes a day. A small investment in exercise can have a huge impact on your ability to concentrate and work quickly.

2) **Do you get 7-8 hours of sleep each night?** Some people work best on 4-5 hours of sleep. But I'm willing to bet neither of us can do that. Pulling an all-nighter is a dangerous move when you need to keep your mind sharp.

3) **What do you eat?** Do you eat a diet high in meat, fat and sugar? Switch to a diet that emphasizes whole grains and unprocessed foods. This will keep your blood sugar levels even throughout the day, avoiding the highs and lows.

4) **How many glasses of water do you drink each day?** You are over two-thirds water. Dehydrating yourself is a quick way to zap your energy.

5) **What meals do you eat each day?** If your answer is lunch, dinner and sometimes breakfast, you're energy levels will suffer. Ideally, you should eat 4-5 smaller meals throughout the day to ensure a more constant supply of nutrients. Eating a bit right before bed can also help with morning grogginess by avoiding low-blood sugar when you wake up.

Circular Scheduling

A linear schedule has work spread evenly over the entire time period. A circular schedule focuses on doing a lot of work earlier with ample rest time afterwards. Keeping a circular schedule helps your body keep up a rhythm of high productivity instead of a death march. Here are few ways to make your schedule more circular:

1) **Set a day off each week**. I take one day off every week where I don't do any schoolwork. Compressing seven days of work into six might seem difficult at first, but taking a day off prevents burnout.

2) **Evenings off**. Compress all your work into the morning. Instead of taking breaks throughout the day, get your work done early so you can have a few hours off each night.

3) **90 minute timeboxes**. Set aside 90 minutes towards a project or studying. After the ninety minutes is complete, you stop working. Timeboxing can help you keep your studying time focused.

Quick Tip!

One of the best books on the subject of energy management is ***The Power of Full Engagement***. Although I've briefly touched on the subject, this book can give far more depth. The book divides up energy into four categories and gives more advice for how to maximize your energy and work within cycles. A must-read for anyone serious about enhancing their productivity.

Productivity Tip #2
Don't "Study"

I never study. I'll read my textbooks. I'll review notes. I'll finish assignments and do practice questions. But I never "study". A big waste of your time is to spend time "studying" without specifically defining what you want to accomplish. At the end of the year, grades, not how many hours you "studied" are going to matter most.

Cal Newport, author of How to Win at College, claims he hates the word studying:

> "It's ambiguous, and for most students it's entangled in all sorts of emotional baggage. They feel guilty if they haven't suffered enough in the library. Student life, for them, becomes a constant struggle — always trying to "study" more, yet always falling a bit short. It's a lot like dieting. But with less involvement from Kirstie Alley."[1]

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1. Cal Newport: "Studying with Kirstie Alley, Decoding the Quarter System, and Coping with Early Classes", http://calnewport.com/blog/?p=258

Instead of studying, define the activities you need to perform in order to learn the material. For myself these are the activities I need to do in order to get an A or A+ in most classes:

1) Read the chapters covered
2) Complete assignments and take notes in class
3) Use some of the holistic learning methods to tackle trouble spots.
4) Optionally take a set of flow-based notes for the material covered before tests.

That's it. My list has been narrowed down by doing as much learning in-class as possible, so your list might have more items. The point isn't that I have a short list, but that I have made a list in the first place. Unless you itemize what **you need to do** in order to learn, you'll waste endless hours "studying" instead of optimizing your time to actually learn.

Productivity Tip #3
Nuke Procrastination

If an assignment is due next Wednesday are you the type of person who starts working on it:

(A) As soon as it is assigned.
(B) All in one session, some time between today and the due date.
(C) Tuesday night.
(D) Wednesday morning, *ten minutes before class!*

Unfortunately, most students I know would have to pick either C or D. Which is the best answer? It may surprise you that I don't believe answering A is ideal either. As I'll explain, beating procrastination doesn't mean just completing work earlier.

The correct answer (in most cases) would actually be B. Completing an assignment in one go saves time by batching. In addition, if you complete the assignment using the Weekly/Daily Goals method, you can save yourself the stress and guilt of deciding when to do assignments.

Weekly/Daily Goals System

The W/D Goals method is one of the best ways I know of to combat procrastination. The idea is simple:

1) **At the end of each week, compile a list of all the assignments, homework, reading and studying activities you want to do in the following week.**

Unless something unexpected arises during the week, you are obligated to finish this list–but no more than this list. This splits off the endless amount of assignments and work you could be doing into a manageable chunk of one week. If you have a particularly busy week, you might hold-off on long-term assignments. If you have a lighter week, you might get ahead on reading for tests far before the date.

2) **At the end of each day, check your weekly to-do and create a daily goals list.**

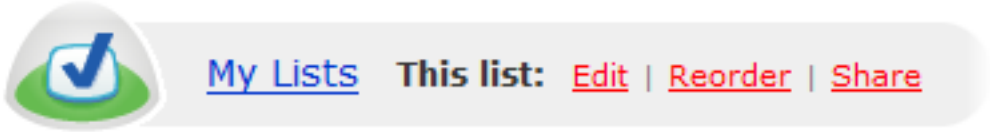
The next step is to break down your weekly work over each day. That's six days of work (assuming you're taking a rest day). You're obligated to finish this list each day, but no more than this list.

What does the W/D Goals system accomplish?

1) It **saves you the stress** of deciding whether to work more or less on a day. You just check your list to see whether you're done.

2) It **keeps you from procrastinating** on big projects. By relying on your weekly and daily goals lists, instead of due dates, you are the one in control over your schedule.

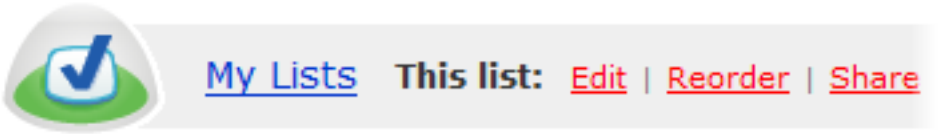
3) It **helps you balance workloads**. By looking ahead at your schedule you can adapt your weekly and daily goals to smooth over your work. Instead of pulling all-nighters before a test, and wasting hours of your time three weeks before, you can split up the work.



Here is a sample of the weekly/daily goals lists I maintain:

Weekly Goals: Feb 4 - Feb 10

- [ ] Weekly Blog Work
- [ ] PTB Article
- [ ] "Flex" Article
- [ ] Backup Website
- [ ] Read Thursday's ENT Case
- [ ] Read Next Tuesday's ENT Case
- [ ] Write Extra LMSL Chapters: "Not



Daily Goals - Feb 5, 2008

- [ ] Classes
- [ ] Gym
- [ ] TM - Speech
- [ ] Read Accounting Ch 5
- [ ] Read Accounting Ch 6
- [ ] Read Thursday's ENT Case
- [ ] Comp Lab @ 11:30

I use TadaList, which is an online to-do list program for storing my lists. Checking my Daily Goals regularly and my Weekly Goals each night, helps me stay on track.

Productivity Tip #4
Batching

Batching involves taking a group of similar, small sections of work and doing them at one time. Batching helps cut down studying time because you can focus completely instead of switching between tasks.

Between both schoolwork and writing, I use batching in many places. I might do all my required reading for each week at one time, or I might write 3-4 articles in a row. Here are some tips to add batching to your productivity system:

1) **Size matters**. Batching works best when collecting small sections of work together. You can't "batch" your entire course for the day before a final exam. Batching will have a negative impact if you take it beyond 3-5 hour sessions of work.

2) **One-Off Assignments**. If an assignment takes me less than 8 hours of work, I usually try to accomplish it in one sitting. Splitting up a 3 hour essay over 15 sessions can add hours of wasted time as you slowly build up momentum in your writing.

3) **Build Your Concentration Threshold**. Your concentration threshold is the amount of time you can focus on a task before your productivity takes a nosedive. By taking on larger batches of tasks, you can slowly expand your threshold. Having a high threshold is helpful because it means you can batch large sections of work.

Quick Tip!

Want to take batching further? Here are some ways you can put it into practice: 20 Tips for Batching to Save Time and Cut Stress.

Productivity Tip #5
Be Organized

Being organized will not get you A's. I've known A+ students who have horrible organization skills and C students with flawless systems. Being organized can help with your productivity and learning, but don't assume that all your problems have disorganization at their root.

If you haven't already, here are the key steps necessary for staying organized:

1) **Everything has a home**. Tasks, assignments and due dates all get stored in a proper location. Mess is the result of the homeless. Devise a place to put everything, and it will be a lot easier to stay ordered.

2) **Carry a notepad with you at all times**. Keep something to write on at all times of the day. This is invaluable for writing down tasks, due dates or ideas.

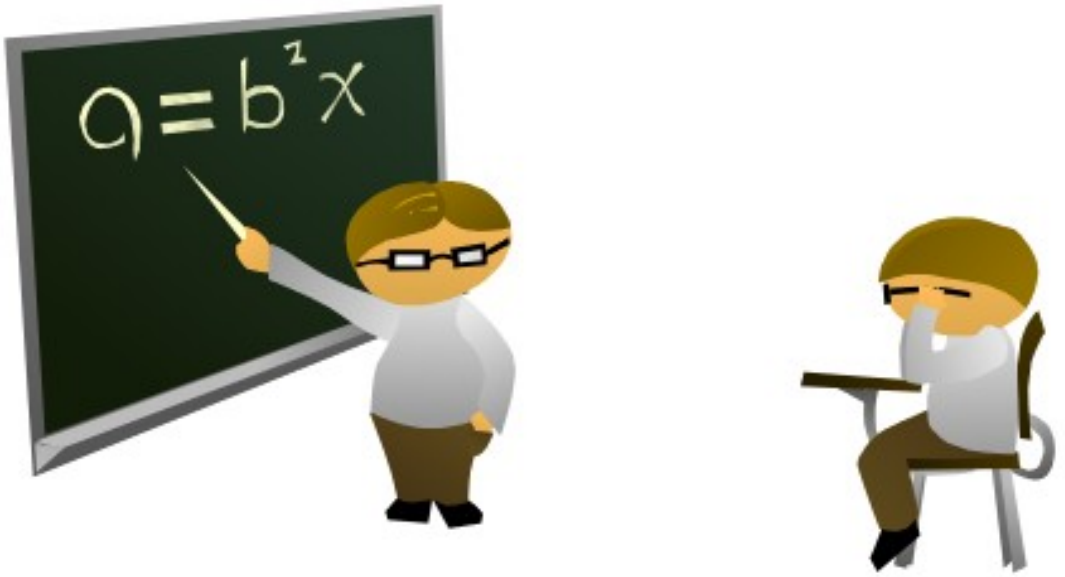
3) **Maintain a calendar and a to-do list**. Use to-do lists to store tasks and projects. Use your calendar to store events and due dates.

Even though being organized isn't a cure-all solution, it can definitely help. Organization skills can make it far easier to be productive, while eliminating stress.

Quick Tip!

If you're struggling with poor organizing habits, I recommend reading ***Zen To Done***, by Leo Babauta. This book focuses on the hardest part of getting organized—turning those skills into habits. Babauta creates a simple framework for staying organized and getting work done.

Educate Yourself



Educate Yourself

Holistic learning doesn't just apply to the classroom, but in your personal life. In fact, I've found that actively engaging in self-education improves you ability to learn in a formal setting. Picking subjects that interest you and pursuing them in your spare time can be incredibly rewarding.

However, self-education comes with its own unique challenges. Without the structure of school, it is harder to maintain a focus, find resources and test your understanding. Despite the expense and inefficiencies of taking classes, they can offer you guided instruction along with a letter grade to tell you your performance.

I've been actively engaged in self-education for as long as I can remember. I've taught myself skills like computer programming, web-design and writing. I've also learned subjects from world religions to evolutionary psychology without ever having taking a formal course. I'd like to present some of the ideas I've found useful in self-education that you might want to apply to your own life.

Most of the self-education I've done has been project-based, but there are other considerations to help improve your ability to teach yourself. Getting the right habits, overcoming the frustration barrier and setting learning goals are also helpful.

Structuring Learning Habits

A formal school structure makes forming the right habits easy. Show up to classes. Read your textbook. Take the tests. Take notes in class. All of these behaviors are not only given by the instructor, but are reinforced by the hundreds of people who surround you in classes.

Self-education is harder to form the right habits because no role-models are easily available. The structure of what you want to learn isn't handed to you on the first day. This flexibility can become a weakness if you don't have the right learning habits. Here are some habits to consider as keys to improving your learning ability:

1) Daily Reading

Reading every day is one of the best ways to improve your understanding. I strive

to read at least a book each week and 50-70 books each year. Books can't teach you everything, but they form a solid foundation of ideas you can build any learning efforts from. By reading a large volume, you can structure your education more effectively, getting a wide variety of viewpoints on a subject instead of just one.

2) Daily Practice

By working on your projects and practicing your skills every day, you can enhance any understandings given to you through reading books. Practicing helps provide a structure for your learning, since it is the first time you will have a benchmark of your abilities.

3) Daily Goal Setting

Reading and practice aren't enough if they aren't directed. If your efforts are aimed at every subject imaginable, you won't get into any useful depth into a subject. But by setting learning goals and breaking it into daily increments, your learning can be more useful to you by learning subjects fully instead of just in pieces.

How to Build Daily Habits

Building habits is another subject that warrants another book in itself. I've written another e-book for that exact purpose. Changing habits isn't that difficult, but here are a few tips to get yourself started on building the right habits to improve your self-education efforts:

1) **Set a trial to condition a habit for 30 days**. Decide to read forty pages a day for a month. Decide to practice your web-design skills for an hour every day. Decide to set daily goals for your learning over the next thirty day period. Thirty days make a habit.

2) **Be consistent**. Set your trial to do the same habit every day, in the same way. Reading one day, listening to a speaker the next and practicing a third day are too disjointed to become habits.

3) **Enjoy the habit**. If you don't enjoy it, your habit won't stick. If you brainstorm a list of ways, it isn't hard to find ways to enjoy activities like reading, practicing and goal-setting.

4) **Pick a time**. I like to do morning reading, because it gives me uninterrupted quiet hours where I can focus my thoughts on a particular subject. Picking a specific time each day will reinforce your habit.

If you aren't sure where to find the time to do daily reading or practice, ask yourself how much television you watch or web surfing you do. If you are serious about learning on your own and can't seem to find the time, TV and StumbleUpon need to be the first things to go.

Quick Tip!

Want more information about how to reprogram your habits? I've written a full five-part series on the subject, Habitual Mastery. If you still want more depth you can read my full e-book on the subject, How to Change a Habit.

Overcoming the Frustration Barrier

Self-education and frustration often go hand-in-hand. Without an instructor who can show you what you're doing wrong, or a guidebook to tell you the next step, self-education requires more patience than taking classes. While I've found classes usually drag at a slow pace, self-education can go too fast.

Ultimately, overcoming frustrations in self-education is a matter of motivation. If you are interested in a subject and that subject is important to you, a few speed-bumps won't keep you from continuing forward. However, I've found it useful to have a few methods to overcome the frustration barrier so self-learning can go smoothly.

Here are a few tips for reducing the frustration barrier:

1) **Write Down any Obstacles.** If I encounter a programming problem I don't currently know how to solve, I try to write down the problem in as much detail as

possible first. Writing obstacles out thoroughly makes it easier to think through problems.

2) **Use Forums**. There are online forums for just about any discipline, skill or subject. If you are having trouble understanding an idea, or are looking for books to explain it, online forums can be incredibly helpful. Search online for answers first, but keep forums as a tool in case you get stuck.

3) **Get How-To Manuals**. If you are trying to teach yourself a skill (doing your taxes, programming, graphic design, etc.) how-to manuals are invaluable. For a tiny fraction of the price of a full course, they can be an excellent reference if you get stuck.

4) **Attack From a New Angle**. If you hit a roadblock in your understanding, try coming at the idea from a different viewpoint. Spend time working on other concepts and come back to it after you have learned more.

Setting Learning Goals

One of the biggest challenges with self-education is that there is little structure. There are no goals, few plans and little direction. Although this loose format makes it easy to explore what you want to learn, instead of what are told you need, it also makes it harder to stick with. Without structure, it requires far more internal discipline to keep going through minor obstacles.

I've found it helpful to create learning goals to give yourself an extra push. Here are a few example goals you could set to give the learning process more structure:

- Read a certain amount of books each year.
- Work towards a project that requires learning.
- Be able to do something before a deadline. Example: *Be able to compose a song, complete your financial statements or speak in Latin before June 3.*

The idea of giving yourself forced deadlines and constraints might not sound like fun. Won't goals just suck off the spontaneity of the moment?

I've found the opposite is true. Having too much structure can be suffocating (as I'm sure many feel about formal education). But too little can make learning boring and aimless. Setting your own learning goals allows you to set the right amount of structure so you can explore new ideas, but also educate yourself in a systematic fashion.

A few tips on setting your learning goals:

1) **All Goals Need to Be Written**. A goal that isn't written down, doesn't exist. Write down your goal as a few sentences, along with a deadline.

2) **Make it Objective**. At any point along your progress, you should be able to easily decide whether you have achieved your goal. "Learning more" isn't a goal, just a whim.

3) **Set Difficult, But Achievable Deadlines**. Giving yourself deadlines forces you to take action instead of just procrastinating. If the deadlines are too easy, they won't inspire action until you are too far behind. If the deadlines are too hard, you've just created a recipe for frustration.

4) **Break it Into Daily and Weekly Actions**. Your goal should be broken into daily and weekly increments. A goal you need to complete today has more urgency than one due in a few months.

5) **Review Your Goals Regularly**. Check over your goals at least once a week to see how you're making progress.

Quick Tip!

Need help setting your goals? You can read more with my nine-part series on goal-setting here.

Self-Education Summary

Self-education has enormous potential if you are willing to pursue it. Getting the right habits and creating a structure for learning can be initially difficult, but afterwards those habits can be put to use towards any goal you might have.

I've collected various resources for self-education you might find useful to get started:

MIT OpenCourseWare – A collection of free courses online offered by MIT.
EHow.com - How to articles on a variety of subjects.
FreeEd.net - "Free education on the Internet" according to their website.
Portal to Free Online Courses – This article links to many major universities which offer free courses online.

◦ Part IV ◦

Summary of Holistic Learning

Getting Started

Holistic learning isn't something you can read over once and then master. It is a combination of a strategy along with various tactics, all designed to improve the way you learn. Practicing these methods along with experimenting on your own can give you more options.

Where you take holistic learning is up to you, but if you aren't sure where to start, here are a few suggestions:

Analyze Your Strengths and Weaknesses

After reading through the holistic learning strategy, the first step should be to pinpoint where your strengths are and what you might have trouble with. Some of these weaknesses can be avoided (through picking courses that highlight your strengths), while others need to be compensated for.

You probably already have a good idea at what subjects you are skilled at (math,

history, art, science, etc.). Now you should spend time asking yourself what points in the learning strategy and types of information you have the most difficulty with.

For myself, I know that my strengths are in abstract and concrete information. I have a highly visual style of learning, which is reflected in many of my descriptions throughout this book. My strongest phase in the holistic learning sequence has always been the Explore phase, although practice has improved my ability to acquire and debug.

My weaknesses would be with arbitrary information. Learning the tools mentioned in the techniques portion of this book have helped greatly, but trying to store lists of facts, dates or definitions hasn't been my specialty. Knowing my strengths and weaknesses in learning help me highlight where I can use my strengths and learn new techniques to smooth over any flaws.

Start a Mind Challenge

The Mind Challenges are set up for the purpose of building new habits. Many of these methods are initially slower, if you aren't used to them. Taking on a challenge for the next 2-4 weeks, can build up your speed and effectiveness using them. Eventually you will need to tailor your approach to suit your goals.

Here are a few important tips to make sure that the holistic techniques stick:

1) **Commit for at least 3 weeks**. There might be several techniques you want to explore from this book. But unless you spend at least three weeks working through a Mind Challenge, you won't be able to turn the new method into a habit.

2) **One at a time**. Don't try to take on several challenges at once. Focusing on one challenge at a time, for the entire duration, will have a bigger shift.

3) **Metaphor, Visceralization, Diagramming first**. Those techniques form the core of the holistic learning system. Pick one of these for your first challenge.

4) **Use the bonus material**. Included with this book are six printouts designed to help you with the Mind Challenges. Printing these off or creating your own can give you a template to make learning the new techniques easier.

5) **Document your progress.** Keep a one-sentence journal for your Mind Challenge. This means writing 1-2 sentences about your progress with the technique. This will make it easier to commit and will also help you to troubleshoot any problems that might come up using the trial.

Setup a Better Studying Routine

Most of the focus of this book has been on mental activities to save studying time. Better studying methods using a better strategy. If your study habits are sloppy, you might be wasting hundreds of hours, even if your learning strategy is fine.

Here are a few productivity ideas you might want to consider:

1) **Do you study a little bit each day or just cram before the final?** Taking time to study every day can save you far more time in the long run than trying to study all at once. I tend to do my reading for the upcoming week on the weekend all at once. Spending just a few hours a week on the weekend saves me from all-night cram sessions later.

2) **Are your notes and textbooks organized?** While I'm a fan of the learn-it-once approach, sometimes you need to review. If all your material is scattered and unusable, this will waste time. Less mess means less stress.

3) **Are you focused during your study sessions, or plagued with distractions?** I study by myself without music, IM, cell phone messaging or any form of human contact. Putting myself into sensory deprivation keeps me focused on studying. If

Becoming more productive and efficient is another topic, which I write about frequently on my own website as well as being the subject of various books. Here are just a few resources you might want to consider if you are trying to get more done in less time:

Productivity Websites

ScottHYoung.com - My website devoted to productivity, learning and habits.
ZenHabits.net - Productivity through simplicity.
Lifehack.org - One of the largest productivity websites.
PickTheBrain.com - Productivity and motivation.
StudyHacks – Productivity for the student
StevePavlina.com – Personal development for smart people.

Productivity Books

Getting Things Done - The classic by David Allen.
The Power of Full Engagement - Energy management.
Zen To Done - A spin off of Getting Things Done, this one focuses on slowly building productive habits.
How to Be a Straight-A Student & How to Win at College – Both classic books that can help you become more productive and handle the challenges of learning. Definitely worth reading!

Decide What You Want

No technique, method or trick can replace motivation. If you don't have a reason to learn, get good grades or know your subject, the best you can do is drag yourself to class. I would never say I've loved every class I've taken. In fact, I've hated classes even after getting an A.

However, I've always been motivated by learning. New ideas and subjects fascinate me, even if the classroom format they are presented in do not. That drive to learn has made using the holistic learning strategy far easier in the long run.

Nobody can make you interested in a class you find boring. No strategy can make you learn something you don't want to. If you're only chasing a piece of paper from a prestigious University, instead of the knowledge and ideas that paper represents, then I don't think any strategy can be helpful.

Find your reason for learning. Even if the reason is as simple as curiosity, find a reason to want to know.

Recap of Major Concepts

At over 200 pages, this book has covered a lot of material. This recap of all the material can serve as a reference if you want to review any ideas or refresh your understanding.

Holistic learning is a strategy based on weaving information into webs, instead of bludgeoning yourself with rote-memorization. The foundation of this strategy is:

1) **Constructs** - The sum total of all connections that represent your knowledge about a subject. These are the cities of your mind.

2) **Models** - Compact units of information that form the seeds of constructs. These are metaphors, visceralizations and diagrams. Models are the major intersections in the roadmap of your constructs.

3) **Highways** - Connections between different constructs. These aid in creative thinking. "Thinking outside the box" perfectly describes the act of thinking beyond the current constructs you have.

Holistic learning works in a sequence of five steps. These steps aren't always followed one-by-one, but this is the path they usually take:

1) **Acquire** - Receiving information through your senses.
2) **Understand** - Get the surface of information.
3) **Explore** - Connect that basic idea to others. Exploration works in three main ways:
    a) **Depth** Exploration - Exploring the background of an idea.
    b) **Lateral** Exploration - Exploring associated ideas.
    c) **Vertical** Exploration - Exploring the idea as it relates to different constructs.
4) **Debug** - Prune away false connections.
5) **Apply** - Take an idea and give it meaning beyond immediate uses.

Information is similar to digestion. The process is the same regardless of what you ingest. But the inputs can be very different. Taking into account different information types can help you plan your learning efforts. There are five major types of information:

1) **Arbitrary** - Facts, dates, lists, rules and sequences. They have little logical grouping or depth.
2) **Opinion** - Information gathered for the sole purpose of supporting or defeating your argument. Volume is important here, rather than being able to memorize.
3) **Process** - Information in the form of skills. Requires practice, but is easier to remember.

4) **Concrete** - Ideas that are easy to visualize. These are often practical ideas that are easy to experience.

5) **Abstract** - Ideas that are difficult to experience. Math, philosophy and physics are some of the most abstract fields.

Summary of Techniques

Speed Reading

1) Use a pointer.
2) Practice read.
3) Use active reading to improve learning while reading.

Flow-Based Note Taking

1) Don't write notes in a rigid hierarchy.
2) Create associations between briefly written ideas.

Metaphor

Look for a story, image or process that mirrors what you are studying.

Visceralization

1) Create a mental image of what you are studying.
2) Add other sensations and emotions to this image.
3) Look for ways the image does not apply or does not fully cover the subject to prevent errors later.

Diagramming

Create flow, concept or picture diagrams to link together several ideas onto the same source.

Link Method

1) Create a sequence of symbols that are easy to visualize.
2) Create "links" between each item by visualizing a bizarre scene that combines the two.
3) Create a link between the first sequence item and a trigger.

Peg Method

Same as link method except you link each idea to a list of 0-12 rhyming symbols you can recall easily.

Information Compression

Three main forms:

1) **Mnemonics** - Using words to compress several ideas into a single idea.
2) **Picture Compression** - Create a picture that links several ideas under a single theme.
3) **Notes Compression** - Rewrite a vast quantity of notes onto just a few pages.

Practical Usage

Look for ways to apply the idea in your daily life.

Model Debugging

Practice questions in your subject regularly and look for potential errors in your holistic web.

Project-Based Learning

Set up projects of 1-3 months that will force you to learn new concepts. This is a useful exercise for self-education, where there is less structure to guide you.

The Productive Student

1) Manage Your Energy
    - Stay in shape, eat healthy and don't work without sleep.
    - Schedule a day off each week.
2) Don't “Study”
3) Nuke Procrastination
    -Set up a Weekly and Daily Goals list to keep focused.
4) Batch smaller tasks into groups.
5) Be organized.
    -Keep a calendar, to-do list and carry a notepad with you at all times.

Self-Education

Self-education can be cheap, fast and rewarding but it also has challenges. Namely, it has less structure and is more difficult than formal education. The main ways you can improve your ability to teach yourself are:

1) Improve your habits
2) Overcome the frustration barrier
3) Set learning goals to track progress.

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About the Author

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Check out my other books and programs:

How to Change a Habit – This e-book explores the philosophy and methods I've used to change dozens of habits in my life from exercising regularly, reading more and becoming organized. If you want to build the right habits, this book will tell you how.

Holistic Learning – My first *free* e-book on Holistic Learning. This introduces the concepts that I later refined in the book you are reading today.

Goals! An Interactive Guide – My first free product, this program explores why you need to set goals and how to do it with a fun interactive game.