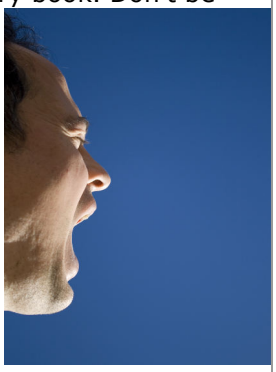
Chapter 1: Crank The Rack, Crack The Whip, Take Control

Objectives For This Chapter

- Statistics as language
- Know who you are and why you are studying statistics
- Understand the importance of statistics
- Identify effective study habits
- Manage your time
- Get some cognitive therapy
- Crack that whip!

Language? I thought I was taking a statistics course?

I've got a secret for you. Shhhhhhh...don't tell any of your friends who might be enrolled in a math course. Here it is: Learning to read statistics material is somewhat analogous to learning to read music or a foreign language--impossible at first, difficult for a while, but relatively easy after some effort. One thing to remember is that since symbols are a way of condensing information, a paragraph that is full of mathematical symbols has much more information in it than an ordinary paragraphy from a history book. Don't be surprised if in later chapters it takes you three or four times longer to get through your statistics reading than it takes to get through your readings in other classes.



One more thing. Just as with learning any language, immersion is key. You have to use the language. You have to speak it. Even if you don't understand what you're saying--SAY IT! A lot of students struggle converting the mathematical symbols in statistics into spoken words. And ultimately, that's what you have to do. There is no way around that. You have to say it so that you know you understand. You have to say it so that I know you understand. You have to say it so that others understand your research. You have to open that big beautiful mouth of yours and say the words...I LOVE STATISTICS!! Okay. Maybe not those words. Maybe you can replace some or your daily profanity with statistics terms like, "You freak'n sigma!"

Why are you studying Statistics?

If you're a little frightened of statistics...good! A little fear is motivating. Now, if you're really petrified of statistics and anything math-related...that's not so good. So, what end of the spectrum do you fall into? Test yourself. For how many of the following would shout out "TRUE"!!

1. I have never been very good at math.
2. When my teacher tried to teach me long division in the fourth grade, I seriously considered dropping out of school and designating my lemonade stand as my chosen profession.
3. When we got to extracting square roots, thoughts of suicide flashed through my mind.
4. I avoided courses such as chemistry and physics because they required math.
5. When I take a test that includes math, I get so upset that my mind goes blank.
6. Sometimes I wonder if I am a little stupid.
7. I feel nervous just thinking about taking a statistics course.

If you answered in the affirmative for any of these, then perhaps some of these assumptions will hold true.:

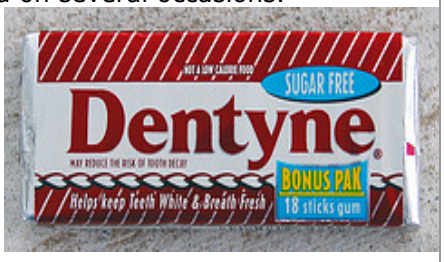
- You are studying statistics only because it is a requirement in your major area of study.
- You are terrified about math and are not sure that you can pass a course in statistics.
- It has been a long time since you studied math.
- With a little instruction, and a lot of hard work, you can learn statistics. If you can stay calm while baking a cake or reading your bank statement, there is hope for you.
- You may be afraid of statistics, and they may never be your favorite creatures, but in this class, you can increase your *statistics self-efficacy*!

So, in order to give you the best chance at success and enjoyment (That's right! I said it!) of this class, we need to do two things. The first is to lower your math anxiety. The second is to bring you to a competent understanding of and ability to apply powerful statistical procedures.

* Adapted from (2010) *Statistics For The Terrified* (5th Edition), by John Kranzler. Published by Pearson Publishing.

Why is it important to learn about statistics?

Like most people, you probably feel that it is important to "take control of your life." But what does this mean? Partly it means being able to properly evaluate the data and claims that bombard you every day. If you cannot distinguish good from faulty reasoning, then you are vulnerable to manipulation and to decisions that are not in your best interest. To be more specific, here are some claims that we have heard on several occasions.



- 4 out of 5 dentists recommend Dentine.
- Almost 85% of lung cancers in men and 45% in women are tobacco-related.
- Cannabidiols increase positive mood more effectively than traditional, SSRI medications.
- Women make 75 cents to every dollar a man makes when they work the same job.
- A surprising new study shows that smiling more often can increase one's life

span.

All of these claims are statistical in character. But are they credible? That depends on how they were acquired. Your reflexive response to any such claims should always be ***HOW DO YOU KNOW?*** This ebook is designed to help you learn statistical essentials. It will make you into an intelligent consumer of statistical claims.

You can take the first step right away. Suppose you hear in a commercial that 80% of children prefer to eat a certain kind of cereal for breakfast. What do you conclude? A. This cereal is superior to all others...at least according to kids. B. You need to know more about where these data come from before making any conclusions. C. 20% of kids prefer to eat Trix. Of course, the answer is "B."

Statistics are all around you, sometimes used well, sometimes not. We must learn how to distinguish the two cases.

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What are some good ways to study and learn in this class?

Statistics is really a unique area of study and with it comes certain study needs. Take note of the following:

1. *Buy a calculator:* I've had students use their cell phones to get through the course, but that is not the ideal. You don't need a fancy calculator to calculate the kinds of statistics that we will encounter in this class. As long as you see the sigma symbol **Σ** on one of the keys, that's the calculator for you.
2. *Develop a solid math foundation:* Nothing is more frustrating than understanding the statistics concept and what to do to solve a problem but not getting the right answer because of a silly computation error.
3. *Keep up:* Yea, yea, yeah. You've heard it in every class. But guess what? In this class, it's especially important to get the assigned reading and homework completed by the due dates. If you've done this, then newly presented concepts won't seem so difficult.
4. *Time management:* Take the **Time Management Survey** (http://www.effective-time-management-strategies.com/time-management-survey.html) to see where you're at. How do you manage your time? Then go into the calendar on your phone or computer and list everything that you have to do for a whole week. Include everything--work, meals, travel, classes, sleep, and of course, study time for your statistics class. Do one day at a time. See how much time you will be able to devote to this class. Outside of class, you want to plan on about **nine hours** per week of study/homework/preparation time. I'll be curious to see just how much time you have for this class.
5. *Form a study group:* Talking about the content in this class is critical to your mastery of it. Simply working through the problems won't get the job done, for most people. Much of the time, we don't really know if we truly understand something until we try to explain it to someone else.
6. *Study actively:* Take responsibility for understanding the material. When you

don't understand, get help. Additionally, think about ways that statistics are applied in the world around you.

7. *Practice. Practice. Practice:* Do the assigned homework and as many other problems as possible. In the beginning, it's easier. The problems involve only a few steps. Increasingly, you will be presented with problems that require you to take several steps to solve them and to make important choices at each step.
8. *Show your work:* Resist the temptation to skip steps when solving a problem. Showing your work helps you located logical or calculation mistakes. It also helps me to identify gaps in your understanding. Finally, partial credit is given on exams for correct portions of answers. In statistics, it's not just about the end result but the work along the way.

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I don't need no stinking therapy!

Identifying The Problem

Think again, muchachos and muchachas. Really, everyone needs therapy! It's a happy place with rainbows and unicorns and glitter...and it smells like chocolate chip cookies, all of the time. More importantly, when you think through debilitative emotions, like a math phobia (Hey, I'm not judging!), taking a therapeutic, problem-solving approach can be highly beneficial. Wherever your math phobia comes from, there is a way to mitigate its negativity in your college life.

When looking at math phobia, psychologists might be inclined to take a cognitive approach. That is, they would want to focus on patterns of thought--specific explanations that we make about ourselves and the world around us. A number of these explanations have particular relevance to the phenomenon of math anxiety:

- *I must be competent and adequate in all possible respects if I am to consider myself to be a worthwhile person. (If I'm not good at math, I'm not a very smart person).*
- *I must do anything that I try, perfectly, the first time.*
- *My unhappiness is externally caused. I can't help feeling and acting as I do, and I can't change my feelings or actions.*
- *It is better for me to avoid life's frustrations and difficulties than to deal with them.*

Does any of the above sound like your self talk? If so, you are probably catastrophizing and overgeneralizing. Therapists might even call such talk irrational.

Catastropohizing is characterized by phrases such as "It's awful!" "It's terrible!" or "I can't stand it!" Do you see how all this relates to the first irrational belief on our list? Performing poorly on a statistics test would be awful if an important part of your self concept was riding on the outcome. When you indoctrinate yourself with catastrophic ideas, you defeat yourself. One can be concerned and even anxious without thinking catastrophically. It does take practice, though, if you've gotten into the habit of doing this.

Negative **Overgeneralizing** is when you take a bit of negative evidence and draw conclusions that go beyond the data. That's just bad science, and we don't allow that in this class. ;-) Overgeneralizing

might be characterized by thoughts such as "I did poorly in my last math class. I'm just no good at math." If you're one of these people, then you're in luck. Why? Because statistics ain't math! It's the *application* of math. For example, we don't go through all of the math used to build the normal curve distribution. Instead we just talk about the normal curve distribution and apply it conceptually. We won't go into that now, but suffice it to say that I've had many students who have struggled with math and found statistics to be a very different, if not friendlier creature.

Demanding self-talk often includes words such as *should, must,* and *need*. If you are math-anxious, chances are that you use these words to beat up on yourself. Unfortunately, these were some of my best friends in graduate school...which I hated!! Oy vey! Don't get me started! So, in this class you are not allowed to use these words negatively--"I shouldn't have made that mistake." You may, however, use these words more positively in phrases such as "I need to be successful" or "I have to pass this course." Does this mean you have to pass it the first time? No. It would be nice, but plenty of people have gotten along just fine even after doing badly at a task, the first time through. Hey, it took me two times to get my driver's license, when I was a kid. And now look at me. I've angered 100's of drivers with how slowly and carefully I drive down the road.

Dealing With Math Anxiety

So, how do we deal with all of this? Follow these steps:

1. *Record your feelings:* When you notice you are feeling anxious, guilty, angry, etc., describe your thoughts and feelings on a piece of paper ("I feel really guilty about not having worked harder at math in previous classes.")
2. *Describe the activating event:* Briefly write down what it was that seemed to trigger your feelings. Try to find the thing that happened just before you experienced the negative emotion. Some examples might be "I was assigned some difficult work and did not know how to complete it" or "I thought about a test coming up that I will almost surely fail."
3. *Identify your irrational beliefs:* As accurately as you can, record what you were saying to yourself before and during the time when you experienced the emotions you recorded in Step 1.
4. *Challenge each or your irrational beliefs:* This is the *How Do You Know* step. Where's the evidence that you will fail? That you are a failure? That you will never master the problems facing you? That you will hate every minute of it?
5. *Replace your irrational thoughts with a rational ones:* If you get a little stuck on this one, think about a favorite movie hero and consider the kinds of thoughts that he/she would have in the same situation. Borrow one of those thoughts and insert it in place of your own irrational cognizing. I love Denzel Washington movies and the characters that he plays. I wonder what his character in *Unstoppable* would say if he was critiquing my lack of self-efficacy. Do you come to class each day feeling unstoppable? If not, then that is something that needs to change.
6. *Use imagery:* Imagine yourself mastering a task. Maybe going in, sitting down, calmly taking an exam, and then walking out with a sense of accomplishment and satisfaction. Make the image as vivid as possible. You should also try coping imagery. Imagine that you're in a difficult situation and how you would handle it. Tell yourself, "Stop. Relax." Try to force yourself to feel more calm. Breath deeply and engage in positive self-talk.

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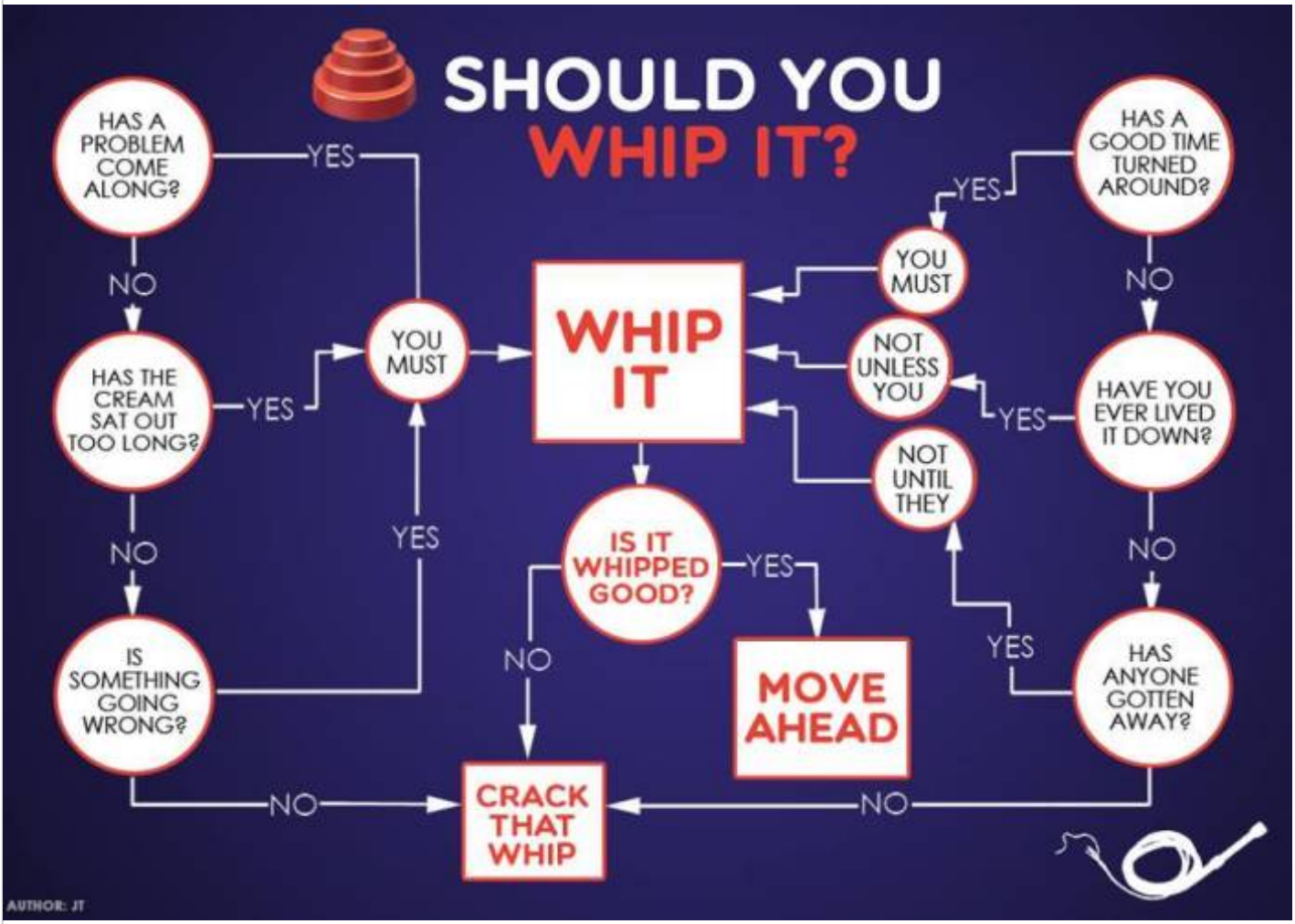
Should You whip It?

Like the 80s punk/new-wave band Devo says, "When a problem comes along, you must whip it!" And so you shall. I'm unendingly amazed at the true gems of wisdom that came from a band whose members wore traffic pylons on their heads. It truly boggles the mind. ;-O Anyhoooo...better to whip this class the first time through, than have to take it again. You may be able to better appreciate the following lyrical flow chart if you first take a look at the boys from Devo in action (https://www.youtube.com/watch?v=j_QLzthSkfM). It's a wonder I survived the 80s.



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Some content adapted from other's work. See home page for specifics.

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Mesa Community College | 1833 W. Southern Ave. Mesa, AZ 85202 | E-mail Address: dborman@mesacc.edu | Phone: (480) 461-7181 |

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