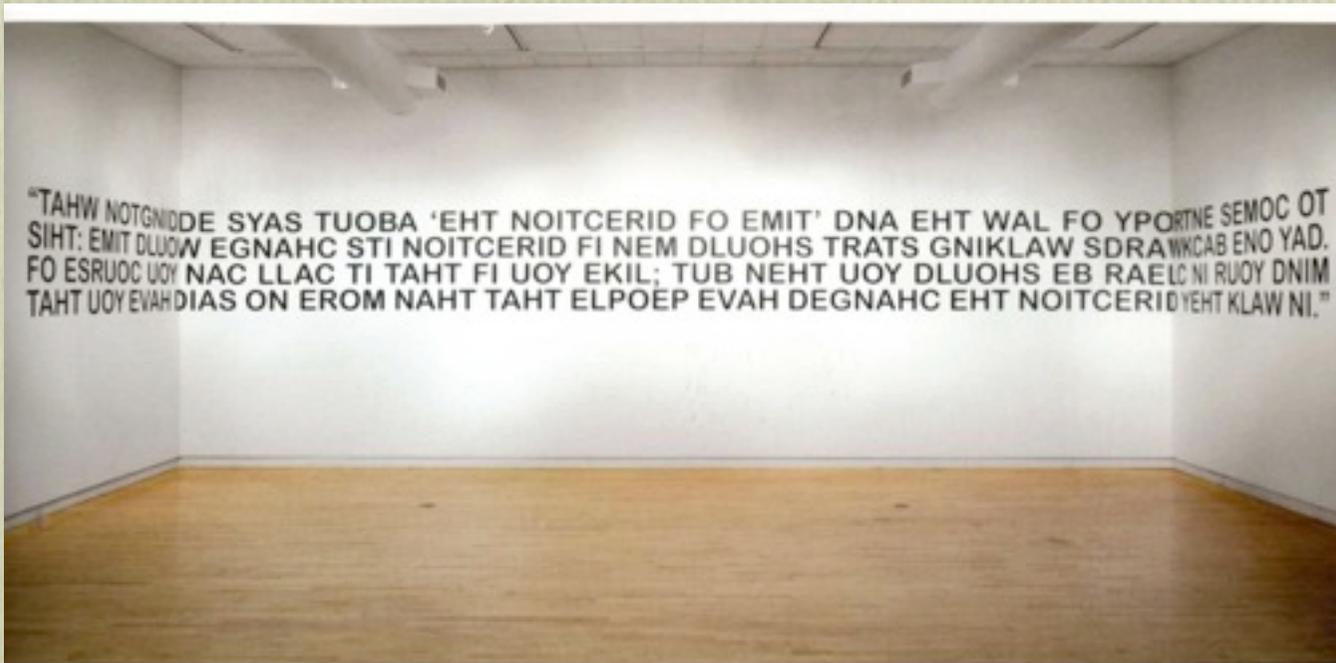


# *Writing with Numbers:*

## Quantitative Reasoning and Student Writing

Neil Lutsky, *Department of Psychology*

---



*You Can Call It That If You Like (#2)*, 2004

Self-adhesive vinyl on wall; 6 x 96 ft.

Installation: Regina Gouge Miller Gallery, Carnegie Mellon University, Pittsburgh  
(cat. only)

Mel Bochner, 2004

*Writing across the Curriculum with Numbers Workshop, December 9, 2010*

# “QR Questions at the Ready”

The image shows a screenshot of the official website for Brett Favre. At the top, there is a navigation menu with links for HOME PAGE, BIO, CONTESTS, FAN STORE, NEWS, SCHEDULE/EVENTS, MESSAGE BOARD, MULTIMEDIA, and BIRTHDAY GREETINGS. The main content area features a large image of Favre in a purple Vikings uniform, holding a football. Below this, there is a "WELCOME BRET Favre SUPPORTERS!" section with a quote from Favre. To the right, there is a "FEATURED PRODUCT" section highlighting a "Game Worn Jersey" for the Vikings vs. Cowboys game on October 17, 2010, priced at \$12,000.00. A white scribble with a black arrow points to the "BUY NOW" button for the jersey. Below the featured product, there is a section for "500 TD Merchandise" with the text "Brett Favre is the only NFL quarterback to pass for 500 TDs" and "ORDER 500 TD MERCHANDISE HERE!".

OFFICIAL *Brett Favre* .com

FOR THE LOVE OF THE GAME.

THE OFFICIAL WEBSITE OF BRETT FAVRE

HOME PAGE BIO CONTESTS FAN STORE NEWS SCHEDULE/EVENTS MESSAGE BOARD MULTIMEDIA BIRTHDAY GREETINGS

WELCOME BRET Favre SUPPORTERS!

"Welcome to my official website. I want to thank all the fans for the years of continued and steadfast support that you've given to me and my family. I hope you enjoy your visit to my website." -- Brett Favre

4 Days Only! Silver Football Special Only \$299.99 Sale ends Sunday Dec. 5th

There's no hesitation for me in that regard," Frazier said at an afternoon press conference at Winter Park. "Brett is a tremendous quarterback and he's been a leader of the team in the 1 1/2 years that he's been here. There are some things we have to do to support [Favre]. Brett will be our starting quarterback on Sunday."

FEATURED PRODUCT

Game Worn Jersey  
Vikings vs. Cowboys  
October 17, 2010  
\$12000.00  
BUY NOW

500 TD Merchandise  
Brett Favre is the only NFL quarterback to pass for 500 TDs  
ORDER 500 TD MERCHANDISE HERE!

“Game worn jersey”: \$12,000!

**OFFICIAL**

*Neil Lutsky* Web Site



Buy Now

QR Workshop  
Worn T-Shirt!

*Limited Edition! & Personally Signed!*

## Our endlessly repeated message:

- *Writing with numbers* is good.
- It's not terribly difficult to get students *writing with numbers*. It entails:
  - ▶ Getting numbers.
  - ▶ Organizing an assignment around #s.
  - ▶ Giving students appropriate background.
- [Repeating the above...across the curriculum.]

# Why is *writing with numbers* good?

- Students are going to be reading *writing with numbers*.

## Top Test Scores From Shanghai Stun Educators

By SAM DILLON

Published: December 7, 2010

With China's debut in international standardized testing, students in Shanghai have surprised experts by outscoring their counterparts in dozens of other countries, in reading as well as in math and science, according to [the results](#) of a respected exam.



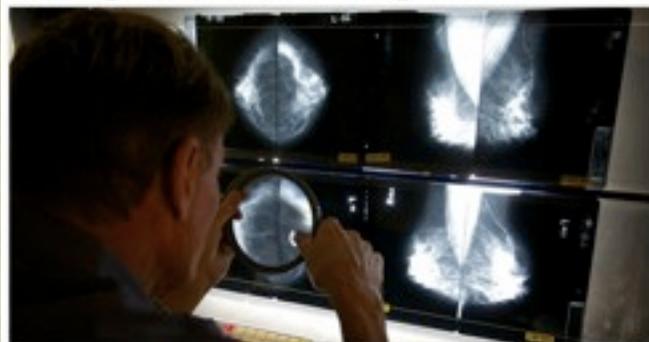
Shenwei/European Pressphoto Agency  
Pupils studying English at a school in Shanghai, a city that has become a magnet for many of the best students in China.

[Enlarge This Image](#)  
American officials and Europeans involved in administering the test in about 65 countries acknowledged that the scores from Shanghai — an industrial powerhouse with some 20 million residents and scores of modern universities that is a magnet for the best students in the country — are by no means representative of all of China.

About 5,100 15-year-olds in Shanghai were chosen as a representative cross-section of students in that city. In the United States, a similar number of students from across the country were selected as a representative sample for the test.

**The New York Times**

Mammograms' Value in Cancer Fight at Issue



A radiologist reviewing mammogram images at the Elizabeth Center for Cancer Detection in Los Angeles. Most health officials recommend the screenings, but experts disagree over their value.

By GINA KOLATA  
Published September 23, 2010

A new study suggests that increased awareness and improved treatments rather than mammograms are the main force in reducing the breast cancer death rate.

**A Small Benefit**

A study of Norwegian women with breast cancer found that regular mammogram screening probably reduces the breast cancer death rate slightly, but also has significant costs.

◀ **For every 2,500 women** who receive 10 years of mammogram screening beginning at age 50:

◀ **Up to 1,000 women** will have at least one suspicious mammogram requiring a follow-up test.

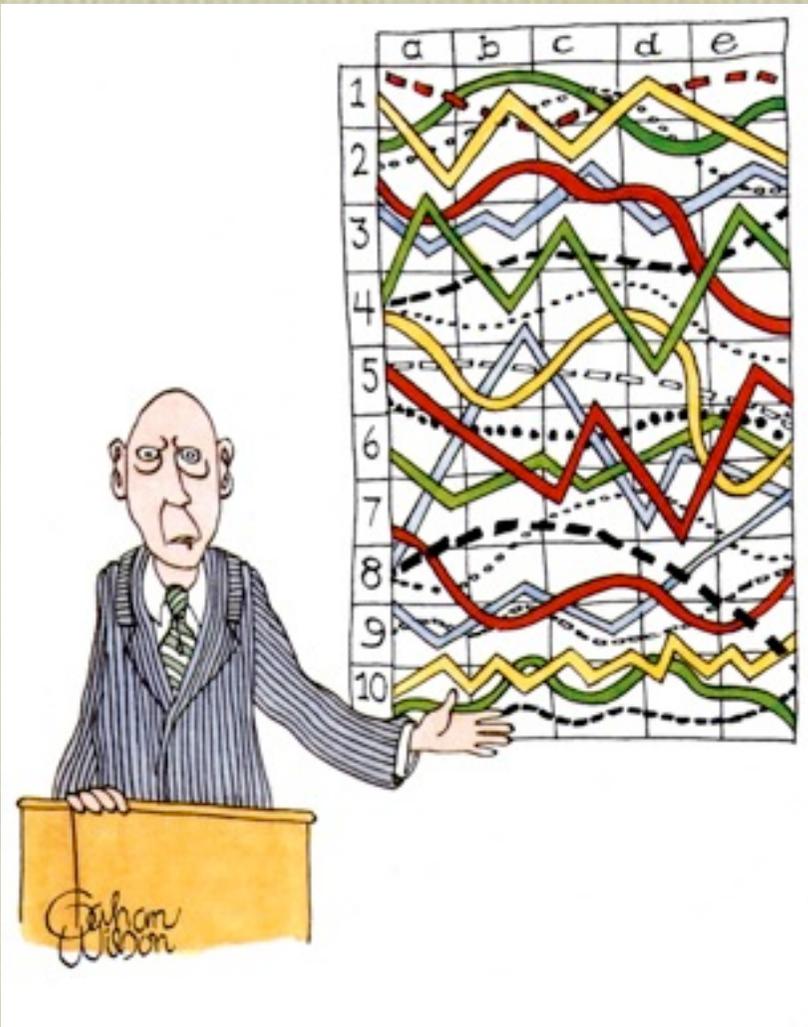
◀ **About 500 women** will have a biopsy.

◀ **5 to 15 women** will receive unnecessary surgery or therapy.

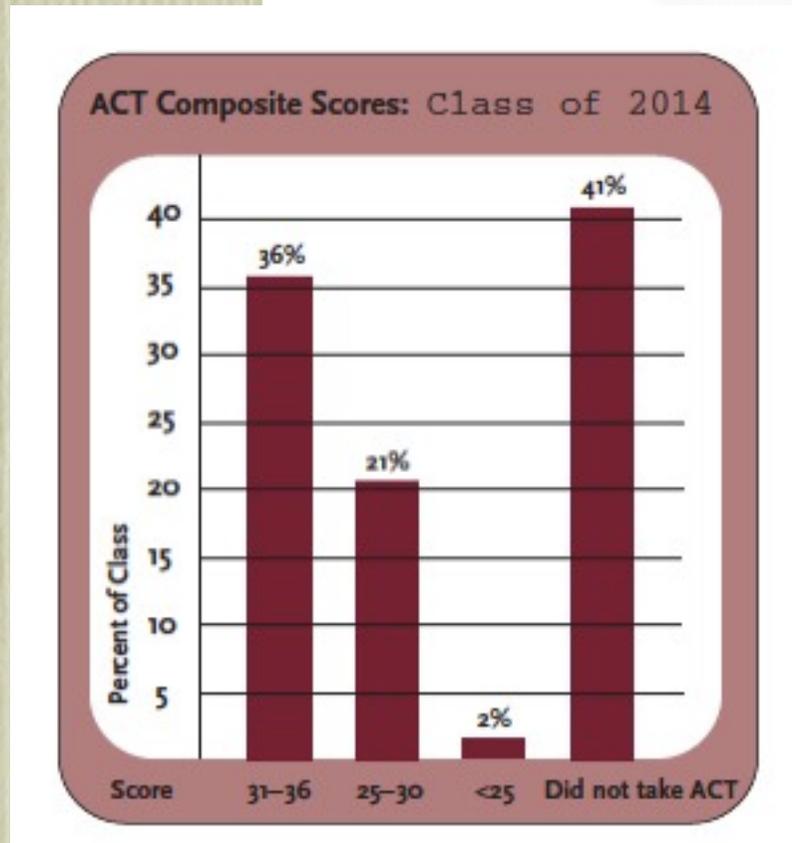
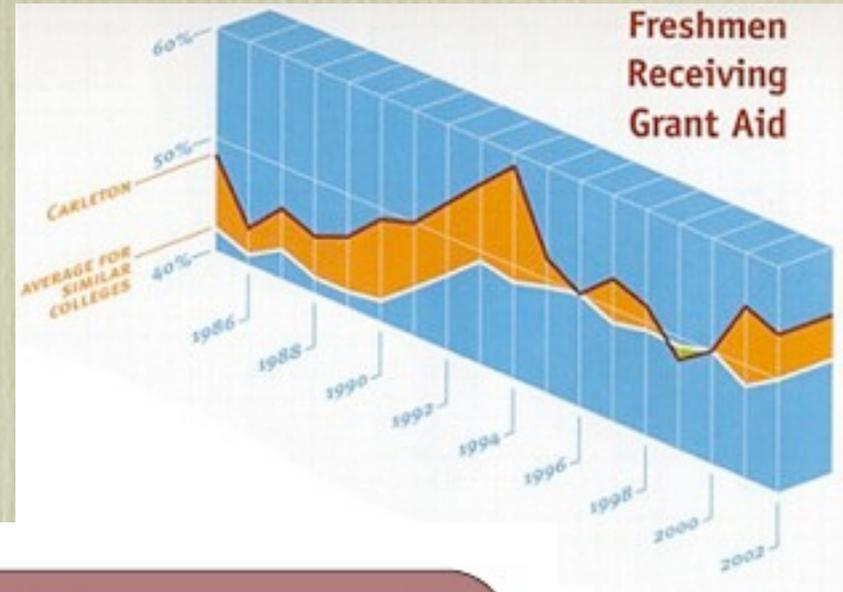
◀ **1 woman** will avoid dying from breast cancer.

Source: New England Journal of Medicine

THE NEW YORK TIMES  
The New York Times



*“I’ll pause for a moment so you can let this information sink in.”*



# Why is *writing with numbers* good?

- Students are going to be reading *writing with numbers*.
- Students are going to be *writing with numbers* themselves.
- *Writing with numbers* has the potential to strengthen fundamental intellectual skills and values.

Reasons why quantitative information can contribute to  
*Clear and Principled Argument*. Numbers can help us:

- articulate our ideas.
- be more precise in stating points.
- ground our observations in evidence.
- test claims and hypotheses.
- represent what we are ill-equipped to see.
- recognize and weigh uncertainty.
- provide a context to inform critical thinking.
- contribute to civil discourse.

## A workshop goal:

- To develop teaching strategies that increase students' *comfort* with numbers and their *confidence* in analyzing and using numbers.



Above Top Secret  
Destroy Before Reading  
**CLASSIFIED**



*“Progress means simplifying not complicating.”*

-Bruno Munari

# Numbers Have Value

The New York Times

## Professor Tracks Injuries With Aim of Prevention

By ALAN SCHWARZ

Published: November 7, 2010

CHAPEL HILL, N.C. — The man with perhaps the most gruesome job in sports was unenviably busy. While other football fans spent the last weekend of October watching games, the 74-year-old retiree prepared still more formal inquiries into events that occupy him more than anyone would prefer — two high school football tragedies.

[Enlarge This Image](#)



Travis Dove for The New York Times

Fred Mueller has almost singlehandedly run the National Center for Catastrophic Injury Research at the University of North Carolina for 30 years.

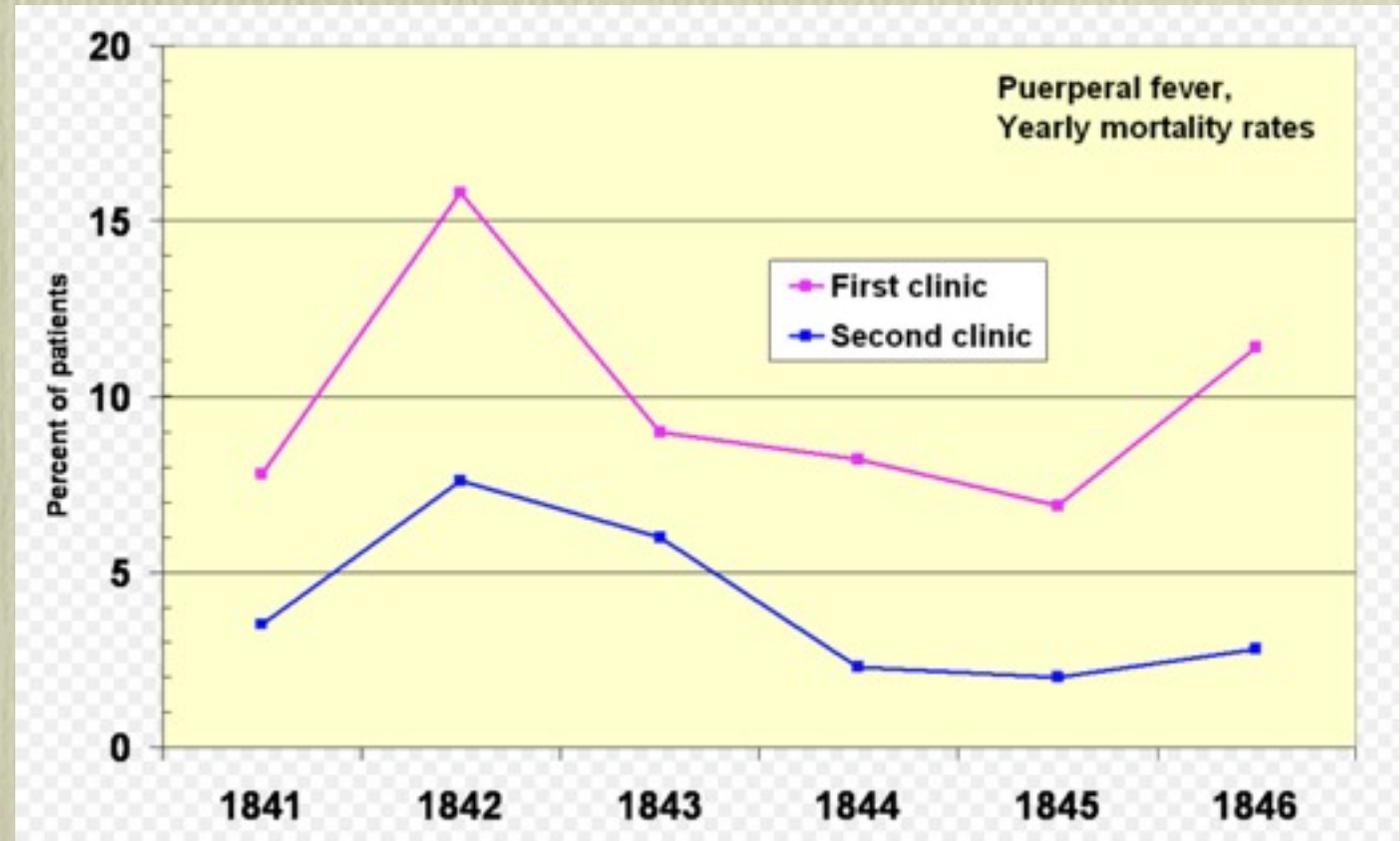
He gathered information from Web searches and e-mailed questionnaires to the National Federation of State High School Associations. The linebacker outside Kansas City, Kan., who collapsed from an apparent [brain injury](#) and died the next morning. The junior-varsity defensive back from Fresno, Calif., who was sent to a hospital and into a [coma](#) by a hit that caused massive brain [swelling](#).

Fred Mueller has almost singlehandedly run the National Center for Catastrophic Injury Research at the [University of North Carolina](#) for 30 years, logging and analyzing more than 1,000 fatal, paralytic or otherwise ghastly injuries in sports from peewees to the pros. [His work](#) has repeatedly improved safety for young athletes by identifying patterns that lead to changes in rules, field dimensions and more.

# The Story of Ignaz Semmelweis



- Hungarian physician.
- Observed differential mortality rates in two birthing clinics.

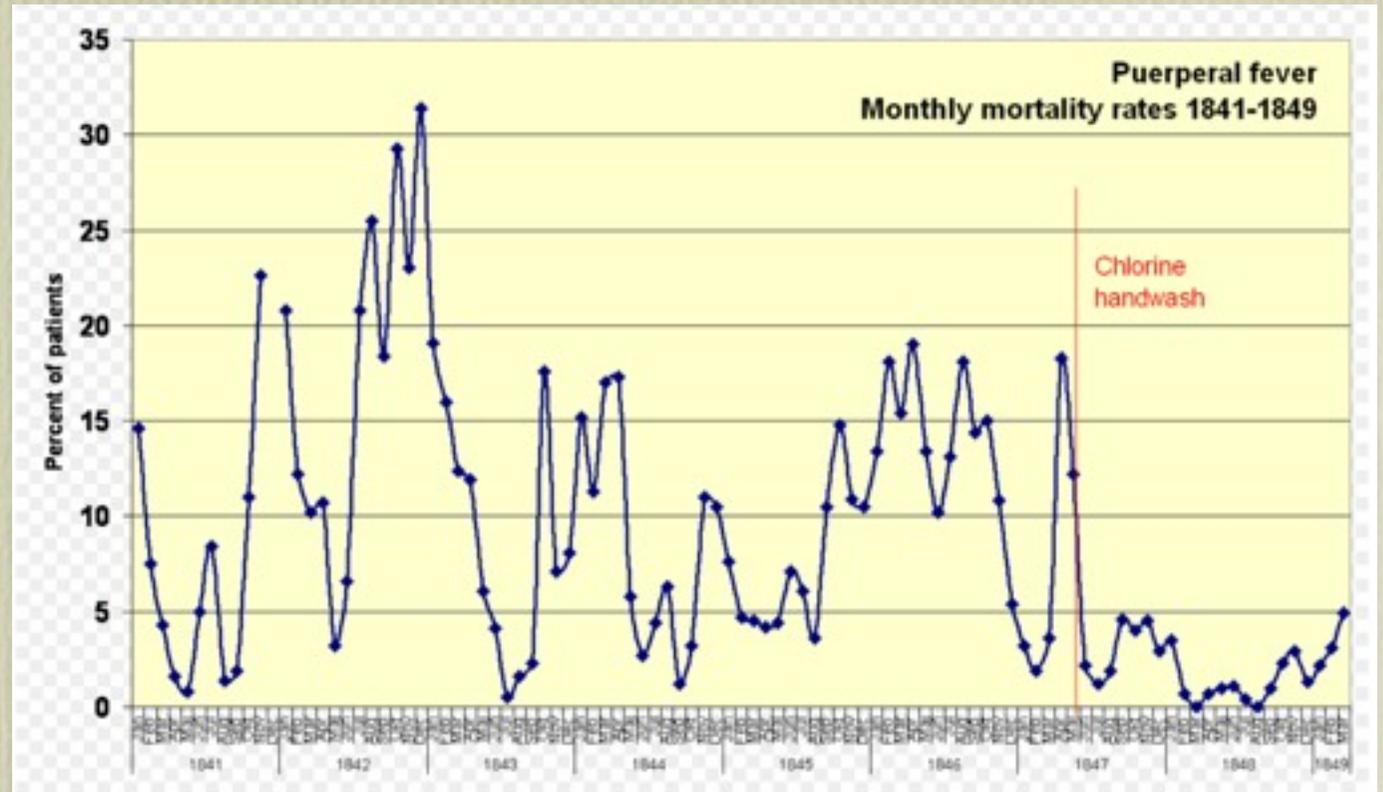


# The Story of Ignaz Semmelweis



- Hungarian physician.
- Observed differential mortality rates in two birthing clinics.
- First clinic operated by medical students.
- Second operated by midwives.

Medical Ss were conducting autopsies before the clinic!



# Numbers Have Value



NOVEMBER 15, 2010

Barack Obama had the mot just last Wednesday for what had just befallen him and his party: a “shellacking.” The President’s choice of word was one syllable (and one “g”) longer than his predecessor’s summary after a parallel midterm debacle. But, then, Obama’s shellacking was several syllables worse than the “thumpin’” that George W. Bush and the Republicans took in 2006. That year, President Bush’s party lost thirty seats in the House of Representatives; this year, President Obama’s lost more than twice as many.

It was a historic defeat. The Democrats retained their Senate majority, now much reduced, only by the grace of the Tea Party, which, in Colorado, Delaware, and Nevada, saddled Republicans with nominees so weighted with extremism and general bizarreness that they sank beneath the wave so many others rode. Come January, for only the



#### RELATED LINKS

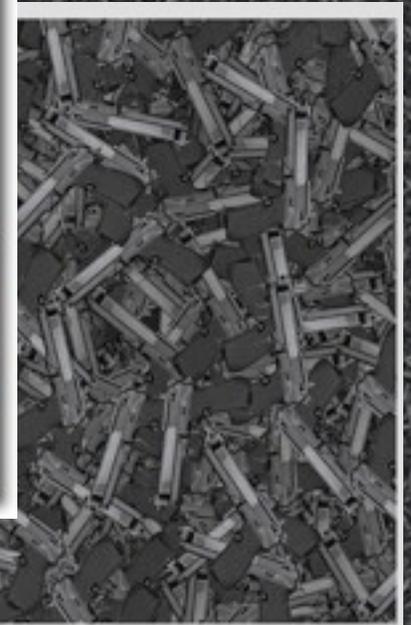
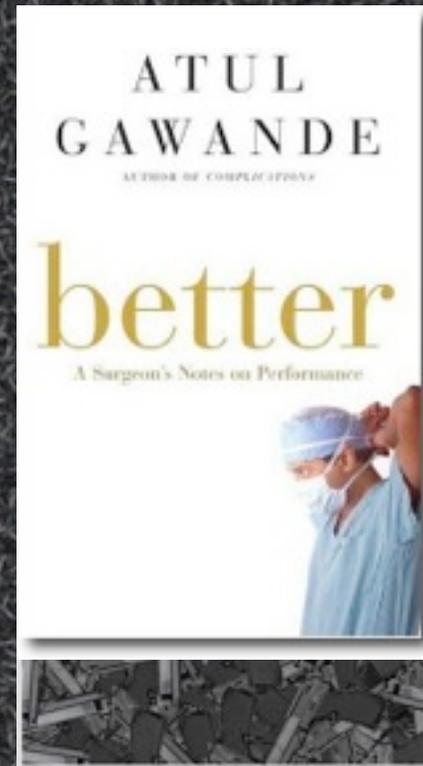
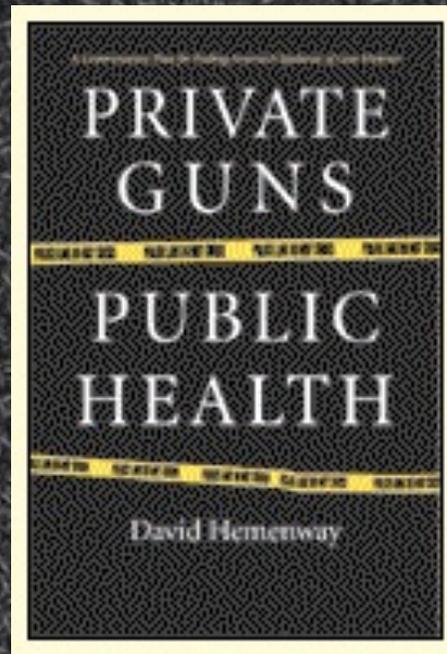
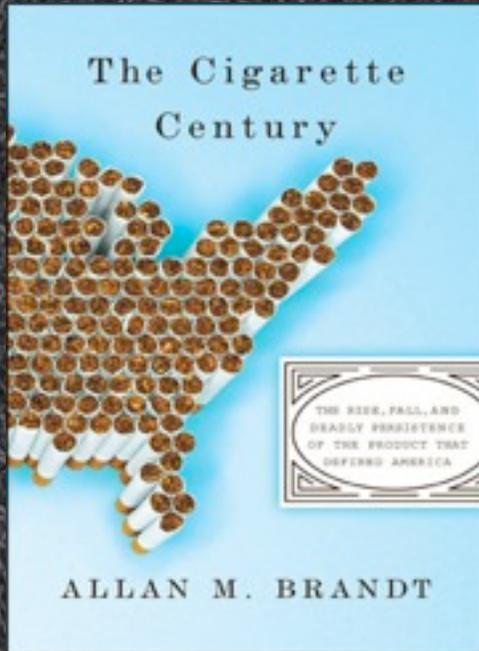
Ask the Author: Join a live chat with Hendrik Hertzberg about the midterm elections on Monday, November 8th, at 3 P.M. E.T.

#### KEYWORDS

Midterm Elections; Democratic Party; Republicans; (Pres.) Barack Obama; Congress; U.S. House of Representatives; Extremism

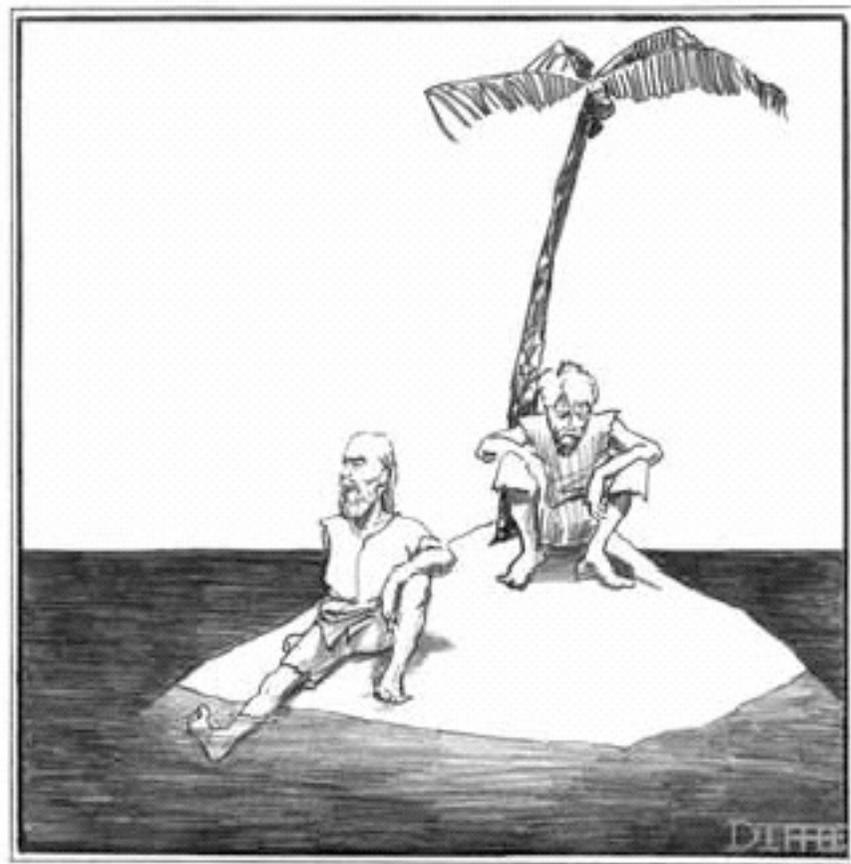
*Are two or more samples being compared equivalent?*

- 2008: 120 million Congressional voters.
- 2010: 75 million Congressional voters.
- 2010 > 2008: Older, whiter, more Republican.



MEANINGLESS, SENSELESS, IR-  
RELEVANT, POINTLESS, INSIGNIF-  
ICANT, INCONSEQUENTIAL, FAT  
FATUOUS, NULL, IN-  
ANE, MUMBO JUMBO,  
DOUBLE-TALK, JARGON, HOOEY,  
HOKUM, HOGWASH, BUNK, BILGE,  
BOSH, BLATHER, BLABBER, BAB-  
BLE, BALONEY, BULLSHIT, CRAP-  
OLA, JABBER, JIVE, GIBBERISH,  
HOT AIR, DRIVEL, DROOL, RUN  
OFF AT MOUTH, GOBBLE-  
DYGOOK, BLAH-BLAH-BLAH-

Mel Bochner



*"I spy something blue."*

## *My writing with numbers assignments:*

- Principles of Psychology:  
*Answering a question using a data set.*
- A&I Seminar: Measured Thinking.  
*Presenting a number we should know.*

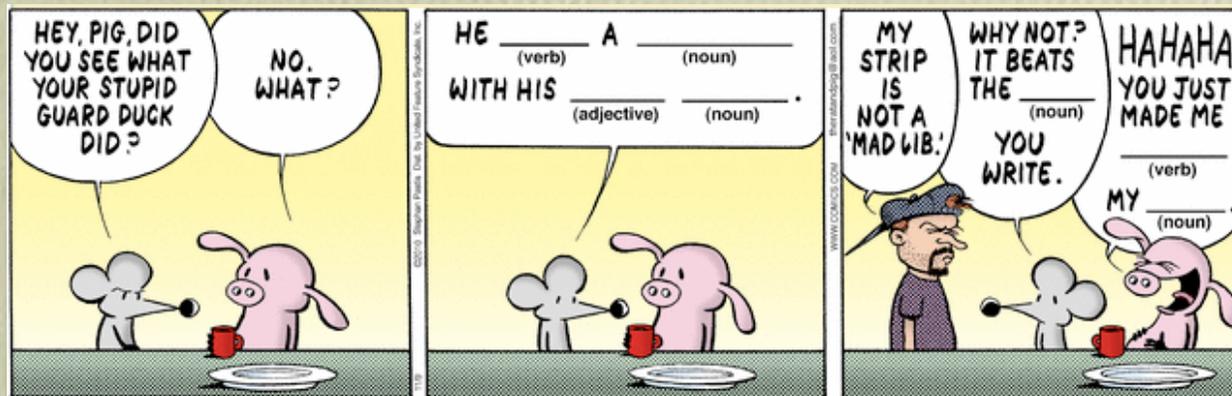
# Have *Fun* with Numbers

## I. Give quizzes that don't count!

Identify and indicate the significance of each of the following.



Fill in the blanks (with the restriction that all the terms you use must be vaguely relevant to things we have discussed in class this term)!



# Komar & Melamid:

What do YOU want...



...to see in a painting?

Tell artists Komar & Melamid — they'll paint it.

**The People's Choice  
Town Meeting**

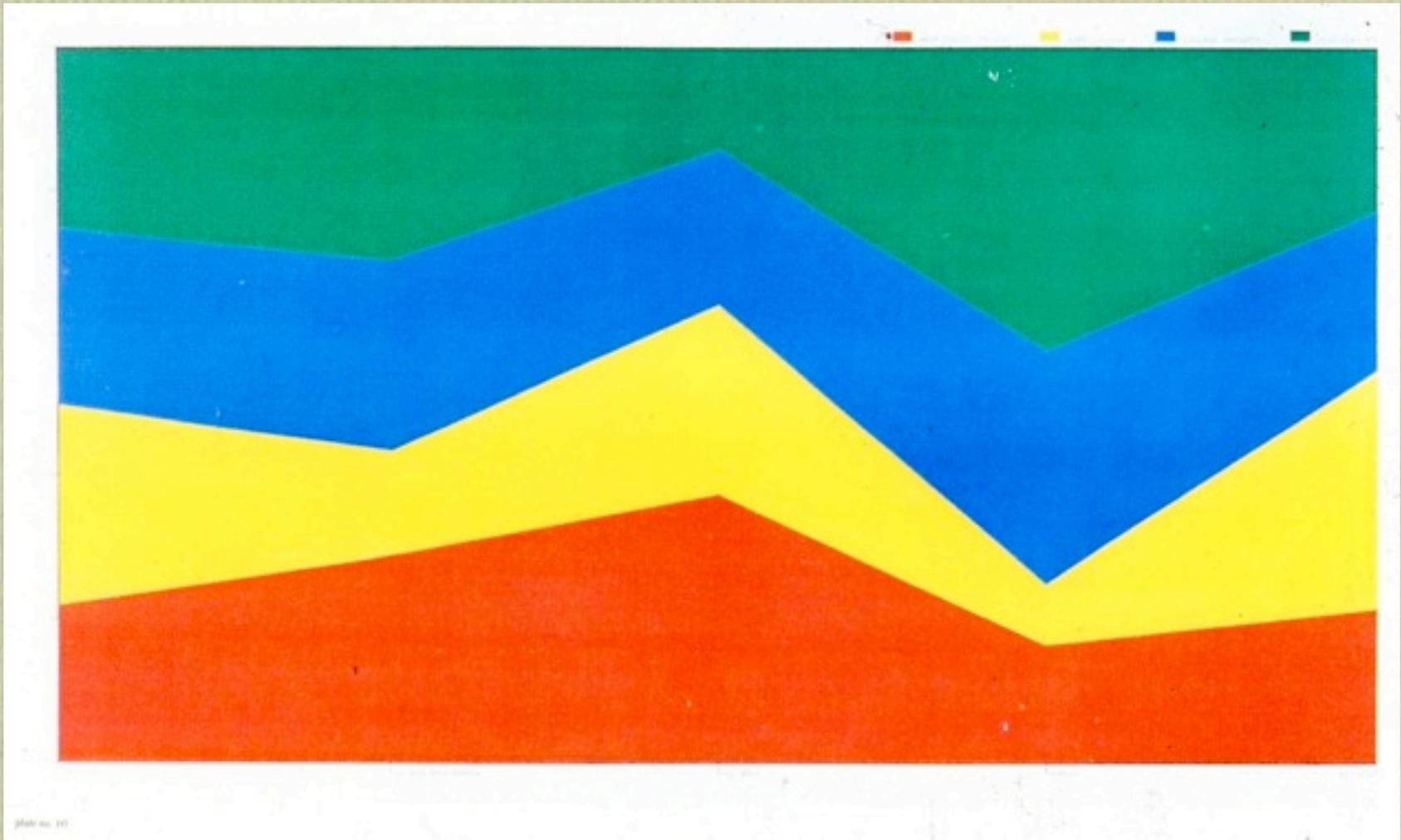
**Thursday, Oct. 27, 7:15 p.m.**

St. John's Episcopal Church, 210 Cayuga St., Ithaca

Come to the meeting and you could win...\$250 cash...dinner for two  
at OldPort Harbour...or a signed lithograph by the Artists!

The People's Choice exhibit and town meetings are sponsored by the Herbert F. Johnson Museum of Art,  
The Golden Fund Images and Society, the NY State Council for the Humanities, The Ithaca Times,  
The Nelson Institute, the Alternative Museum, and the Cornell Art Department.





Komar & Melamid

## Have *Fun* with Numbers

### I. Give quizzes that don't count!

#### *Numbers we should know:*

- ➔ Births in the United States annually.
- ➔ Leaves on a large Carleton oak tree.
- ➔ Ave. January high and low temps in Nfld.
- ➔ Number of Civil War military fatalities.
- ➔ Deer population of Minnesota.

# *Measured Thinking: Final Class*

IDSC 100, November 17, 2010

---





Course  
Evaluation  
Deposit Here

CYCLE

Bottles & Cans

Manufactured by  
Recycling Systems, Inc.  
10000 W. 10th Ave.  
Denver, CO 80202  
Tel: 303.733.1111

2. What is the significance of these numbers in the context of our work this term?

a. 56,000 & 10?

b. 6.87 billion & 1.96?

c. 10,000 & 420,000?

d. 1957 & 1865?

4. There is a website called [WeaselWords.com](http://WeaselWords.com)! What do you think the site addresses, and what do you anticipate feeling when you see the site?

HOME SUGGESTION BOX GLOSSARY SITE MAP CONTACT US

# WeaselWords.com

NEWS & INFORMATION FOR FERRET LOVERS

WELCOME • FERRET CARE • FERRET NUTRITION • MISC • ALL ARTICLES

## MAIN MENU

- » Articles
- » Ferret Events
- » Ferret Names
- » Ferret Facts
- » Guest Book

## PICTURES

- » Ferret Pictures
- » Reader's Pictures
- » Ferret Wallpaper
- » Ferret Videos

## LINKS

- » Ferret Breeders
- » Ferret Clubs

**H**ave you recently purchased a ferret? Are you thinking about getting a ferret but want to learn more before taking the plunge? Have you owned ferrets for a while and would like to learn more? Or do you simply want to learn more about **America's third most popular companion pet after cats and dogs.** Then this site is for you.

This site features articles written by leading experts, owners and enthusiasts. In addition to the articles there is a [Ferret Photo Gallery](#) and ever popular [Readers Ferrets gallery](#). It's always fun to see other peoples ferrets. Looking for a ferret, check out the long list of [shelter](#) and [breeder](#) links from around the world. Lastly, there links for [ferret events](#), a huge [ferret name](#) list, and [guest book](#) for you to sign.

10. Minnesota Knowledge Section: *What am I?*

> In winter, my temperature is 72°F, but I have no central heating.

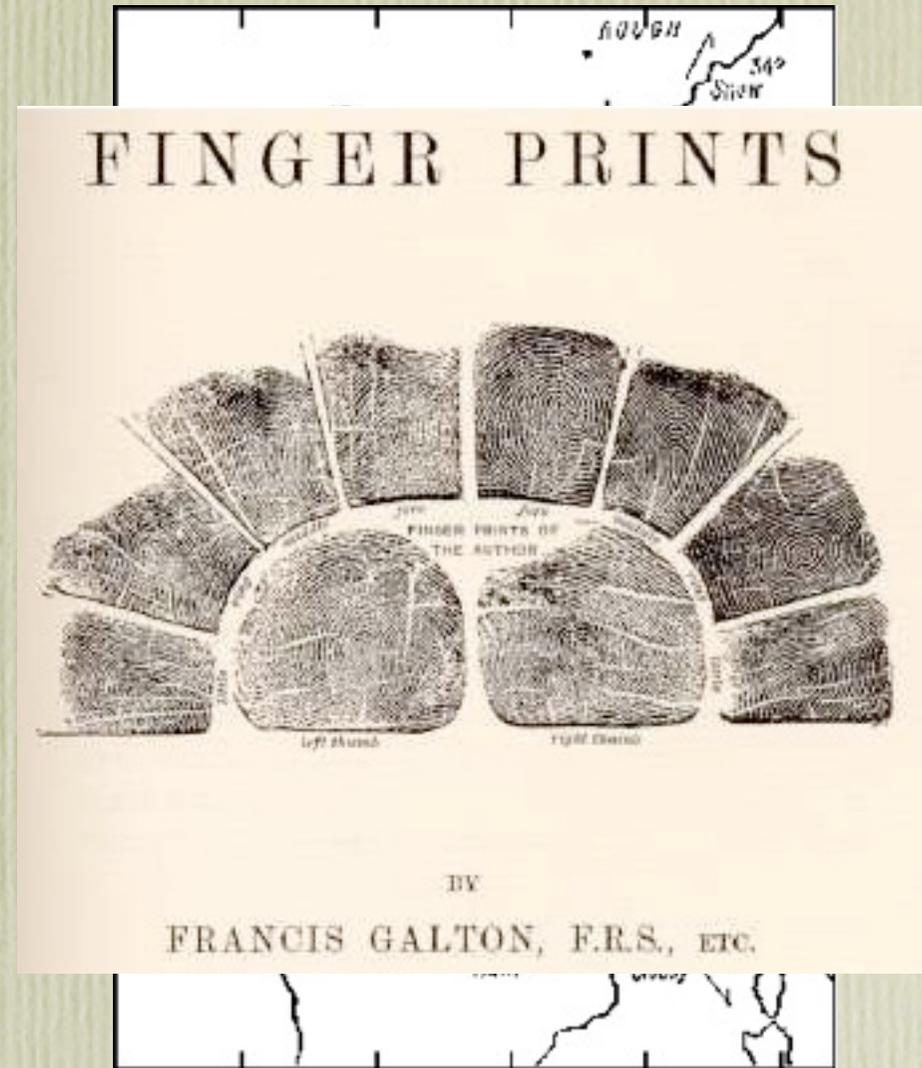
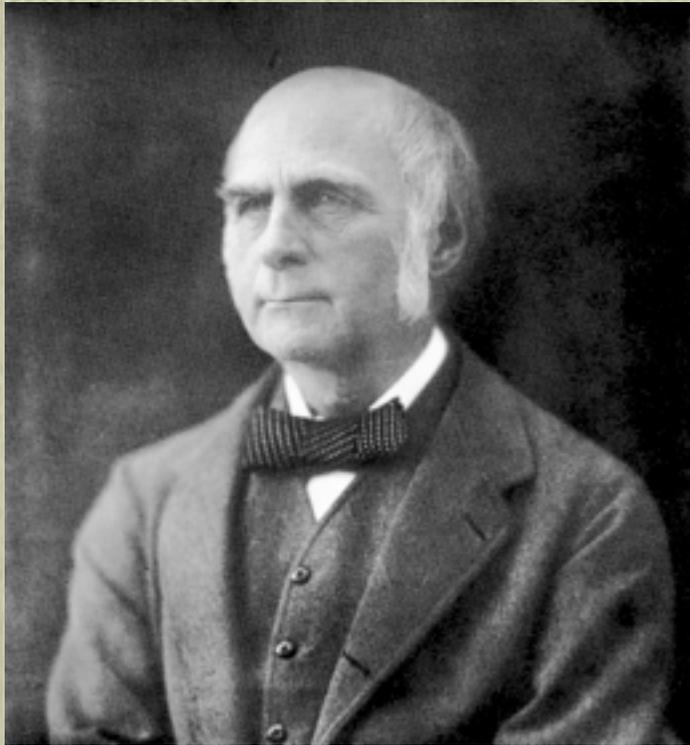
> I am 4.2 million square feet.

> I attract more visitors annually than Disney World, the Grand Canyon, and Graceland combined.

10. What am I?



- II-A. Whom have we studied who might have created this?  
II-B. Name something else he or she developed.



Sir Francis Galton

*Extra Credit: Who was Galton's cousin?*

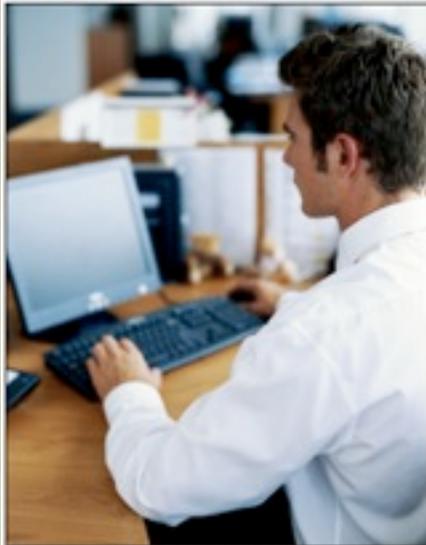
## 12. What's the first thing you should think when you see a story like this one?

### **Study Finds Working At Work Improves Productivity**

NOVEMBER 5, 2007 | ISSUE 43-45

WASHINGTON, DC—According to a groundbreaking new study by the Department of Labor, working—the physical act of engaging in a productive job-related activity—may greatly increase the amount of work accomplished during the workday, especially when compared with the more common practices of wasting time and not working.

 ENLARGE IMAGE

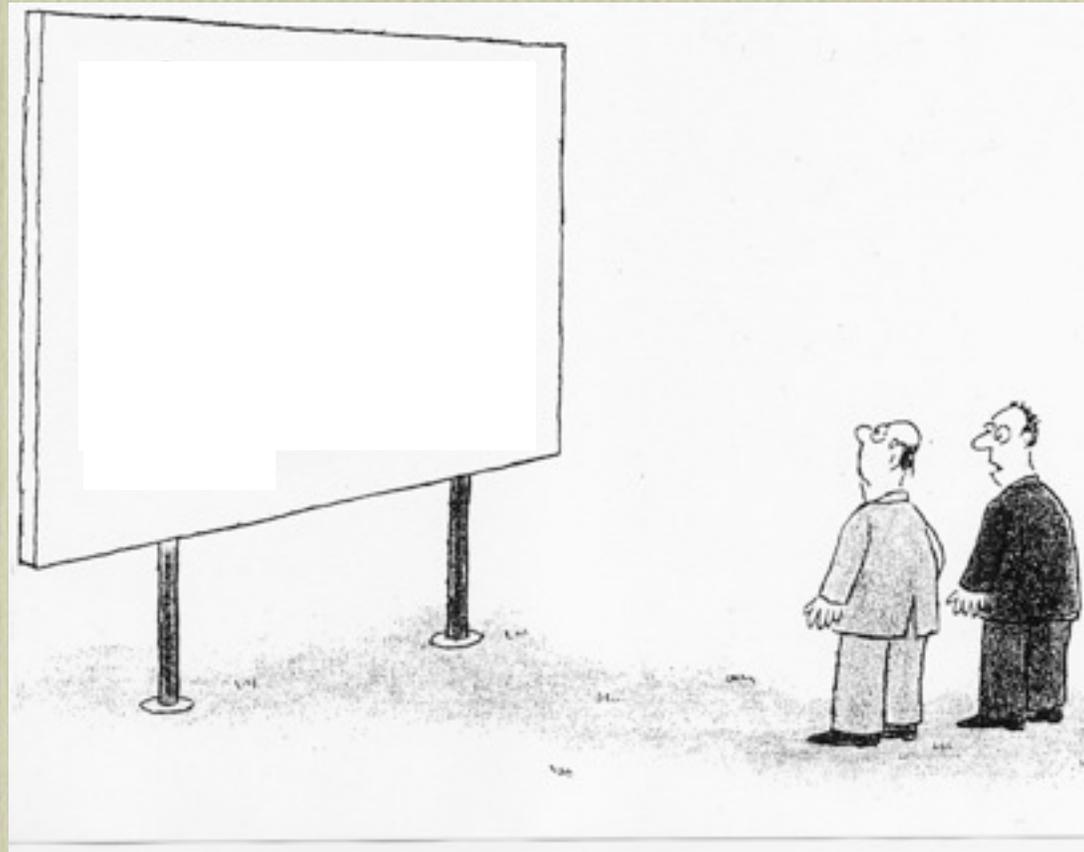


An American worker can triple his work output by working.

"Our findings are astounding: By simply sitting down and doing work, employees can dramatically increase their output of goods and services," said Deputy Undersecretary of Labor Charlotte Ponticelli, who authored the report. "In fact, 'working' may revolutionize the way people work."

Perhaps even more shocking, the study reveals that not working significantly decreases worker productivity, sometimes even resulting in no work getting done at all. Similar findings were reported in the areas of avoiding work, putting off work, complaining

24. What's on the billboard?





"JUST HOW MANY PAIRS OF EARRINGS  
WILL YOU ACTUALLY NEED ON THIS  
VOYAGE?" SNAPPED THE FIRST MATE

## HOW WOULD YOU MOVE MOUNT FUJI?

MICROSOFT'S CULT OF THE PUZZLE

How the World's Smartest Companies  
Select the Most Creative Thinkers



WILLIAM POUNDSTONE

AUTHOR OF BIG TICKETS

"A fun read. . . Useful and enjoyable . . .  
not just for those in the job market."

—USA Today

Have *Fun* with Numbers

## II. Give Fermi problems.

I recently came across a billboard in which a hospital proclaimed that it was one of the top 100 hospitals in the United States. Is this impressive or not?

*Estimate the number of hospitals in the United States.*

# How many Porta-Potties would a million people need at an outdoor event?

## Providing Toilets for 39,000 Runners



Librado Romero/The New York Times

### How to use the planning chart:

1. Determine how long your event will last.
2. Determine approximately how many people will attend your event.
3. With this information, use the chart to calculate the number of units needed to insure sanitary conditions.

	NUMBER OF HOURS FOR EVENT									
	1	2	3	4	5	6	7	8	9	10
<b>People Attending</b>	<b>UNITS NEEDED</b>									
50	1	1	1	1	2	2	2	2	2	
100*	2	2	2	2	2	3	3	3	3	
250*	3	3	3	3	4	4	4	6	6	
500*	4	4	4	5	6	7	9	9	10	12
1000*	6	6	8	8	9	9	11	12	13	13
2000*	8	9	12	12	14	16	18	20	23	25
3000*	10	12	16	16	20	24	26	30	34	38
4000*	12	13	16	22	25	30	35	40	45	50
5000*	15	15	20	25	31	38	44	50	56	63
6000*	18	18	23	30	38	45	53	60	68	75
7000*	20	20	26	35	44	53	61	70	79	88
8000*	22	22	30	40	50	60	70	80	90	100
10,000*	25	25	38	50	63	75	88	100	113	125

*These are the standards from the Portable Sanitation Association International*

*\*(1) unit provides approximately 200 uses*

## 5-Minute Assignment:

Pose a Fermi question for students that is relevant to a topic you teach.

Try to answer your own question.

# Engineer Self-Efficacy:

- Make the assignment challenging but easy.
- Provide adequate guidance and instruction.
- Structure an appropriate sequence of steps.
- Identify supporting resources.

# Engineer Self-Efficacy:

- Make the assignment challenging but easy.
- Provide **adequate guidance and instruction.**
- Structure an appropriate sequence of steps.
- Identify supporting resources.

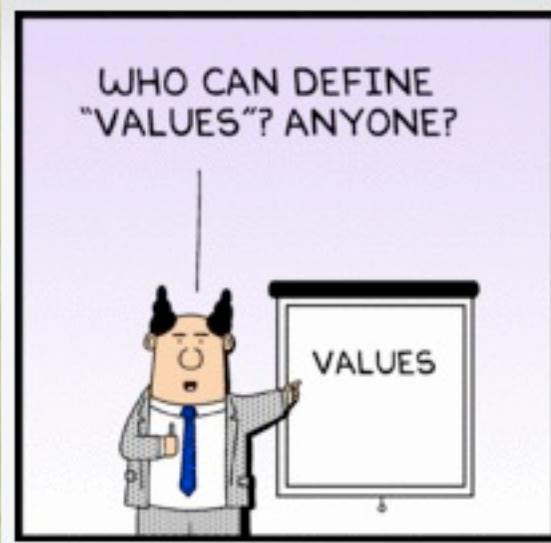
# What is the moral character of an argument?



# Values: *A Responsible, (Ideal) Scholarly Argument*

- Located in a context of previous scholarship.
- Stated precisely and supported with evidence.
- Addresses the reasonable questions of a careful reader.
- Recognizes limitations and complexities.

# Values: *A Responsible, (Ideal) Scholarly Argument*



# Numbers We Should Know Papers

- Two page paper; bring 3 copies to class Monday.
- Here's what the papers should do:
  - *Identify a number you believe well-educated people should know.*
  - *Present a few cogent reasons why you believe this number is important.*
  - *Make the number meaningful for your reader. Be certain to define the domain the number represents.*
  - *Provide source information for your number and indicate why your reader should believe the number you cite is reasonably reliable.*

*How can we evaluate  
the information we find?*



Do the scholarship.

# *What does it mean to do the scholarship?*

- ✓ Verify the original source.
- ✓ Consider source credibility.
- ✓ Evaluate the methods.
- ✓ Critically assess plausibility.
- ✓ Cross-check with other sources.
- ✓ Give appropriate credit.
- ✓ Participate in the community of scholars.

# NWSK Rubric

\_\_\_\_\_ **Number selection:** Appropriateness and significance of topic. [10]

\_\_\_\_\_ **Reasons supporting number importance:** Quality and clarity. [10]

\_\_\_\_\_ **Number presentation:** Definition and comparative contrasts. [10]

\_\_\_\_\_ **Source information:** Identification and reliability evaluation. [10]

\_\_\_\_\_ **Paper organization:** Structure; Opening and closing. Title. [20]

\_\_\_\_\_ **Writing quality:** Grammar, word usage, sentence focus. [20]

\_\_\_\_\_ **Argument quality:** Statement clarity and evidence for claims. [10]

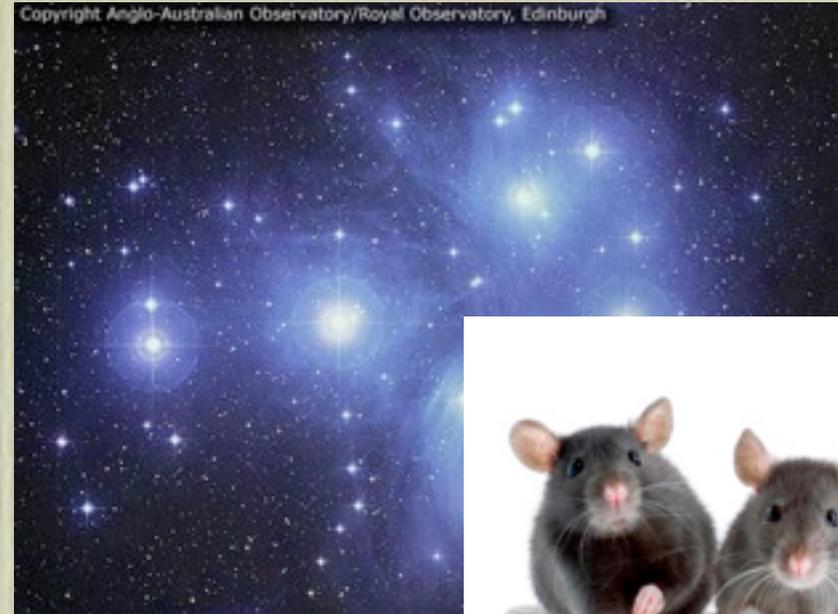
\_\_\_\_\_ **Complexity:** Uncertainties recognized and questions raised. [10]



*Exercise Caution*

# Anticipate the Questions of a Reasonable Reader

- *Sufficiency:*
- *Typicality:*
- *Accuracy:*
- *Relevance:*



Ramage, Bean, & Johnson (2007), *Writing Arguments*

IO

QR

Q

- What do the numbers show?
- How representative is that?
- Compared to what?



Outcome statistically significant?

the effect size?

the results those of a single study or literature?

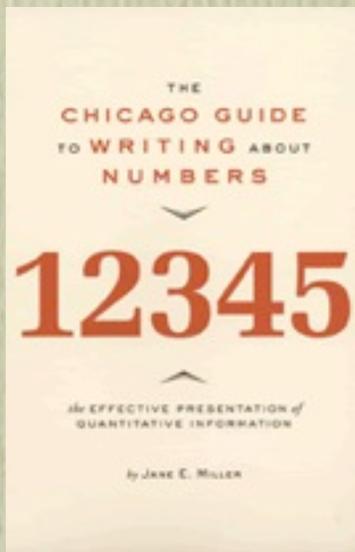
the research design (correlational or experimental)?

was the variable operationalized?

Rea

dy:

- Who's in the measurement sample?
- Controlling for what?



# Mechanics:

## Miller's (2004) Seven Basic Principles

- Establish the context.
- Choose effective examples and analogies.
- Use an appropriate vocabulary.
- Decide where to present numbers.
- Report *and* interpret numbers in text.
- Specify the size and direction of associations.
- Summarize overall patterns: **GEE.**

Jane Miller, *The Chicago Guide to Writing about Numbers*  
**Buy this book**  
(after the Workshop Worn T-Shirt)

# PAPER ASSIGNMENT

*Two pages, three copies,  
due Monday, October 11 in class.*

Take one of [Jane Miller]'s principles or other suggestions for writing effectively with numbers and evaluate--citing specific examples--how well Hemenway meets [her] standards in *Private Guns Public Health*.



WALLY, WOULD YOU LIKE  
TO BE ON MY "TTP"  
PROJECT?



WHAT DOES  
'TTP' STAND  
FOR?



S. Adams

IT'S SHORT FOR  
THE TTP PROJECT.



5-18



4/27 ©2003 Darby Conley. Dist. by U.F.S. Inc. WWW.COMICS.COM



## Noun/Pronoun Mismatches

# The value of concision



AS HE REACHED THE FINAL  
PARAGRAPH OF HIS MARRIAGE  
PROPOSAL, BILLY NOTICED THAT  
RUTH WAS NO LONGER THERE

The value of  
concision  
*and clarity*



# Engineer Self-Efficacy:

- Make the assignment challenging but easy.
- Provide adequate guidance and instruction.
- Structure an appropriate sequence of steps.
- Identify supporting resources.

Opportunities for revision are good.





“Your manuscript is both good and original, but the part that is good is not original, and the part that is original is not good.”

*-Samuel Johnson*

# *A Student Paper on Facebook*



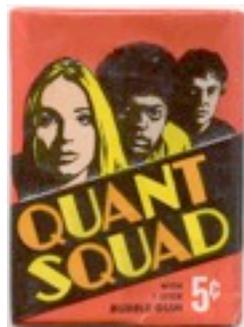
*Opening sentence:* “Facebook is a **wildly popular** online social networking tool...”

*Revision:* “Facebook is the Internet site most frequently viewed by males and females, aged 17-25, in the United States today (eMarketer, 2007). Sixty-nine percent of females and 56% of males in that age group have Facebook accounts; nearly 65% of users log on to Facebook once a day.”

MARCH 27, 2008

## Mathematics To Retire Favre's Number

CAM  
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icians,  
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uesday to  
Favre's stellar  
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e game; two,  
one and  
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passing record," professor Jeffery Hamilton said. "No person will be permitted to ever use the number again, though it may be necessary to create a new integer to place between three and five." Favre's number will be retired sometime during the 2008 NFL season and will join the other numbers retired from mathematics, including 23, 42, and 1,003,256. 

Buy Now

QR Workshop  
Worn T-Shirt!