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CHANCE News 13.01
Jan. 6, 2004 to Feb. 9, 2004

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Prepared by J. Laurie Snell, Bill Peterson, Jeanne Albert, Charles Grinstead, with help from Fuxing Hou and Joan Snell. We are now using a listserv to send out notices that a new Chance News has been posted on the Chance Website. You can sign on or off or change your address at this Chance listserv. This listserv is used only for this posting and not for comments on Chance News. We do appreciate comments and suggestions for new articles. Please send these to jlsnell@dartmouth.edu. Chance News is based on current news articles referenced in Chance News Lite.

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Figures won't lie, but liars will figure.

Charles H. Grosvenor

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Contents of Chance News 13.01

Here are two Forsooth from the December 2003 RSS news.

> Data from UK Sport shows that football carried out 1,256 [drugs] tests from April 2002 to March 2003, more than any other sport. But these figures are misleading. There are approximately 5,000 professional footballers in England, so a footballer has roughly one in four chance of going through a drugs test.
>
> By contrast, UK Athletics administered 509 tests in the same period against an elite performer base of 200 people -- meaning an athlete is eight times more likely to be tested.

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BBC Sports.

</div>

These remarks are right opposite the following graphic:

How the sports compare
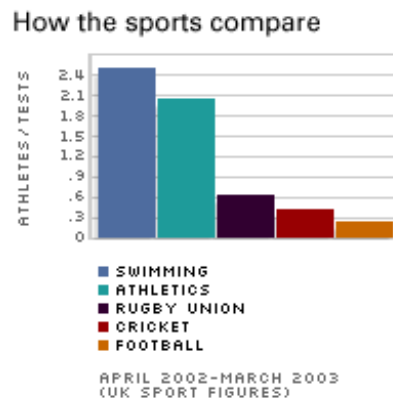
Obesity levels in the UK have tripled in the past two decades. Almost 24 million adults are now overweight or obese - a fifth are men and a quarter are women.

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The Big Issue.
28 July-3 Aug 2003

</div>

Myles McLeod provided the following that might also be considered a forsooth item.

Product recalls are a serious matter; this is also humorous.

Hormel finds calculator parts in Chili.
Food maker says about 104,000 lbs of canned chili
with meat may be tainted by calculator parts.
January 29, 2004: 9:49 AM EST   (CNN/Money)

Emil Friedman sent us the following note:

Here's a cute one, paraphrased from the *Readers Digest* (Feb. 4, p 174.)

The skipper of an Icelandic trawler accidentally rammed a yacht, causing $40,000 worth of damage. About a year later, he hit the same boat, causing $30,000 in damage.

STATISTICS QUESTION: What are the odds of this happening twice?

ANSWER: Forget "birthday problems" and data dependent hypotheses. The second collision occurred when the skipper steered toward the yacht to apologize for the previous year's collision.

Jim Kelley wrote us:

> With leap year approaching this year, the question is: has anyone who was born on FEB.29, [other then newborn infants] also died on Freb. 29. after living a normal life span. I can't seem to track anyone who has. There are lots of births and deaths listed for those days. However I can find no one both born and died on that day, other than newborns.

Our local Google expert, Peter Kostelec, reported that this was not easy.But Peter did provide the example which he found here. A Robert Hughes was born in February 29, 1776 and died in February 29, 1860.

DISCUSSION QUESTIONS:

(1) On the *Honor Society of Leap Year Day Babies*' website we find the statement:Your chance of being born on Leap Year Day is about 1 in 1461. But in a footnote we read that others claim that it is 1 in 1506. Where do these numbers come from? Which do you think is correct? How many leap year babies can we expect in the U.S. this year?

(2) How would you estimate the probability that a person born this February 29th will die on a later February 29th? How likely is it that one of this year's U.S. leap year babies will die on a later 29th February?

Greg Leibon is teaching the Dartmouth Chance class this term and gave us his discussion motivated by the recent mad cow disease scare.

Mad Cow Madness.
Greg Leibon, with special thanks to Elizabeth Jane Whittington and the current Chance! Class.

Question 1. Suppose you are in the middle of a mad cow epidemic and really want a half pound hamburger. How many miles should you cut out of your driving schedule to balance out the risk of eating this burger? (Answer: Exactly one mile!)

Question 2. Suppose you are in the middle of a mad cow epidemic and you just bought a Powerball lottery ticket and ate a half pound hamburger. Is it more likely that you will win the jackpot or perish from the human form of Mad Cow Disease? (Answer: Both these chances are equal!)

Discussion Questions:

1. Who might like us to dwell on each of the above comparisons?

2. What have we learned about the chance of winning the lottery as compared to the risks associated to driving?

Solutions to Mad Cow Madness.

First, we will estimate the risk

Mad Cow Risk.

First, we will estimate the risk of getting, hence dying from, a disease-inducing-serving of beef during the British "Mad Cow Epidemic". We will estimate this risk by using the ratio of the number of disease-inducing-servings of beef caused by the epidemic to the total number of beef servings produced by Britain during the epidemic.

Let's first determine our denominator. Using this data we find that the United Kingdom produces about $(1000)(1000)$ tons of beef for consumption each year. Using a conversion table this is $(1000)(1000)(.9842)(2240)$ pounds or rather about $2(10^9)$ pounds. Let's assume that a serving is about 1/2 a pound. Then the British beef industry produces about $(2)(2)(10^9)$ servings of beef a year. This epidemic lasted at least five years. Hence there were at least $(5)(2)(2)(10^9)$ servings of beef produced.

Now let's estimate our numerator. Recall, there were about 140 deaths attributed to diseased cow meat during the Mad Cow Epidemic in Britain. Hence of the $5(2)(2)(10^9)$ servings of beef, we will estimate about 140 were disease inducers.

From these estimates, the chance of a given serving of beef being a disease-inducing-serving is about $140/((5)(2)(2)(10^9))=70/(10^{10})$, or rather a bit less than $100/(10^{10}) = 1/10^8$.

Discussion Questions:

(1) Discuss the relevance of this computation to the current U.S. "Mad Cow Scare".

(2) Discuss the assumptions we made in order to interpret our ratio as a chance.

(3) Discuss the assumptions we made in order to estimate this ratio's numerator and this ratio's denominator.

(4) Discuss whether or not it is reasonable to consider our estimate a worst case scenario.

Driving Risk.

Second, we will estimate the risk associated to risk associated to driving a mile. First choose our possibilities, namely all the miles driven. From this data we find there were 2.6 (10^{12}) miles driven in US in 2000. Now we need to estimate which of these miles ended in an occupant fatality. Using this data as well as the above, we find that there were (41,717-5,842) (or about 35000) occupant fatalities. ASSUMING that each fatality corresponds to some given mile, we have that our risk of being killed in a given mile is about (35000)/(2.6(10^{12})) or very nearly $10^4/10^{12} = 1/10^8$.

Discussion Topics:

1. Discuss the assumptions we made in order to interpret such our ratio as a chance.

2. Discuss the assumptions we made in order to estimate this ratio's numerator and this ratio's denominator.

Jackpot Chance.

It is well known that the odds of winning the Powerball jackpot are 1 in 1.2(10^8). In other words, the chance of winning the jackpot is about $1/10^8$.

Discussion Topic:

1. Discuss how you could figure out this number yourself

Peter Doyle received a random disc with random music and suggested that readers of Chance News might enjoy participating in this project.

A Pop/Rock Music Experiment in Random Determination

This is an interesting random music project under the direction of Doyle Dean. The projects web site gives the following description of the experiment.

> We have produced a compact disc containing thirty songs that have essentially written themselves. Each song is ninety seconds in length and each was conceived by methods of random determination. Song structures have been used as blueprints upon which individual notes or chords have been changed according to dice rolls. From drumbeats and guitar sounds to vocal and lyrical content, chance and fate have nurtured the songs into being. The pieces were written and recorded at the time of creation, one element at a time. The musicians have never performed nor 'rehearsed' these pieces in a conventional manner. Only now do the elements come together in song form.

One thousand compact discs are being sent out into the world using (quasi) random methods, e.g., left in a restaurant in Topeka, a subway car in New York, or aboard a boat in Bangkok. The discs will then be (re)distributed by willing participants. The multi-lingual liner notes will encourage one who comes across a CD to listen to and/ or copy the material and then pass the disc on, either to a friend or by random means. They will also be encouraged to log on to our web site and enter the disc number, location and date. The CDs are not for sale, nor are they to be kept. You can learn more about this project and hear samples of the music at the projects web site.

We are told that there are still some CD's available. If you are interested contact Doyle Dean. (doyle_dean@yahoo.com).

Who's counting.
Arithmetic and the candidates, *ABCNews* **January 1, 2004.**
John Paulos

In his January monthly column for ABCNews, John Paulos suggests that every President should know some math. So he proposes that moderators of political debates, both for the primary and general elections, ask at least one basic numerical question during each debate. He provides a short quiz with ten questions to show what he has in mind.

DISCUSSION QUESTION:

Go to Who's counting and read John's ten questions and see how you do on his quiz. Then estimate the score President Bush and the current Democratic candidates would get on his quiz.

Rich Gordon suggested this item.

A Fair and Balanced Weblog
Mark Kleiman

Mark Kleiman, Professor of Policy Studies at the UCLA School of Public Policy and Social Research, maintains a monthly electronic newsletter called "A Fair and Balanced Weblog" in which he comments on current political issues. The January issue includes an amusing discussion called Wrong! where Kleimin critiques the meaning of margin of error used in a January 7, 2003 Associated Press article. This article starts with:

> WASHINGTON -- Wesley Clark has closed the gap with Howard Dean among Democratic voters, according to a national poll taken at a time when Dean had been under intense criticism from rivals.
>
> Dean had the support of 24 percent and Clark had the backing of 20 percent in the CNN-USA Today-Gallup poll out today. The poll of 465 Democrats and those who lean Democratic had a margin of sampling error of plus or minus 5 percentage points, meaning Dean and Clark are essentially tied for the lead nationally. The poll was taken Jan. 2-5.

You will also find here up-to-date poll information, including the prices at the Iowa electronic markets winner-take-all nomination contract. and Tradesports. Kleiman also gives here a good description of how the Iowa electronic markets works.

DISCUSSION QUESTIONS:

(1) What do you think the phrase "Dean and Clark are essentially tied for the lead" means? What do you think the AP thinks it means? Is it reasonable to call it a "statistical tie" if the differences between the candidates are within the margin of error?

(2) Kleiman's critique of how the 5% margin of error is interpreted in the article includes the following explanation. "All it means is that, if I'd called another 465 people at the same time, using the same algorithm to select them, using the same weighting formula to adjust the sample to the assumed population of actual voters, and having the same interviewers ask the same questions, there's a 95% chance that the results of the second sample would have been within 5 points of the results of the first sample." Critique Kleiman's explanation.

(3) Kleiman posts a reader's response to the above statement in which it is asserted that "a sampling error of +/− 5 points means there is a 95% chance that the sampled proportion is within 5 points of the true population proportion...There is only an 83.5 percent chance that the 'results of the second sample would have been within 5 points of the results of the first sample.'"Critique this statement. How do you think the 83.5% probability was determined?

(4) What do you think is the best way to report the polling results and how the margin of error should be interpreted?
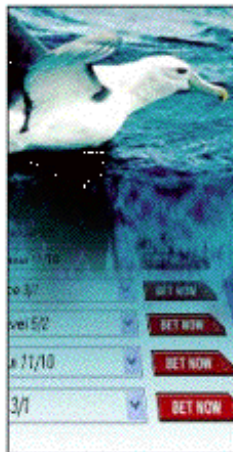

Myles McLeod provided the next item.

Place your bets on the big birds.
BBC News Online
Alex Kirby

UK online betting firm ladbrokes.com has paired with an organization called the Conservation Foundation and the Tasmania state government to raise awareness about the plight of the Tasmanian Shy Albatross by launching The Big Bird Race.

An estimated 300,000 of the birds die each year from entanglement in fishing lines as they migrate 6000 miles from Tasmania to South Africa.

The race goals are:

- Encourage more countries to sign a document called the *Agreement for the Conservation of Albatrosses and Petrels (ACAP)*.

- Raise funds for further conservation efforts.

The Big Bird Race.

Scientists will fit eighteen birds with satellite transmitters so their movements can be monitored via the Internet. Ladbrokes.com will post betting parameters and amounts on their Web site shortly. The race lasts from March to August. Schools and minors can monitor the race without betting from www.wildlifebiz.org.

The Course.

The foundation asked Ladbrokes to back the event because it says the race is very like horse racing, especially the Grand National.

- They are two of the world's longest steeplechases/migrations.

- There are major hurdles to overcome (the albatrosses will risk hypothermia over the southern ocean).

- The horses have trainers, the birds have scientists monitoring them.

- Each albatross will have the equivalent of an owner, a high-profile backer (still to be announced).

- In place of jockeys, the birds will carry tags.

- Backers will be able to follow the action and bet on the outcome of both races.

Only five months to go on one of
the world's longest migrations

Source: BBC News, 22 Jan. 2004

[Studying literature by the numbers](#).
New York Times, 10 Jan, 2004
Emily Eakin

Graphs, Maps, Trees: Abstract models for literary history - 1
[New Left Review](#), Nov Dec 2003
Franco Moretti

Franco Moretti is a professor of English and comparative literature at Stanford and is director of the university's center for the study of the novel. He has decided that literary research should make better use of some of the tools of science. He is writing three papers for the *New Left Review* to show how this might be done using graphs, maps, trees, and abstract models. This first paper emphasizes the use of graphs. The *Times* article writes:

> If Franco Moretti had his way, literature scholars would stop reading books and start counting, graphing and mapping them instead. For an English professor, this is an ambition verging on apostasy. But Mr. Moretti... insists that such a move could bring new luster to a tired field, one that in some respects, he says, is among "the most backwards disciplines in the academy."

> Literary study, he argues, has been a random, unsystematic affair. For any given period, scholars focus on a select group of a mere few hundred texts: the canon. As a result, they have allowed a narrow, distorting slice of literary history to pass for the total picture.

> "What a minimal fraction of the literary field we all work on," Mr. Moretti declares, tactfully including himself among the guilty. "A canon of 200 novels, for instance, sounds very large for 19th-century Britain (and is much larger than the current one), but is still less than 1 per cent of the novels that were actually published: 20,000, 30, more, no one really knows — and close reading won't help here, a novel a day every day of the year would take a century or so."

> The perils of such a method, he writes, are clear: "A field this large cannot be understood by stitching together separate bits of knowledge about individual cases, because it isn't a sum of individual cases: it's a collective system, that should be grasped as such, as a whole."

To illustrate this Moretti provides the following simple graph showing the three rises of the British novel.

The three rises of the British novel.
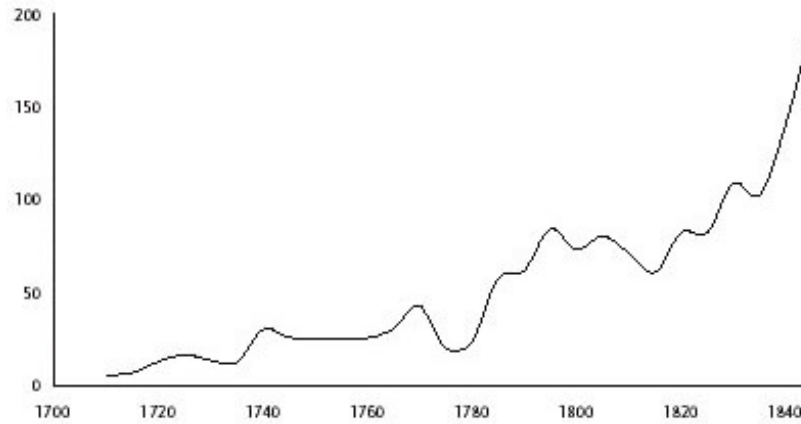
Sources: McBurney, *Check List of English Prose Fiction 1700-39*:
Beasley, *The Novels of the 1740*; Raven, *British Fiction 1750-70*;
Peter Garside, James Raven and Rainer Schöwerling, eds, *The English Novel 1770-1829*, 2 vols,
Oxford 2000: Andrew Block. The English *Novel, 1740-1850*, London 1961.

Moretti remarks that such a plot provides the data but does not provide the interpretation. He says "Where the significant turning points lie along the continuum--and why--is something that must be decided on a different basis".

Moretti provides similar graphs for other countries showing considerable variation in the patterns of evolution of the novel in different countries. Click here for a graph showing the fall of the novel in Japan. He also provides other graphs, including one showing the coming and going of different types of novels, and discusses what can be inferred from these graphs. You can see his graph of the evolution of the types of British novels from 1740-1900 here.

The *NYTimes* article reports that Harold Bloom pronounced Mr. Moretti "an absurdity."

> I am interested in reading, "he said with an audible shudder." That's all I'm interested in."

The article goes on to say:

> Mr. Moretti cheerfully acknowledge that his ideas were controversial. But that has not dampened his enthusiasm."My little dream, "he added wistfully, "is of a literary class that would look more like a lab than a Platonic academy".

Emil Friedman suggested the following discussion question:

DISCUSSION QUESTION:

What would happen to Moretti's "turning points" were he to plot the per-capita number of novels, or the number of "quality" (as defined by methods similar to those of Charles Murphy?) novels, etc.

Pete Schumer suggested the following article.

Pigskin overtime rules and beaned batters spur math theorems.
Wall Street Journal, 9 January 2004, A7

(1) Do the "fatalities per million cars" data surprise you? Why or why not?

(2) Which vehicles do you think are the most dangerous? In answering the question, what weight did you give to the data presented in the table? Do you think your answer might be different if additional data were available, such as vehicle-miles driven?

(3) Critique the following statement. "Cars don't kill people; drivers kill people."

Of fuzzy math and 'food security'.
New York Times, 11 January 2004, Sect. 4, p. 16
Tom Zeller

In December, the US Council of Mayors released its annual survey on hunger and homelessness. You can read its press release or download the full report. A key finding was a 17% increase in the demand for emergency food, a story that was widely reported in the media. It turns out, however, that the survey has found increased demand every year since 1988, with a high of 26% in 1991 and a low of 9% in 1995.

The American Heritage Foundation issued its own report criticizing the methodology of the survey. It cited data from the Census Bureau and the US Department of Agriculture showing that while "food insecurity" is indeed up somewhat in the last few years, it remains lower than it was in 1995. So why, they ask, should the survey results systematically differ from national trends?

A spokesperson for the Council of Mayors conceded that the 25 individual cities in the sample did their own research, and the Council then compiled the percentages. The figures should not be used, for example, to produce estimates of the actual number of Americans living in hunger. Nevertheless, the Council believes that the findings reflect the continued pressure on service agencies.

The *Times* presented a graphical comparison of the two reports, entitled One Topic, Two Studies, Two Conclusions.

Perry Lessing suggested the following story.

Subconsciously, athletes may play like statisticians.
New York Times, 20 January 2004), F1
David Leonhardt

Bayesian integration in sensorimotor learning.
Nature, 427 (15 January 2004), 244-247
Konrad P. Kording and Daniel M. Wolpert

When an athlete makes a split-second decision, fans are likely to interpret it as a finely trained reflex. But the research reported here suggests that the athlete is subconsciously doing probability calculations. The *Times* quotes Kording as saying "the human brain knows about Bayes rule." The cover of the *Nature* issue features a tennis player running to make a shot. The caption reads "Anyone for bayesian integration?".

The researchers constructed an experiment in which subjects tried to guide the cursor across a computer screen which blocked their view of the controlling hand. In practice runs, the cursor appeared on average one centimeter to the right of the subject's hand. During the experiment, subjects got information about the location of the cursor when it was about halfway across the screen. Sometimes it was a distinct arrow, other times a vague cloud. When the arrow appeared, the subjects used that information directly. When the cloud appeared they used the uncertain information in a manner consistent with Bayesian updating of

their experience from the practice runs.

The *Times* article explains that tennis players have to be better randomizers than people who are asked to mentally generate coin flip patterns. For example, a player receiving serves tries to anticipate whether the ball will come to the forehand or backhand side, and would be able to take advantage of nonrandom patterns.

In Chance News 12.06 we discussed Edward Tufte's new book *The Cognitive Style of PowerPoint* and we asked the following discussion question: Do you agree with Tufte that PowerPoint presenatations are so bad? If so, why do so many people use them?

Myles McLeod answers this question:

The following anonymous Amazon.com review of Tufte's book recounts one reviewer's informal empirical comparison of several co-workers' PowerPoint presentations versus his own handout presentation created using Tufte's recommendations:

> **Know Your Audience!** December 29, 2003.
>
> Reviewer: **A reader** from Highland, CA United States.
>
> After the first read, I was disappointed with Edward Tufte's essay on PPTs. I was expecting more practical suggestions from the master of visualizing information; steps we could all take to make our PPTs better. This essay mostly gives graphic examples of bad PPTs. We've all seen plenty of bad PPTs in our lives. Do we really need to pay Mr. Tufte to see more?
>
> The point of the essay seems to be, instead of trying to make your PPTs better, you shouldn't even bother using the evil software package from Microsoft. Instead, make a nice handout for your audience.
>
> So I decided to perform a test. I was involved in an internal presentation to a different group in the company. One by one, eight different managers gave a 10 to 15 minute presentation to a group of about 25 people. While the other managers worked on their PPTs, got their laptops ready, and made sure a screen and a Boxlight would be in the conference room, I worked on a one-page handout. My presentation would stand by itself, without the crutch of PPT illuminating the wall behind me; the handout would supplement my presentation, and would allow the audience to take something physical back to their offices.
>
> After the presentations were over, the audience was asked to fill out a survey. To summarize, they hated the handouts, loved the PPTs. And the PPT presentation they loved the best was one of the most hideous examples I had ever seen--one Mr. Tufte would have had a field day tearing apart, one slide at a time.
>
> I agree that too many presenters use bad PPTs as a crutch, and as presenters we should rely more on handouts as a secondary communication tool. However, in my own experience the audience seems to want and *expect* PPTs-in which case a bad PPT might be more effective than no PPT at all. Read Tufte's essay and take his points to heart, but ultimately, KNOW YOUR AUDIENCE!
>
> Source: Amazon.com

His statement "*We've all seen plenty of bad PPTs in our lives. Do we really need to pay Mr. Tufte to see more ?*" misses the point. Tufte made quite an impression by simply showing how many (most?) users

employ the tool. Given Tufte's view that the product should be subject to a global product recall, is it surprising that he does not offer more PowerPoint presentation improvement tips?

How polished could the reviewer's presentation have been if he produced it " *While the other managers worked on their PPTs, got their laptops ready, and made sure a screen and a Boxlight (were) in the conference room...*" ? One can only speculate about why the reviewer's audience preferred the PowerPoint presentations over his handout. Perhaps the handout was not as effective as the reviewer thought, or his delivery did not match his peers'. Whatever the case, it would be interesting to hear Tufte's comparison of the two.

PowerPoint is used almost everywhere today, and barring unforeseen circumstances at Microsoft, it is likely to be around for many more years. A random Web poster named 'maglia' offers his views here on a board devoted to Web design. He believes PowerPoint files are an unavoidable medium that should be used with restraint then quickly destroyed to guard against their future use as substandard historical records.

So, is PowerPoint evil? Some say yes; others no. An otherwise outstanding presentation converted to PowerPoint may lose clarity, impact and variety as surely as an atrocious presentation converted to PowerPoint may benefit from added structure and ease of use. Tufte's implied argument seems to be that PowerPoint's net effect across millions of users has been a significant lowering of average presentation quality.

This tendency to find middle ground is recognizable as the well known principle called "Regression to the Mean". The term is attributed to Francis Galton [1] (1822-1911), who in turn credits Belgian astronomer and statistician Adolphe Quetelet (1796-1874) for his ideas on the Bell Curve. An interesting sidebar about Quetelet is that he is also namesake for the term *Quetelet index* , the measure for obesity.

Cornell Professor William Trochim [2] provides an illustrated treatment of regression to the mean in his research guide. Suppose we change his regression diagram by substituting the terms 'Pre-PowerPoint Quality' for 'pretest', 'Post-PowerPoint Quality' for 'posttest', then relabel the horizontal axis 'Presentation Quality'. Trochim's graphs would then visually communicate the same message Tufte preaches. Using Trochim's terminology, Tufte could then say that the 'regression artifact applies to the quality of PowerPoint presentations among a nonrandom sample from a selected population'.

> **" Will Not Hide My Light Under a Bushel."**
>
> Gentlemen—I will not hide my light under a bushel, for I want the people to know what your medicine has done for me. For four years I have been afflicted with asthma, and could not get anything to do me any good until I got your Gooch's Mexican Syrup. took three bottles and it cured me entirely. I give you this hoping it may be the means of saving some one from a horrible and premature death. Yours under obligations,
>   REV. THOS. B. WARWICK,
>   Scott Town, O.

From The Memphis Daily Avalanche
Memphis, Shelby County ,Tennessee
April 2, 1887

Source: TheOldenTimes.com

Blaming PowerPoint for producing poor presentations is unfair. To do so is to commit a judgment error

termed the *regressive fallacy,* described by Robert Todd Carroll [3] in his Skeptic's Dictionary . Carroll explains the regressive fallacy is the mistaken attribution of cause that can be accounted for in the normal random happening of events. PowerPoint then is arguably no more responsible for causing a poor presentation today than Gooch's Mexican Syrup mentioned in graphic above was responsible for curing the Rev. Thomas B. Warwick's asthma in 1887. PowerPoint simply makes it much easier to turn both great and poor presentations into mediocre ones. The real issue however, is that while bad presentations existed before widespread PowerPoint adoption, they are now much more likely to happen.

Why then do so many people use PowerPoint if they think it has such obvious flaws? They use it for the same reason they use MS Windows – it is everywhere and often its use is compulsory. On the other hand, advocates say the tool is convenient, easy to use, and standardized.

And so, what steps can a reluctant PowerPoint user take to improve presentations As chance would have it, Pamela Bagley and David Izzo of Dartmouth Biomedical Libraries offer some general tips, a PowerPoint presentation entitled PowerPoint: the Good, the Bad, and the Ugly, and other resource links.

Finally, unabashed PowerPoint fans can take heart that a teen has provided this condensed version of *The Cognitive Style of PowerPoint*.

REFERENCES

[1] Galton F., "Regression towards mediocrity in hereditary stature", *Journal of the Anthropological Institute* 1886;15:246-63.

[2] Trochim, William M., The Research Methods Knowledge Base, 2nd Edition. Internet WWW page, at URL: < http://trochim.human.cornell.edu/kb/index.htm > (version current as of 08/06/2003).

[3] Carroll, Robert T., The Skeptic's Dictionary: A Collection of Strange Beliefs, Amusing Deceptions, and Dangerous Delusions, John Wiley & Sons; 1st edition, 2003.

MORE QUESTIONS:

(1) Is concern about PowerPoint becoming a medium of record with the potential to dull the expression of complex ideas a valid worry?

(2) If tasked to deliver a persuasive presentation, how would you utilize PowerPoint to maximize your message's emotional impact? Would your strategy differ if your main discussion goal was to ensure accurate transmission of facts?

The N.F.L's passer rating, arcane and misunderstood.
New York Times, **14 January 2004, D1**
Richard Sandomir

The NFL's passer rating system was featured in sports pages this month when Peyton Manning of the Indianapolis Colts achieved a perfect rating of 158.3 in a playoff game against Denver. This unwieldy figure comes from a formula that has been used since 1973 to rate quarterbacks. It combines four components of performance: percentage of passes completed, average yards per completion, percentage of passes for touchdowns and percentage of passes intercepted. Unfortunately, the *Times* article does not completely clarify the formula. We read:

> How does a quarterback attain a 158.3 rating? He must ace all four categories, which for
> mathematical reasons, awards a maximum of 2.375 points if his completion percentage is

at least 77.5 percent; his ratio of touchdowns to passing attempts is at least 11.9 percent; he averages 12.5 yards a pass; and he throws no interceptions.

If the quarterback hits the jackpot, as Manning did against Denver, his four-category total of 9.5 is divided by 6, then multiplied by 100, and the result is 158.3.

Any performance below those targets receives fewer points, and requires a maze of arithmetic gesticulations to reach the final rating.

You can find more information online. A number of web sites present some version of an online calculator that computes the rating from raw data on number of attempts, completions, total yards, touchdowns and interceptions. The NFL web site has more detail, explaining some of the philosophy behind the formula, illustrating with data for the 49ers Steve Young, whose season mark of 112.8 for 1994 stands as the NFL record.

The most complete description we could find is StudyWorks! Online, which gives all the computational details. Each category is scored with a piecewise linear function. For example, in the completion category, anything below 30% gets a score of 0 and anything above 77.5% gets 2.375. Between these values, the scale is linear with a slope of 0.05. This site presents a number of other pedagogical activities in the sciences, including other exercises with probability and statistics.

Well, there are problems on the college front also.

B.C.S. coordinator says that the system requires some adjusting.
New York Times, 5 Jan. 2004
Joe Drape

This article begins with:

> Mike Tranghese, the coordinator of the Bowl Championship Series, said Sunday that the formula for creating a national title game had failed this season by leaving Southern California out of the Sugar Bowl. The Trojans were No. 1 in polls by the news media and the coaches.
>
> "Never in our wildest dreams did we think we could have the No. 1 team in both the human polls not here playing for the national championship," Tranghese said at the Superdome before the B.C.S. title game between Oklahoma and Louisiana State. "We've got to do something different."

This might be a good time to discuss football rankings in your class. There is a huge amount of literature here and the best we can do is to point you to some web sites that would be helpful for such a discussion. We are indebted to Hal Stern for suggesting these sites and his comments on them.

> The official BCS web site. Here you will find a description of the system in its nuts and bolts.
>
> Billingsley's college football site. The Billinglsy system is one of the 7 computer systems included. You will find here links to all of the computer systems. Massey, Wolfe, Billingsley, Colley including varying degrees of detail about their ratings. Sagarin, Anderson and Hester, and the NY Times basically provides zero details. Massey's page has an interesting comparison of a large number of rating systems.
>
> Colley's site is interesting. You can go in and change a game and see what happens to

his ratings. If you change the outcome of the Boise St - Hawaii game (which Boise won) which ended the regular season you find the USC jumps ahead of LSU in the Colley ratings and this is enough to have USC jump ahead of LSU in the entire BCS selection process. How odd is that?

And here is another article you might like to read.

College football rankings: do computers know best?
*Interfaces*, Vol. 32, No. 5, Sept-Oct. 2002,pp85-94
Joseph Marinich

Here is a the abstract for this article:

The bowl-championship-series (BCS) committee uses 10 ranking schemes, including eight computer rankings, to select college football teams for bowl-championship-series bowl games, including the national championship game. The large financial benefits of participating in BCS bowl games make it imperative that the selection process accurately select the best teams.

We evaluated the performance of the 10 ranking schemes the BCS committee used during the 1999 and 2000 seasons to select bowl teams. We found that almost all are equally accurate, but the Seattle Times scheme clearly underperforms the others. In addition, two proposed changes to the BCS selection formula, (1) to prohibit computer ranking schemes from considering the margin of victory in their rankings, and (2) to include explicitly the outcomes of head-to-head games among teams being considered for BCS bowls, could do more harm than good and could decrease the likelihood of the committee selecting the best teams for the BCS bowls.

Here's a cartoon on this subject sent to us by Emil Friedman:
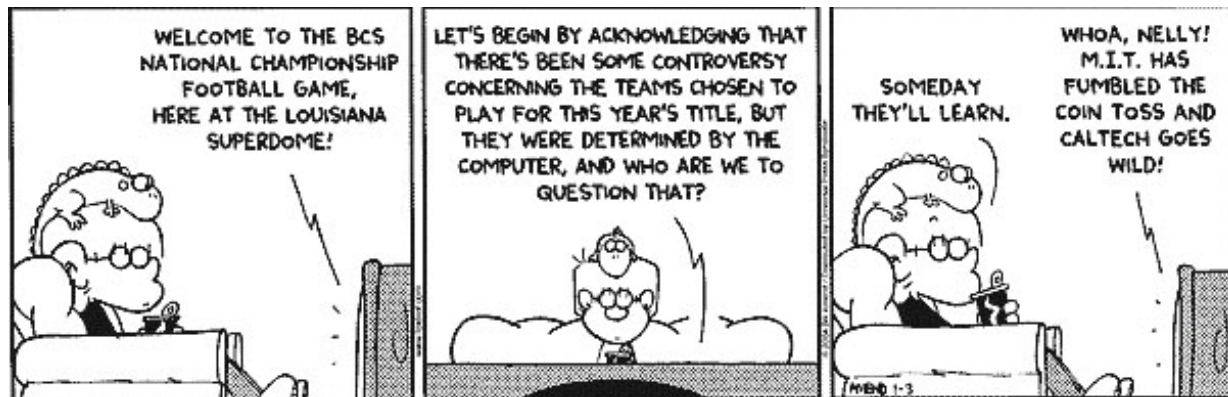
The next articles was contributed by John Gavin who remarked that it shows the importance of good statistics when policy makers are making decisions about resource allocations.

Africa's Potemkin deception.
***Financial Times*, London, Tues, Jan 19, 2004, page 21,**
Michael Holman

The author says that the lack of basic statistics about countries in Africa hampers decisions about how best to allocate resources. For example, it is believed that Nigeria has the biggest population in Africa but the population could be anywhere from 120 to 140 million people. Holman says:

The last reliable census was conducted by the British in the colonial era about 50 years ago. Post-independent counts have been distorted by rivalry between the Christian south and the Muslim north and tensions over the distribution of the country's oil wealth among the states: allocation is based partly on a state's population.

If we do not know something as fundamental as the number of Nigerians, who account for one in six Africans (or five or seven) and we guess at their birth rate, every statistic about Nigeria confidently cited by its development partners is not a fact, but an assumption, based on trends with questionable foundations.

And if this is the Nigeria, can we believe World Bank figures, often based on extrapolations that go back decades, for Mail or Malawi or Mozambique, whether about radio sets per 1,000 households or literacy rates?

Holman was Africa editor of the *Financial Times* from 1984 to 2002. You can read essentially the same article here.

John Gavin also recommended the following article:

Signifying nothing?
Too many economists misuse statistics
The Economist, **29 Jan. 2004, p71.**

The article begins with the following cryptic comment based on a variation on our quote for this issue.

> Figures lie, as everyone knows, and liars figure. That should make economists suspect, since they rely heavily on statistics to try and resolve a wide range of controversies.

The article goes on to discuss the misuse of statistical significance in many economic studies. We read:

> A failure to separate statistical significance from plausible explanation is all too common in economics, often with harmful consequences. In a past paper Professors McCloskey and Ziliak (1) attacked other economists' over-reliance on statistical rather than economic reasoning, and focused on one case in particular.

> In the 1980s, the American state of Illinois launched a programme to keep people off the dole. Economists asked whether its costs outweighed its benefits. One study estimated that the programme produced benefits that were more than four times as large as the costs. Although this seemed a good deal for taxpayers--and other tests seem to support this conclusion--the authors of the study rejected such a finding because they found that their estimate was not statistically significant. In other words, their results fell just short of 90% certainty--the usual, though ad hoc, rule of thumb for most economic work--of not being random.

> But far from this being an unusual case, Ms McCloskey and Mr Ziliak found that 70% of the papers published during the 1980s in the American Economic Review (AER), one of the most respected journals of the dismal science, failed to distinguish between "economic" and "statistical" significance. They relied too much on numbers, and too little on economic reasoning. Increasingly insignificant

> The two had hoped things might be getting better in recent years. The reverse seems to be the case. In their latest work, Ms McCloskey and Mr Ziliak looked at all the AER articles in the 1990s, and found that more than four-fifths of them are guilty of

the same sin. Indeed, so pervasive is the cult of statistical significance, say the authors, that ever more economists dispense altogether with the awkward question of whether the patterns they uncover have anything meaningful to say about the real world.

While this article is interesting, even more interesting, is the latest McCloskey and Ziliak article (2). The authors write passionately about their feeling that that statistical significance is widely misused especially in economics. There are lots of quotes from our heroes such as:

> William Kruskal, an eminent statistician long at the University of Chicago, an editor of the International Encyclopedia of the Social Sciences, and a former president of the American Statistical Association, agrees. "What happened?" we asked him in a recent interview at his home (William Kruskal 2002). "Why did significance testing get so badly mixed up, even in the hands of professional statisticians?" "Well," said Kruskal, who long ago had published in the Encyclopedia a devastating survey on "significance" in theory and practice [3], "I guess it's a cheap way to get marketable results."

Read the article and see if it changes your feelings about statistical significance!

REFERENCES

[1] McCloskey, Deirdre, and Stephen Ziliak. 1996. "The Standard Error of Regressions." *Journal of Economic Literature*, Mar 1996: pp. 97-114.

[2] Stephen T. Ziliak and Deirdre N. McCloskey. 2003, "Size Matters: The Standard Error of Regressions in the American Economic Review" (forthcoming, Journal of Socio-Economics).

[3] Kruskal, William S. 196a. "Tests of Statistical Significance." Pp. 238-250, in David Sills, ed., International Encyclopedia of the Social Sciences 14. New York: MacMillan.

DISCUSSION QUESTION:

At Coverwired.com you will find advice on which bets to make on for the NBA basketball games. From their past records you see that if you have followed their advice for the 2002-2003 season you would have won 56% of your bets. Assuming that you are going to bet in the 2003-2004 season, what considerations would you take into account in deciding whether to following their recommendations. In particular, would you require that their previous record be statistically significant? If so, would this be sufficient?

Finally, we have another insightful article provided by Myles McLeod.

Africa isn't dying of AIDS.
The Spectator, 13 Dec. 2003
Rian Malan

Rian Malan questions the mathematical underpinnings of HIV/AIDS computer models and "AIDS lobby" motives. As the title suggests, the topic is controversial, especially in African states.We read the article with an eye towards hearing Mr. Malan's allegations of statistics abuse in global HIV/AIDS policy decisions.

The Spectator magazine is no stranger to dispute. They have this to say about themselves:

> The Spectator was established in 1828, and is the oldest continuously published magazine in the English language. The Spectator's taste for controversy, however, remains undiminished. There is no party line to which our writers are bound - originality of thought and elegance of expression are the sole editorial constraints.

Rian Malan is no shrinking violet. In 1977, while working as a crime reporter in his native South Africa, he immigrated to America to dodge the South African military draft. Over a decade later, he stopped work on a book tracing his Huguenot ancestry in South Africa to instead publish a book on apartheid [1], and then returned to South Africa as the apartheid system fell. More details about Mr. Malan are available here. Not mentioned in the interview is that Malan is the great-nephew of Daniel Malan, described here by Infoplease.com:

> **Malan, Daniel François**, 1874-1959, South African political leader. A minister of the Dutch Reformed Church, he left the pulpit after the outbreak of World War I to become editor of an Afrikaner nationalist paper. Rising to prominence in the National party in Cape Province, he was elected to parliament in 1918. He served (1924ú33) as minister of the interior, public health, and education in the cabinet of J. B. M. Hertzog. After World War II, Malan's National party and the small Afrikaner party, campaigning on the issue of white supremacy, came (1948) to power with Malan as prime minister. His government initiated the racial separation laws known as apartheid. He retired as prime minister in 1954.

On to the article [2]... The contents are similar to an earlier Malan work [3] published in Rolling Stone Magazine shortly after 9/11. Both articles contain much rhetoric and many informal facts, but no formal citations. I will identify Malan's main themes, and then try brief examination of both with the benefit of alternate sources of information.

ANALYSIS

Summary of Malan's Theories.

> (1) Computer models may be overstating HIV prevalence.

> (2) Diseases such as malaria and TB are ignored in favor of HIV.

Computer models may be overstating HIV prevalence.

UNAIDS is a global joint venture of nine United Nations agencies:

- United Nations Children's Fund (UNICEF)

- World Food Programme (WFP)

- United Nations Development Programme (UNDP)

- United Nations Population Fund (UNFPA

- United Nations Office on Drugs and Crime UNODC)

- International Labor Organization (ILO)

- United Nations Educational, Scientific and Cultural Organization UNESCO)

- World Health Organization (WHO)

- [World Bank](#)

UNAIDS charter is to *help the world prevent new HIV infections; care for those already infected, and mitigate the impact of the epidemic.* UNAIDS produces annual HIV prevalence statistics for countries throughout the world and distribute epidemiological software and tools to anyone interested through their Web site.

African countries represent a significant challenge for those estimating disease statistics. Researchers determined the most efficient way to collect disease surveillance information was to focus on testing pregnant women at central health care clinics, termed 'sentinel antenatal clinics'. According to the UNAIDS Web site, statistics gathered from the 15-49 year old women frequenting these clinics in a number of countries serves as a good proxy for infection rates in the larger general population of males and females of all ages.

South Africa is one of a few sub-Saharan African countries with the highest HIV infection rates in the world. As expected, this fact sparked intense debate within South Africa - enough debate to spur the government to drop UNAIDS produced HIV prevalence statistics and models in favor of those created by the [Actuarial Society of South Africa (ASSA)](#). The numbers produced by ASSA are lower than those produced by UNAIDS, but their size and increasing trends offer no solace to skeptics. Malan remains unconvinced about the reliability of data produced or the tools used by both UNAIDS and ASSA.

As Malan ends his article, he reveals his motivation for writing the piece - to question the appropriateness of earmarking government resources to provide HIV antiretroviral drugs. A 2001Johannesburg newspaper article entitled [AIDS Arithmetic Won't Help Mbeki](#) [4] captures the sentiment of this debate within South Africa.

Back to Malan's assertion about model accuracy. The following graphics displays the HIV prevalence rate estimates among pregnant women that visit prenatal clinics.

HIV prevalence among pregnant women at antenatal clinics in South Africa, by age group: 1991–2002
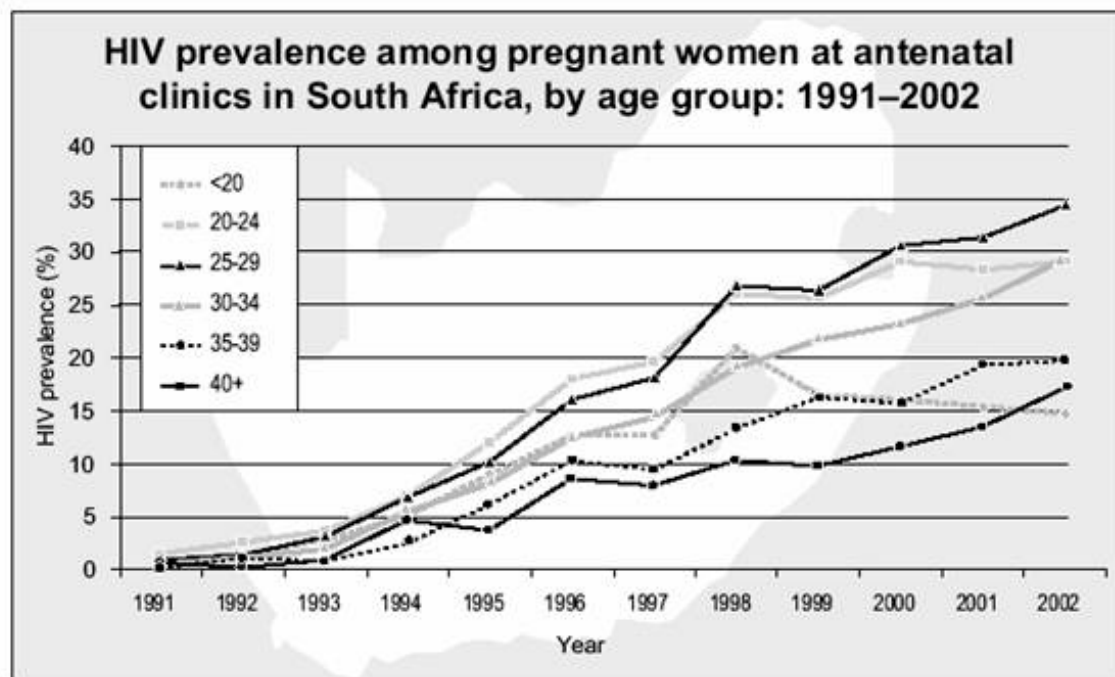
Source: Department of Health, South Africa

A recent WHO/UNAIDS document entitled ***Reconciling Antenatal Clinic-based Surveillance and Population-based Survey Estimates of HIV Prevalence in Sub-Saharan Africa*** [5]

shows the estimated HIV prevalence figure for all age and sex categories is about 15-16%.

> In **South Africa,** a national survey of people aged two years and over was conducted in 2002 (Shisana and Simbayi, 2002). The survey included a questionnaire and oral fluid samples were collected using the Orasure HIV-1 oral specimen collection device. Samples were tested in reference laboratories using a single Vironostika test. HIV prevalence among adults 15-49 years was 15.6%.

As mentioned previously, HIV prevalence rates for women visiting antenatal clinics serve as input for South Africa's ASSA2000 epidemic model. Here is a graph of those observed rates versus the ASSA2000 model's fit against those data (see *Aids Update 2002* [6]). The model's forecast graph fairly closely captures the observed trend in antenatal prevalence rates.
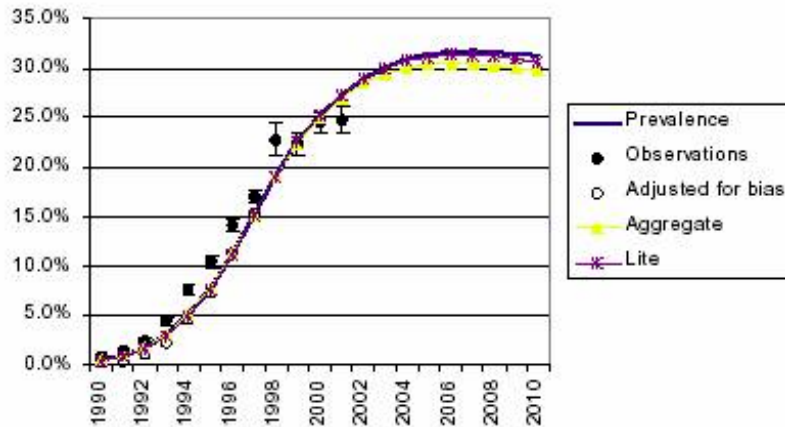
Figure 1. Comparison of ASSA2000 with antenatal prevalence rates

At this point, one might wonder how well the ASSA2000 model is able to extrapolate this antenatal prevalence rate data into prevalence projections for the larger South African population and how closely the model's projections compare to data from the national 2002 oral sampling.

We downloaded the ASSA2000 model and its instructions document from ASSA's Web site . The instructions document explains assumptions, a high-level model flowchart, algorithms, and step-by-step instructions to produce tables and graphs. Scenarios modeled can be of either "No Change" or "Change" types. The former models an epidemic where the disease runs its course with no intervention, that is no antiretroviral drugs given or behavior changes encouraged. The latter displays projections when corrective actions are applied. We ran a "No Change" scenario that resulted in an Excel spreadsheet with data for the period 1985-2015, a portion of which is reproduced below.

NO CHANGE SCENARIO	2000	2001	2002	2003
Numbers (total and infected)				
		45,768,984		
Total population	45,078,805		46,361,337	46,848,269
Total HIV infections	5,263,841	5,968,521	6,558,628	7,027,931
Total births	1,142,387	1,139,039	1,131,308	1,120,501
Births infected perinatally	58,048	63,880	67,984	70,644
Babies newly infected by mother's milk	16,259	18,289	19,780	20,794

AIDS sick

Total AIDS sick (in the middle of year)	236,228	334,253	453,352	591,088
Deaths:				
Non-AIDS deaths	387,667	392,447	396,537	399,954
AIDS deaths	139,009	194,892	262,209	339,500
Accumulated Aids Deaths (to middle of the year)	298,645	462,642	688,428	987,061
Prevalence rates				
Antenatal clinics	25.2%	27.3%	28.9%	30.1%
Women aged 15 - 49	21.5%	23.9%	25.8%	27.4%
Adult women (ages 20 - 65)	19.6%	21.8%	23.5%	24.9%
Adult men (ages 20 - 65)	20.5%	22.8%	24.7%	26.0%
		22.3%		
Adults (ages 20 - 65)	20.1%		24.1%	25.4%
Total population	11.7%	13.0%	14.1%	15.0%
Incidence rates				
Total new infections	892,241	851,175	810,891	774,173
Mortality statistics				
Life expectancy at birth	56	55	52	50
Maternal orphan statistics				
Total orphans (in middle of year)	493,846	555,684	636,876	739,576
Total AIDS orphans (in middle of year)	124,989	190,993	279,102	391,137

The model produced a projected overall population prevalence rate of 14.1% for 2002. The model's answer here is lower and so more conservative than the 15 to 16% estimate got from the 2002 door-to-door oral sampling.

This experiment did not produce figures to support Rian Malan's assertion the ASSA2000 model used in South Africa overstates HIV prevalence rates. In fact, the modeled outputs seem to match empirical data closely.

Diseases such as malaria and TB are being ignored in favor of HIV.

Malan's argument here is that he sees the problem of 350 million malaria infections and about 1 million malaria deaths as a problem more worthy of global aid than HIV. He further contends that spending on HIV outstrips that on malaria by 90: 1. Getting an answer here requires looking at the UNAIDS and The Global Fund Web sites. A quick check of recent UNAIDS press releases shows this 21 January, 2004:

> **WHO pushing to rapidly scale-up measures to fight TB and HIV.**
>
> **Collaborative approach to speed distribution of AIDS treatment and reduce spread of tuberculosis in high HIV prevalence areas.**
>
> 21 January 2004 | GENEVA -- The World Health Organization (WHO) announced today a plan to expand collaboration between national tuberculosis and HIV/AIDS programmes to curb the growing pandemic of TB/HIV co-infection, with a principal focus on Africa where 70% of the world's 14 million people who are co-infected live.

You can find the full press release here.

[Africa isn't dying of Aids](#)

[Aids in Africa: In Search of the Truth](#)

[Aids Arithmetic Won't Help Mbeki,](#)

[Reconciling Antenatal Clinic-based Surveillance and Population-based Survey Estimates of HIV
Prevalence in Sub-Saharan Africa](#)

[Aids Update 2002](#)

[malpractice](#)

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