



The **BEACON**

News from

The Coalition for Excellence in Science and Math Education

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In this issue: Scientific Advisors, Bill MacPherson—CESE Members Making a Difference (featuring David E. Thomas), Kim Johnson—Darwin Day, Dave Thomas—Book Review, *Darwin Day Collection One*, Amanda Chesworth—*Finding Darwin's God*, Book Review by Bill MacPherson—How (and how not) to Present Data, Walt Murfin—Book Review, *Deliver Us From Evil*, Tim Schuster, MD

SCIENTIFIC ADVISORS

There has been much comment in the news lately about federal and state governments' hiring of scientific advisors for their political leanings rather than their scientific expertise. I am told that both Republicans and Democrats have done this, but that does not absolve anyone's administration from the guilt of doing it. The public welfare requires that scientific advisors provide administrations with accurate, impartial advice on which to base decisions.

Whenever a potential appointee for a particular advisory panel, who may be considered an expert in his field, is questioned about his political opinions or his feelings about hot button issues unrelated to his field of expertise, and his answers to those questions become the basis for his rejection, the country loses the benefit of a valuable source of knowledge.

It seems that many administrations only want advisors who agree with their preformed opinions on matters and want the advisors to rubber stamp these opinions so as to provide a veneer of scientific respectability. Scientific respectability can only suffer as a consequence, as scientists come to be seen as the painted women of whoever is in power at the time. This can do nothing but hurt us in our attempts to get governments at all levels to accept our advice and to base their decisions on data rather than gut feel.

Of course, scientific opinion is not completely devoid of preconceived opinion, but only the

constant grinding of one opinion against another will produce the polished stone that is the pride of the scientific endeavor. Without dissenting opinion, the process will never produce anything greater, at best, than diamonds in the rough and, at worst, worthless dross.

It is up to all of us to react vigorously whenever scientific opinion is treated as mere window dressing, to be accepted or discarded based upon the political associations of the scientist proposing it. Scientific opinion on the other hand must be kept as free as possible from the pollution of political bias.



Bill MacPherson
CESE President

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CESE MEMBERS MAKING A DIFFERENCE

David E. Thomas, founding member and long-time board member of CESE has, as usual, been extremely busy. One could reasonably wonder when he has time to sleep.

- In addition to his involvement with CESE, he is President of New Mexicans for Science and Reason (NMSR) and also publishes their newsletter, a truly outstanding effort, and maintains their web site <http://www.nmsr.org> which includes a weekly update of Hot News in the world of science, and occasionally pseudoscience as well. Of course, Dave arranges for the outstanding speakers at the NMSR monthly meetings.

- He is a Fellow of the international Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) <http://www.csicop.org>, a consulting editor for their journal, *The Skeptical Inquirer*, and occasionally contributes an article. (In this connection, he is still receiving and answering mail generated by his article on the fallacious Bible Code mania. (Nov/Dec 1997 21(6)30-36 and follow-up entries: 22(1)13, 22(2)57-58, 22(6)16-17, and 23(5)12). Dave also has written a book review of the new sequel to the Bible Code, which will appear in the March/April issue.)

In addition to these on-going commitments, Dave also has shorter projects:

- He gave his Bible Code talk at a CSICOP conference in Germany in 1998.

- He has twice traveled to northern New Mexico to speak on the Aztec UFO hoax.

- He is currently carrying on another months-long on-line debate with a creationist, this time a Discovery Institute Fellow who is also a member of the Twin Cities (Minnesota) Creation Science Assn.

- Dave is assisting with his wife Pam's campaign (The Little Lady With Big Ideas) for reelection to the Los Lunas school board.

- His soon-to-be-published article for *Skeptical Inquirer* is a good job of slicing and dicing the recent Sci Fi channel's presentation on the Roswell UFO (again!) purporting to show through new evidence and sound archaeological techniques that something strange must really have crashed at this infamous spot in the desert.

Of course, Dave is doing what all good scientists would do if they had his energy and drive to set the scientific record straight: He is pointing out where purported science is *not* science and where people take license with facts to press their own agendas.

Oh yes, Dave does have a day job too! He is a full-time physicist/mathematician at Quasar International, Inc., working with frequency domain waveform analysis and computer

Continued on page 3

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implementation to automatically determine if material flaws exist in numerous parts for various manufacturers around the world.

He is a graduate of New Mexico Tech with a BS in Physics and an MS in Mathematics.

BEACON readers know that Dave also supplies us cartoons.

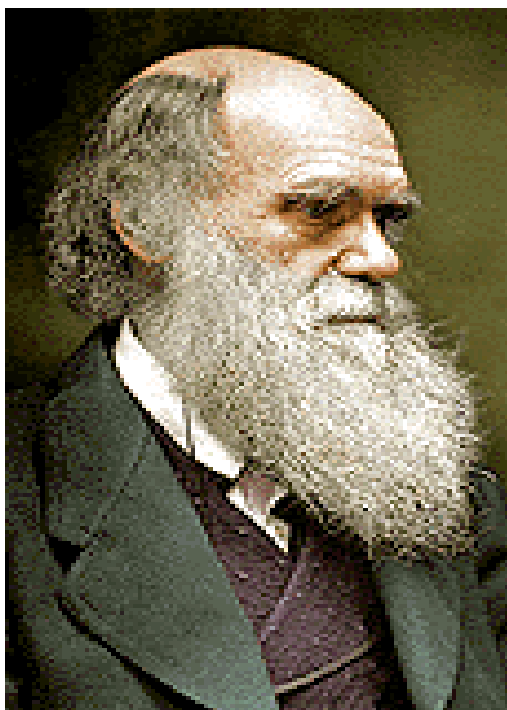
Finally, Dave still does his annual Juggling and Magic show to help Peralta Elementary School raise money. He got started doing this when his kids were in kindergarten at Peralta, and is still at it, even though his kids are now college age. ☞

DARWIN DAY

FREE—OPEN TO THE PUBLIC :

7:00 PM, WEDNESDAY, February 12th, 2003

New Mexicans for Science & Reason (NMSR) will celebrate Darwin Day with a special presentation on *Would My Career Be Different if Darwin Had Never Lived?* Our speakers are Spencer Lucas of the NM Museum of Natural History and Science, and Cosette Wheeler of the Molecular



Genetics and Microbiology division of UNM's Health Sciences Center. The meeting will be held in the New Mexico Museum of Natural History and Science Multi-Purpose Room. The meeting is Co-sponsored by the Coalition for Excellence in Science and Math Education. ☞

Dave Thomas

BOOK REVIEW

New "Darwin Day" book published courtesy of Amanda Chesworth, Program Director of the Darwin Day program.

(<http://www.darwinday.org>)

Darwin Day Collection One—the single best idea, ever

In the true spirit of celebrating the beauty of both science and humanity, we offer a smorgasbord of reading pleasure in one volume exemplifying the vast impact Charles Darwin and the theory of evolution have had across disciplines and among a diverse group of people.

Darwin Day Collection One is an anthology of fascinating subject matter gathered from some of the finest minds to be found within the human species. The collection contains contributions from many scientific and educational organizations, publications, and academic societies in the noble pursuit of improving the public's understanding of science and championing our shared humanity.

Darwin Day Collection One is the first in an annual series published by Tangled Bank Press (<http://www.tangledbankpress.com>). The book will be on display and available for purchase at the New Mexicans for Science and Reason Darwin Day event, 7 PM Feb. 12th, 2003, at the New Mexico Museum of Natural History & Science, and can also be reserved online at (<http://www.darwinday.org/tbp/collection-one.html>), where a table of contents is available for viewing. Contact Amanda Chesworth at

info@darwinday.org for more information.

The book features contributions by Richard Dawkins, Molleen Matsumura, Gary L. Bennett, Mark Ridley, Ian Plimer, Ian Tattersall, Massimo Pigliucci, Rob Beeston and Amanda Chesworth, Elliott Sober, Lawrence S. Lerner, Taner Edis, Kenneth Miller, Eugenie Scott, Steven Pinker, CESE member Dave Thomas, and many more. ☞

BOOK REVIEW

FINDING DARWIN'S GOD

By Kenneth Miller

Kenneth Miller is a world-renowned biologist and a man of faith. As such, his opinions are frequently sought to counter claims from the religious right that acceptance of evolution necessitates an atheistic philosophy. In addition to being a first-rate scientist and textbook author, Miller is an engaging and entertaining speaker. After hearing his talk at the New Mexico Academy of Science Centennial, I decided to read this book. While I have not been converted to believing in God, I can see that there is another side to Richard Dawkins' viewpoint that Darwin enabled a person to be an intellectually fulfilled atheist. Miller has allowed a person to become an intellectually fulfilled believer.

After spending about half the book thoroughly debunking Intelligent Design, which has rarely been done better, he gets to the point that interested me, and that was how he could be a believer and yet fully accept Evolution. Others have done it but not many have put down on paper how they reconcile their views. It seems that in Miller's eyes, Evolution was an absolute necessity for his belief in God. Evolution was God's way of allowing things to develop along his plan. The fact that, as Stephen Jay Gould has often stated, if you wound the tape of life backward and played it forward again it would not be the same the second time, does not bother him. Some creature would have come forward to be God's chosen and a soul would have been

imparted to that creature. It seems to him that there is progress in evolution and that progress is toward higher intelligence. (Many biologists deny this and state that the only determinant is toward differential survival and higher intelligence is only a freak occurrence. If a species had a good survival mechanism that enabled it to produce more offspring than its competitors, it would win the natural selection game and high intelligence would not have been a necessity.) To quote Miller, "The natural history of evolution is unrepeatable because the nature of matter made it unpredictable in the first place."

Miller states that quantum unpredictability is part of his belief in God and tells the story of Einstein's discomfort with anything being truly indeterminate. Miller cites Einstein's oft-quoted statement, "God does not play dice." He then quotes Neils Bohr's rejoinder to Einstein "Who is Einstein to tell God what to do?" It is the seeming randomness of evolution that turns off its frustrated opponents. What they don't seem to see is that being indeterminate is not the same as being random. It is not true that anything can happen at each stage of evolution but all the things that happened in the past influence everything that happens in the future. Again quoting Miller "What the critics of evolution consistently fail to see is that the very indeterminacy they misconstrue as randomness has to be, by any definition, a key feature of the mind of God. Remember, there is one (and only one) alternative to unpredictability- and that alternative is a strict, predictable determinism...Caught

between these two alternatives, they fail to see that the one more consistent with their religious beliefs is actually the mainstream scientific view linking evolution with the quantum reality of the physical sciences."

Quantum physics does not prove the existence of a supreme being of course, but according to Miller, it does allow for one in a very interesting way. It excludes the possibility that we will ever gain a complete understanding of the details of nature. According to Miller, "We know there is a boundary around our ability to grasp reality. And we cannot say why it is there. But that does not make the boundary any less real or any less consistent with the idea that it was the handiwork of a Creator who fashioned it to allow us the freedom and independence necessary to make our acceptance or rejection of His love a genuinely free choice."

Miller's form of religion has no place in it for Deism, which he feels is a "God of the gaps" philosophy, explaining what science can't. The gaps keep getting smaller and smaller, so the room for God keeps getting smaller along with them. God, by Miller's view, is an active God and not confined to things that can't be explained. It is interesting that almost all sides of the question reject a Deist God. All would agree that the way things work today is fully consistent with a materialist view of biology that results from contemporary studies of life. To quote Miller, "(creationists)...regard.. those very same mechanisms... as inadequate to explain His agency in the past." There is an inconsistency in the Creationist argument here.

HOW (AND HOW NOT) TO PRESENT DATA

Miller is, as one would expect, a proponent of the Anthropic Principle. It states that all of the constants of the universe are uniquely fine tuned to allow the development of life. Many scientists do not like the implications of the Anthropic Principle and go to extreme lengths to propose other possible scenarios for the development of the universe including alternate universes, unknown to us, that have slightly different physical constants and where life was not inevitable. Miller discusses the ideas of Daniel Dennett and states that while he (Dennett) disagrees with the Anthropic Principle, his disagreement is so strong that he inadvertently reveals the strength of the Principle in the process.

To me the value in this book is that proponents of Evolution do not have to become defensive when religionists of the hard-core Creationist stripe say, "Of course you believe in Evolution, you're an Atheist." I would first start by saying "I don't believe in Evolution, I accept it as an established fact, backed up by mountains of evidence, and you don't have to be an atheist to accept the truth of Evolution." And you would have Dr. Miller's book to back you up. Of course you can't be a biblical literalist and still accept Evolution, but if you believe in God you do not have to yield the field to biblical literalists.

Bill MacPherson



Now that we have had a few tutorials on gathering and manipulating data, we're ready to present it to others. Even if you don't personally make presentations, you should learn to recognize the most common methods. Most viewers are not mathematically sophisticated and we don't want to confuse them with a lot of abstractions. On the other hand, we should present enough so that knowledgeable viewers can judge the quality. The presentation has to be both clear and scrupulously honest. Sometimes those goals are not compatible. For simplicity, let's confine this to test scores, although the concepts are applicable to any kind of data.

Here's an example of a presentation that's simple, but thoroughly dishonest. It is intended to show that Anglo scores are higher than those of minorities. Because the scales are omitted, it's impossible to tell how much higher. Just looking at the chart, you might think Anglo scores were more than double those of minority students. Whenever you see a chart like this, be suspicious of the presenter's motives.

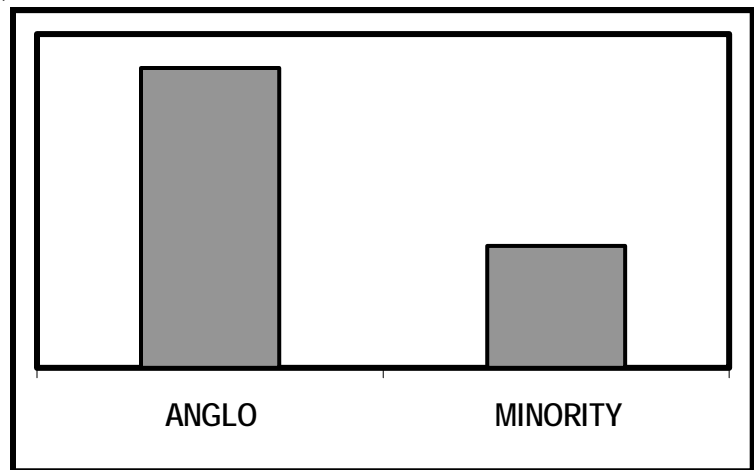


Figure 1

We could present the data in a table. Now we're being more honest, but not very clear. You can see that Anglo scores are higher than minority scores. However, it doesn't tell us whether the difference is large compared to the spread of scores within ethnic groups.

6 TH GRADE STATEWIDE TOTAL SCALE SCORES		
ANGLO	HISPANIC	INDIAN
675.3	652.8	642.9

Figure 2

We can show a plot of the distribution of scores. Now we have probably given some viewers more information than they can

absorb. Still, this is a good presentation, as long as you're willing to explain the meaning for those who didn't grasp it. Someone is certain to notice that the curve for Indians goes higher than the curve for Anglos. That is not easy to explain to anyone who does not have a fairly firm grasp of mathematics. You have to point out that scores are on the horizontal axis. Probably it is hopeless even to attempt an explanation of "probability density." At least, we have now put the really essential information on the figure. One important point: the figure shows that some Hispanics and Indians do better than most Anglos. We don't see this when we look at averages.

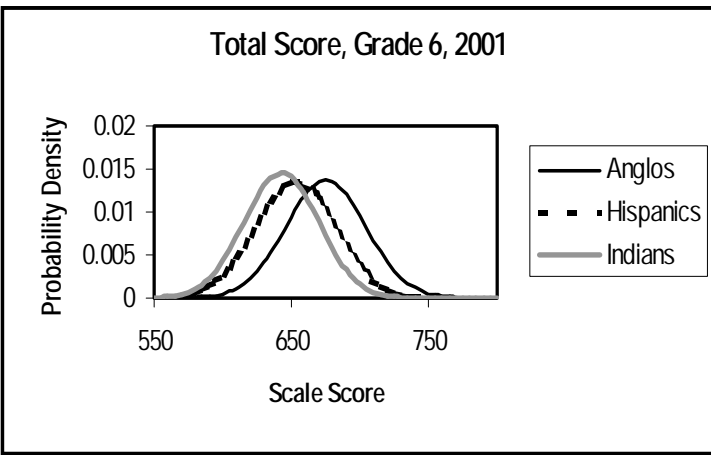


Figure 3

We could make a simple line plot that shows values. However, you all know that data – even for simple phenomena – is unlikely to fall into a perfect line. The plot shows that average grade equivalent decreases as the fraction of minority students increases. You should bear in mind

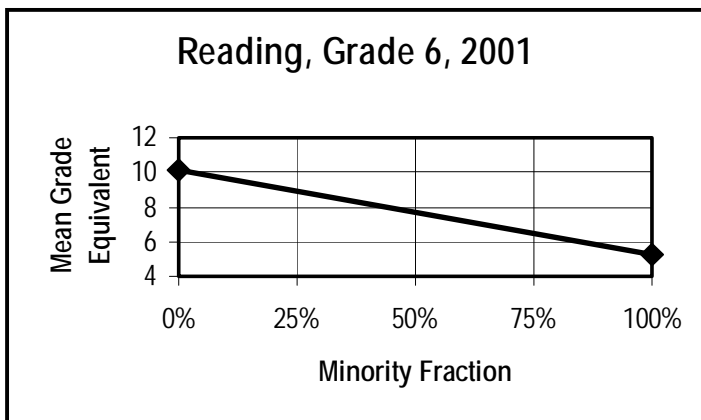


Figure 4

that most people do not understand the concept of "grade equivalent." You will have to explain this carefully. We need to let people know that the national average is 6.6 in this case.

It is more honest to show all the data points, so that viewers can see that relationships like this really aren't so simple. Each point on the next plot is the average score for one school. This shows that some schools with few minorities did worse than we might expect. Some schools with many minority students did much better than we might expect. This is a point that not many people seem to grasp, and it is important. We would need to bear down on this heavily for our explanation of the figure.

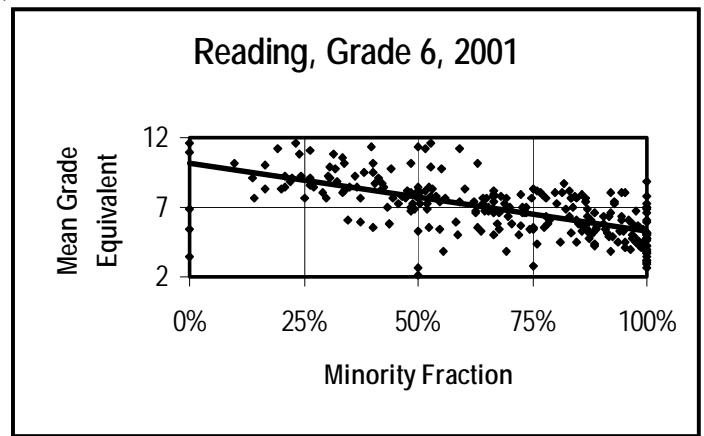


Figure 5

We'd like to show how the minority fraction compares to other demographic variables. There is a method that is powerful, but hard to explain to an unsophisticated audience. We have to use terms like "variance." You could probably tell people it's a measure of the scatter of data. You tell them that several variables affect the data. Part of the spread of data is associated with (for this case) the fraction of minority students, and part is associated with the fraction of students in poverty. We can separate these effects mathematically. We represent each fraction by the area of a circle. The next figure (Figure 6, following page) shows real data for the TerraNova tests given in spring 2001.

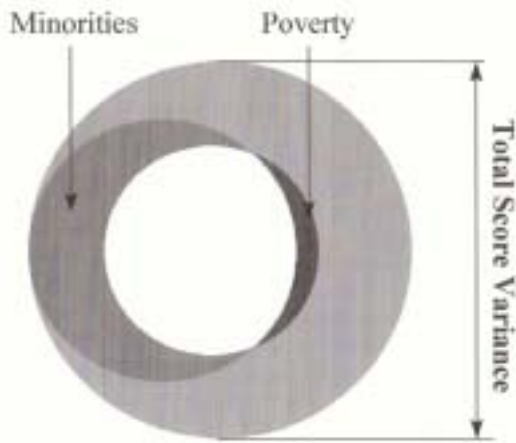


Figure 6

With this type of presentation (a “Venn Diagram”) you can point out the considerable area outside the minority and poverty circles; there is plenty of room for growth. You can show the relative effects of each. You can point out that the circles overlap, and you can say that the reason is that minority students tend to be poor. The result of the overlap (the white area) is that poverty, although apparently important, has far less actual effect than does minority fraction.

Data can be presented in many ways. Some are simple, but deceptive. Some of the more complete methods need intensive explanation. Some methods will probably not be understood by everyone.

And now maybe you have a better idea about how *not* to lie with statistics.



**Walt Murfin
CESE Statistician**

BOOK REPORT

Deliver Us From Evil

by CESE member Louis Wynne
published in 2002 by 1stBooks.com

Torture of the most appalling sort has become a commonplace of the 21st century world although most Americans leading insulated lives do not want to know about it or think about its vast implications. Capt. Tom Fresquez, Wynne’s Hispanic anti-hero, blunders into this physically and spiritually excruciating conundrum.

As a cautiously correct U.S. Air Force officer Fresquez has already sacrificed most of his individual identity to buy into the American dream of respectable conformity when he unwittingly becomes the focus of a murderous cabal of foreign terrorists who happen not to be Islamic. Not only does he know too much, but though an intelligence officer, Fresquez still doesn’t realize what it is that he does know. When the most skilled torturer of the terrorist group deftly drives Fresquez into insanity he is left to the tender mercies of our own state-sponsored “mental health system.”

Why the terrorists, and indirectly our author, the former intelligence officer and experienced clinical psychologist, Dr. Louis Wynne, leave antihero Fresquez alive but incapacitated instead of finishing him off along with his secret is the deepest riddle of this disquieting work of near-fiction. After working professionally with the author, this reviewer suspects that Dr. Wynne is presenting us with an allegory, a modern Pilgrim’s Progress in which Everyman struggles not with Sin but with that even more seductive principle, Conformity.

This struggle is the theme uniting the three worlds that we vicariously experience in this enthralling first novel. These are the equally insane worlds of the psychiatric establishment, the military bureaucracy, and the surprisingly conformist world of international terrorism. Wynne dissects all three with irony while keeping the reader involved in the unfolding action.☐

Tim Schuster, MD
Albuquerque, NM



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in Science and Math Education
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Notes:

DARWIN DAY 7:00 pm, Wednesday, February 12th, 2003

New Mexico Museum of Natural History and Science, multi-purpose room,
Free and Open to the Public (See Page 3.)

E-Mail missing? Send new address to Marilyn Savitt-Kring <mmkring@juno.com>.

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