National Capital Area
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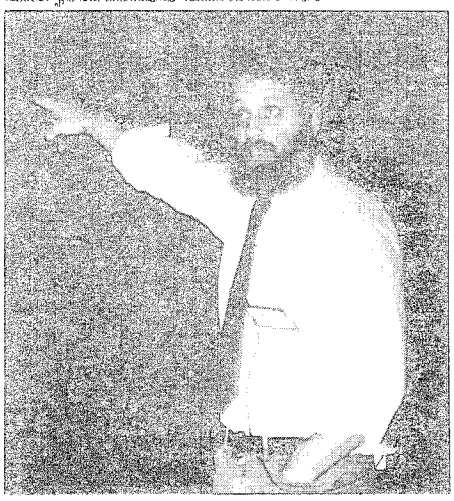
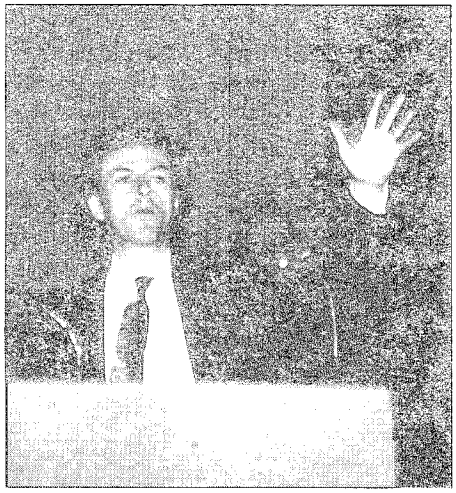
Zimmerman: Leaders and journalists illiterate too



Paulos: Holding innumeracy accountable



Scientific Literacy Called National Imperative

"Critical thinking is critical to the national interest and national security," declared Paul Kurtz in opening the leadoff event at the 1990 CSICOP Conference on "Critical Thinking and Scientific Literacy." Science in American schools is not being adequately taught, according to the University of Buffalo philosophy professor and CSICOP chairman. Both students and adults are unable to distinguish between science and pseudoscience, astronomy and astrology, scientific medicine and holistic medicine. "It is appalling that there is no balance in the media, that the president's wife consults an astrologer, that a senator can be inspired by Uri Geller."

Scientific literacy and critical thinking go hand in hand, said Kurtz. Crucial to greater public understanding of science are widespread understanding of its methods, of the use of logic and evidence, that absolute certainty is not possible. "Critical thinking must be higher on the agenda of American education," he concluded.

Three panelists fleshed out Kurtz's thesis of widespread ignorance. Michael Zimmerman, a biology professor at Oberlin College, picked up on Kurtz's theme by asking, "How are people who think the world was created 4,000 years ago going to respond to predictions that the earth will increase in temperature within the next few decades?"

The biologist used data from a study he had conducted to show how widespread scientific illiteracy is. Almost 40 percent of elected officials in Washington did not disagree strongly with creation science, and a full 80 percent of Ohio legislators felt similarly. Either number is too large, Zimmerman said, but the greater ignorance among the legislators shows why creationists target local officials.

Zimmerman ran down a list of other questions in his poll that showed large numbers—usually majorities—of federal and state officials failed to disagree strongly with the idea that dinosaurs were contemporaneous with humans, that the earth is less than 20,000 years old, that aliens built ancient monuments, that communication with the dead is possible, that psychic means can be used to predict the future, and that astrology is accurate.

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Annual Conference Comes to Capital for First Time

By Stephen R. Dujack

At a time when some of the most critical issues of the day involve science and public policy, the 1990 CSICOP Conference—held in the nation's capital for the first time—concentrated on "Critical Thinking and Scientific Literacy." For three days in late March and early April, skeptics from around the country came to the Hyatt Regency Hotel in Crystal City to hear debates and discussion on the need for greater public understanding of problems ranging from declining standards in science education in the American classroom to the difficulty citizens have in grasping topics ranging from evolution to the Copernican system to global warming.

If Joan Quigley had come to town, her appearance would have made the front page of the *Washington Post's* Style section. Sadly, only a handful of newspapers—the *Post* conspicuously missing among them—chose to cover the CSICOP conference, despite the appearance of noted scientists such as aerospace inventor Paul MacCready, bestselling author James Paulos, and the head of the recent National Academy of Sciences examination of paranormal phenomena, Ray Hyman. The conference sessions were tremendously useful, challenging, and edifying—particularly the talk by the only parapsychologist on the program to show up, former Princeton School of Engineering Dean Robert Jahn—but the public at large will never know.

That is unfortunate. Although I doubt that Senator Claiborne Pell—who failed to appear to defend his support of research into military and intelligence applications of psi—would halt his activities if they were exposed more to the

(Continued on page 2.)

NCAS encourages the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view, and disseminates factual information about the results of such inquiries to the scientific community and the public.

NCAS does not reject claims on *a priori* grounds, antecedent to inquiry, but rather examines them objectively and carefully.

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Address NCAS Inquiries to:
D. W. Denman
8006 Valley St.
Silver Spring, MD 20910
(301) 587-3827

Newsletter address:
Stephen R. Dujack
5820 Doris Drive
Alexandria, VA 22311
824-0854

President's Column

Thanks to All of You!

By Chip Denman

If you were at the CSICOP Conference—or even if you are only reading about it here in this special issue of the ***Skeptical Eye***—you probably can guess that a lot of effort went into making it happen. Much credit goes to these members who gave their time and energy to make the weekend a success:

Harvey Alperin	Bing Garthright	Edward Larson	Lee Rickard
Jack Balaun	James Glanville	Pete Lins	Walter Rowe
Steve Brinich	William Gormley	Larry Littig	Melanie Scott
Mary Cadette	Karen Gray	Randy Lockwood	Lys Ann Shore
Michael Cakora	Sharry Hamaski	Patti Maslinoff	Steve Shore
Keith Cramer	Edith Hebblethwaite	Doug McNeil	Jon Slobins
Grace Denman	James Hebblethwaite	Sean O'Niell	Scott Sugarman
Mike Epstein	Joe Himes	Eugene Ossa	Jamy Swiss
Herb Ferderhen	William Jones	Pat Paul	Jake Warner
Deena Flinchum	Pam Kogan	James Prizant	Martin Wooster
Lynn Francis	Kevin Krause	Brian Rennex	

I would like to single out a few people whose extraordinary efforts seemed, well, paranormal:

Karen Gray practically lived at the registration table for the entire weekend; I'm not sure that she made it to any of the regular sessions. Similarly, Grace Denman was a permanent fixture at the NCAS booth; she was probably the one who sold you your t-shirt and "Prove It" button.

Jamy Swiss worked closely with CSICOP's Tom Flynn and with Penn & Teller to arrange for the visual and sound support so the rest of us could see and hear at every session. Never before has CSICOP had such a professionally engineered setup. (And thanks to Penn & Teller for donating special funds to rent the high-quality public-address system.)

Mary Cadette lent her experience as a stage manager. Mary, a member who had not previously been active in our events, was a hardly noticed ghost at every session who made sure that the microphones, mixers and amps, lights, and projectors were actually working. Even at the banquet she was tweaking equipment while the rest of us relaxed.

And more than anyone else, Gary Stone was personally responsible for the good face that NCAS showed for the conference. Gary put in a tremendous amount of effort beginning weeks before and continuing right through the final session. CSICOP Executive Director Barry Karr told me that this was the smoothest conference to date; the credit goes to Gary.

Thanks to all of you! ❑

Conference, from page 1

media spotlight, or that citizens would suddenly find the Reagans' use of astrology in state decisionmaking more than a harmless conceit if they could read about astronomer Andrew Fraknoi's debunking of that pseudoscience, the conference's sessions transmitted an important message. The future holds challenges that can only be solved by leaders and an electorate who understand that basic science is basic to the habitability and functioning of the world in which we live—and that we as a nation are failing to make the grade in achieving the necessary scientific literacy.

Since NCAS was the host of the conference, many of our members were busy running events, selling buttons, books, and tee-shirts, or helping out in other ways—not to mention swarming around the conference on trends in finger-nail decoration one flight up—and because some sessions ran concurrently, and some members simply couldn't come at all, we present this special issue of the ***Skeptical Eye*** with to fill in those gaps and to illustrate that for three days in early spring, reason was in the ascendant on at least one bank of the Potomac. ❑

The Quandary of Research on Animals

By Neil L. Inglis

One of the most prominent environmentalist slogans in Britain in the 1970s was "Eat Less Meat—Save Grain For The Starving!" At the time, some college sophomores proposed converting this into "Eat More Meat—Let The Starving Eat Grain!"

With derisive remarks like these, it's not hard to see why the fur really flies at public forums on vegetarianism and animal rights. At the Saturday afternoon session on animal rights, leading antivivisectionist Donald J. Barnes set the tone early on when he labeled the word "meat" as a euphemism and insisted that "flesh" be used in its place.

Lockwood: Stresses the three Rs

A former laboratory researcher who worked with monkeys, Barnes came to believe that animal experiments were worthless and indefensible—a view he now expounds frequently in his capacity as director of the Anti-Vivisection Society's Washington office. Speaking with the fervor of the converted, Barnes told of "a morning stroll" with his "companion animal"—his expression for pet—during which he had lifted worms from the sidewalk, and cradling them in his hands, replaced them gently on the grass. Humane treatment of animals is a moral imperative for Barnes, and he finds it tremendously liberating not to have to eat flesh, to crush worms on the sidewalk, to wear furs for vanity, or to inflict pain on animals in the laboratory.

In rebuttal, Richard L. Melvin, a professor of physiology at the University of Michigan, argued that refraining from animal research was itself immoral. With the aid of several slides, Melvin invoked a host of ancient scourges for whose eradication animal research takes much of the credit: the "iron lung" wards of yesteryear; an Asian polio victim, waddling on all fours in a wretched Third World bazaar; shriveled, acetone-breathed infants in the era before insulin injections.

Alas, vivisection's impressive track record cuts little ice among the various gatherings Melvin addresses. After one such talk, he recalled, a little girl had written to condemn him for his "needless, murdering torture of innocent animals."

Steering a middle course between these rocks was NCAS's vice president, Randall Lockwood, director of the Higher Education Program at the Humane Society of the United States. Lockwood outlined his organization's sensible, mainstream policies on the use of laboratory animals, stressing the "Three Rs": Replacement, Refinement, and Reduction of animals in research. Lest audience members imagine that lobbying organizations had gained nothing with their efforts, Lockwood displayed an embarrassing pesticide advertisement from the Eisenhower era ("DDT is good for me-e-e!!!")—a useful reminder of the sloppiness and ignorance of humanity's relationship with the rest of the animal kingdom in the past.

Standards are much tougher now. Animal research is governed by a strict regulatory system encompassing unannounced lab checks and multilevel review. Melvin outlined what he views as the grim approval process in force at the University of Michigan, where research proposals must negotiate a course through review committees that sometimes reject proposals on slender grounds. Two anti-vivisection groups prowl the hallways and scrutinize every protocol for flaws. As if this weren't bad enough, he said, there are the mountains of paperwork to fill out.

These and other incongruities of the animal rights controversy were much in evidence throughout the session. Franklin Loew, dean of the School of Veterinary Medicine at Tufts University, imagined a grubby specimen of *Rattus norvegicus* lurking in a gutter two feet outside George Washington Hospital, at constant jeopardy from rat poison, while his cousins snuggled in their cages two feet inside the hospital, enjoying a range of safeguards vouchsafed to few creatures, human or otherwise.

Barnes proved himself a master of such inconsistency. In Mexico, he had seen a scrawny cat attempt to plunder a bird's nest while being divebombed by the mother. In pondering with which creature his responsibility lay, he had decided it was with neither. In nearly the same breath, Barnes assailed recent experiments in which bullets have been fired into cats' skulls to study their healing mechanisms. Barnes concluded that animals should be allowed to follow their own behavior patterns within their own domain, yet would insist that they should not be dragged kicking and screaming into ours. Are Barnes's views gaining headway? When confronted with opinions polls that suggest qualified public support for animal research, Barnes quipped that a majority of the public also believes the sun to revolve around the earth.

Barnes's presentation was the most thought-provoking and disturbing of the session. He is not the only person using emotive language to make his point (animal research lobbies "wheel in" dying children as the alleged victims of research cutbacks; witness Charlton Heston's appearance in a brochure published by an organization called The Incurably Ill for Animal Research). And without doubt, the scientist's ambivalence toward the public seemed less foolish after one audience member described petowners who have animals exterminated—simply because the pets don't match their drapes.

As this and other episodes proved, the animal rights controversy is a grim and cheerless business; in the words of opening speaker Larry Horton, vice president of public affairs at Stanford, the data are contemporary but the fundamental arguments have remained unchanged since the animal rights movement began in the 19th century. ❑

Hyman Wins Debate by Default

University of Oregon Psychologist and CSICOP Fellow Ray Hyman handily won his Saturday debate against Claiborne Pell because the so-called "New Age Senator" failed to show up. Actually, conference planners had long expected that the chairman of the Foreign Relations Committee, perhaps the highest-ranking proponent of government research into the paranormal, would be replaced at the last minute by his aide Scott Jones. But Jones too begged off, citing an injury to his wife's ankle.

So Hyman held forth for nearly an hour without notes about his experiences as chairman of the National Research Council's subcommittee on parapsychological research, part of a broad-ranged study into various techniques for "making super people," as Hyman put it. The council's findings were published in book form in 1988 by the National Academy of Science, and the subcommittee is continuing to evaluate work in parapsychology.

Hyman: Sticks pins in official paranormalists

Hyman noted with some amusement that numerous officials in the military and intelligence communities, along with legislators and members of the executive branch, were worried that the Soviets are 25 years ahead of the United States in paranormal research for national security—a "psi gap." Several high-placed officials told him that if he could only see the classified data that the government possesses, he too would be convinced.

Well, Hyman got the necessary clearances and reviewed the information. "There was nothing there other than what you might have read in the *National Enquirer*, and nothing new." He wondered about the secrecy, since all the material he saw was already in the public domain.

Nonetheless, military and intelligence people believe that the Soviets can gather information at a distance, hypnotize soldiers from afar, and even kill human beings with mind waves (so far, fortunately, they only seem to have had luck with frogs). They are worried that the Soviets are developing "psychotronic weapons" to confuse the minds of our soldiers.

The subcommittee concluded that 130 years of research into the paranormal had failed to produce any verifiable results. That finding, however, is unlikely to change the minds of our leaders who believe in psi—including 20 percent of Congress, according to an article in *U.S. News & World Report*. For his part, Pell has charged that the study was a misappropriation of government funds because it was led by a noted skeptic.

Policymakers who push most strongly for research into this area are not armed with studies and data but, rather, have had

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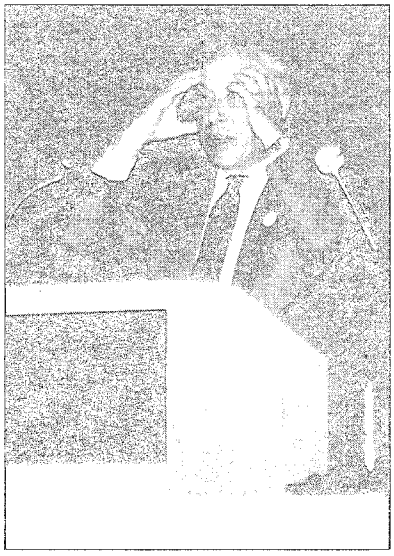
Klass Gives Classic Exposé

NCAS's own ufologist Philip J. Klass had his audience howling with laughter during his Friday afternoon session titled "Everything You Ever Wanted to Know About UFOs but Were Afraid to Ask."

Klass began his talk with a quick history of UFOs, starting in the late 19th century through the rise of the modern UFO movement in the late 1940s. At that point, a security conscious U.S. government began its Project Blue Book study, which, although it came up with nothing, convinced many in the public that there must be something to the sightings or the Air Force would not be investigating them. The fact that the study was classified at first further spurred public belief.



Klass: Wards off UFOlogists with wit and wisdom

Finally, in 1967 scientist Ray Hynek decided to do a comprehensive investigation and formed an independent study group—The Hynek Center for UFO Studies. Hynek declared at the outset that within a year he would have incontrovertible evidence, or there would be no reason to believe in the existence of extraterrestrial visitors. Ten years later, the most impressive evidence concerned the supposed incident at Rozwell, New Mexico, where a spacecraft had purportedly crashed and the government had taken its dead pilots into custody. Klass said that the Rozwell evidence fails to stand up to scrutiny.

At about the same time, the leading pro-UFO group, NICAP, was careful to exclude persons who claimed multiple sightings, trips aboard saucers, communication with aliens, and hoax photos. Today, however, the leading UFO groups have cast aside these cautions.

Meanwhile, UFO books of all stripes continue to be published and sell well. One of the most recent is *The Gulf Breeze Sighting: The Most Astounding UFO Sightings in U.S. History*, published by the large New York publisher William Morrow. Morrow, which paid Ed Walters and his wife, Frances, a reported $200,000, originally had a title declaring that the book—containing numerous photos by Ed and Frances—was positive proof of UFOs. The publisher changed the title after a NASA scientist determined that the photos were faked, but Morrow published the book anyway.

The Walters book violates all the precepts of the early pro-UFO movement: it contains multiple sightings, trips, communication with aliens, not to mention the hoax photos. Klass displayed slides of several of the photos from the book, each of which was greeted by chortles from the audience. The Walters' saucer looks like a Victorian street lamp, or perhaps one of those

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Jahn Only Anomaly at Conference

Despite the fact that University of Hawaii professor Victor Stenger asserted that, at present, there are no anomalies in science, fellow panelist Robert Jahn proved to be an anomaly at the convention: he presented evidence supporting paranormal phenomena. Jahn, now dean emeritus of the School of Engineering at Princeton, has been pursuing this muse for 12 years, since a student suggested a rigorous investigation of whether psychokinesis and remote viewing are possible.

Jahn: A need to redefine scientific replicability

Jahn began his presentation by projecting a slide of a cartoon in which a dragon addresses an audience of knights in shining armor: "To begin with, I would like to express my sincere thanks and deep appreciation for the opportunity to meet with you. While there are still profound differences between us, I think the very fact of my presence here today is a major breakthrough." Jahn indeed has become one of the few in the field to enjoy the respect of skeptics and believers alike, and his presentation of data from two large experiments from his Princeton Center for the Study of Anomalies was met with, well, respectful skepticism. This dragon deserves credit for defending his thesis in the CSICOP lion's den.

Which is not to say that he has proved the existence of paranormal phenomena. What he has shown, however, is that it is possible to collect a vast body of data in which subjects try to produce psychokinetic effects, and that the data can vary from chance by a minute, though statistically significant, amount. Though later questioning revealed that his principal experiment, involving efforts by humans to influence a random number generator, had used just two subjects to produce nearly a third of the thousands of trials he had recorded, and though he declared that his results had not been replicated because the equipment is too costly, there is no readily apparent prosaic explanation for his findings.

Jahn has indeed made efforts to avoid the pitfalls of predecessors such as J.B. Rhine, who was undermined by fraudulent collaborators, and Russell Targ, whose protocols have been challenged, who had problems with missing data, and whose random number generator experiments have been dismissed because the numbers were not truly random. Jahn uses a $100,000 device to generate numbers of a high degree of randomness; he has taken care to invite skeptics to inspect it; he says it is calibrated regularly; he appears to have been scrupulous in maintaining records of all data; and the experiments are double-blind.

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Critical Thinking Critical to Education

In an age dominated by critical scientific issues ranging from global warming to nuclear waste disposal, a panel of scientists chaired by the venerable Paul MacCready was unanimous in concluding that the American educational system is not teaching students the critical thinking skills needed to face these challenges.

The most interesting speaker in the Friday afternoon session on "Critical Thinking in Public Education" was Anton Lawson, a professor of zoology at Arizona State University. He showed the audience an innovative method for teaching scientific reasoning to children that has already had demonstrated success in the classroom.

Schrock: Criticizes critical thinking courses

As an example, Lawson showed a page with three rows of line drawings. The first row was labeled "All of these are Mellinarks"—an abstract shape—the second, "None of these are Mellinarks," and the third, "Which of these are Mellinarks?" Students who look at the first row can quickly pick out two characteristics that seem to be common to all of the figures, but on examining the second row discover that two of the figures (known to be non-Mellinarks) also share these characteristics. This forces the student to go back to the first row to find a third characteristic also common to Mellinarks that is not present among the non-Mellinarks. That done, the student can pick out which figures in the third row have the necessary attributes of the Mellinark.

Simply put, this is the hypothetico-deductive method, where explanatory hypotheses are formed, tested, modified (or discarded) if necessary, and tested and modified again and again until they explain all the known data, then are used to solve other problems.

Those who are unable to solve simple problems of this type are unable to understand scientific reasoning, Lawson said. Fortunately, finding the Mellinarks is like puzzle-solving fun for children, who end up using logical reasoning without realizing it.

Unfortunately, critical thinking can have its pitfalls, according to Richard Schrock, an assistant professor of biology at Emporia State University. He warned against what he called "premature speculation"—thinking that goes awry because it is based on insufficient evidence—which he claimed often occurs in course materials that attempt to foster critical thinking.

The solution, he said, is to move students away from textbooks out into the real world, where they can no longer give textbook answers to textbook questions.

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NCAS President Chip Denman, Penn Jillette, and Jamy Swiss

Remote

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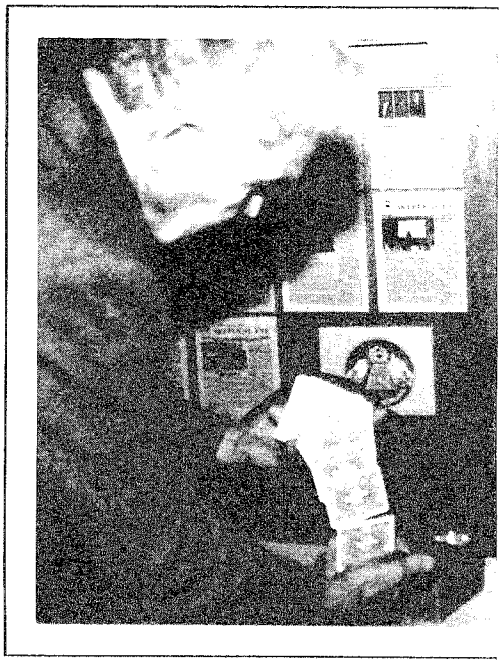

NCAS Treasurer Grace Denman has trout

iller holds gas can well away as Penn lights up

Views of

Conference

CSICOP Chairman Paul Kurtz makes sure tableware doesn't bend as Randi speaks

e picking a card

Penn sees colors in spinning black-and-white disk

AU President Declares Future Belongs to Teachers

The United States is "a nation at risk" because of poor education, outgoing American University President Richard Berendzen told the diners at the convention's closing awards banquet.

America's dropout rate is the highest in the industrial world, a fifth of the adult population cannot read, teen pregnancy is twice that of any comparable country, Berendzen said. Echoing many of the themes—and statistics—cited the previous night by keynote speaker Gerard Piel, the astronomer and academic faulted the U.S. educational system, which still revolves around a calendar based on an agrarian society.

Berendzen: Science illiteracy places nation at risk

As examples of scientific illiteracy, Berendzen noted that 21 percent of the populace believes that the sun orbits the earth, only 45 percent know that a year is based on an astronomical process, and only 43 percent know that electrons are smaller than atoms.

He agreed with Piel that too many teachers present science as an established body of fact, and echoed his complaint that "no one is in the pipeline" to replace today's generation of scientists. The United States could have shortage of half a million technologically qualified professionals by the end of the century, he said.

He also criticized the media for failing to educate the public. Berendzen took a sharp jab at Time-Life Books for its series on the occult, which he labeled "disinformation." He faulted the *Washington Post* for printing astrological predictions every New Year's.

He closed by recalling the words of Christy McAullife, the teacher who died in the *Challenger* tragedy. At first he had wondered why a teacher should be sent into space. When he met her, he put the question to her. "I touch the future," she said. "I teach."—*S.R.D.* □

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20910

Piel Sounds Appeal for Sputnik-era Science Education Effort

Noting that the annual CSICOP conference was being held in the nation's capital for the first time, keynote speaker Gerard Piel said that scientists "are ready to put our money and time where [George Bush's] lips are." Piel noted that Washington of late has not been the scientific capital, citing funding for military research on the paranormal, the technologically improbable Star Wars program, and the fact that until recently the presidential schedule was set by an astrologer.

Piel: Time to liberate science and math teaching

Piel, who was editor of *Scientific American* for 30 years and president of the American Association for the Advancement of Science, went on to deplore the state of science teaching in the United States. "Science is not being taught; facts are being revealed." Only one-third of American high schools have three years of required science, and only one-fifth teach physics. "We have to revive that moment in 1957 when President Eisenhower proclaimed the National Defense Education Act" in response to the Soviet Union's launching of the first Sputnik.

He noted that the United States has since fallen behind its competitors. In Japan, for instance, students spend twice as many hours in school. He deplored the fact that of the $200 billion annual expenditure on schools, only $1 billion goes toward teaching materials. He criticized textbook publishers for giving in to creationists by leaving out material on evolution. He said that standardized tests have forced educators to concentrate on facts rather than an integrated program including laboratory work.

The result has been a renewed case of national scientific illiteracy. The media fail in their role to inform the public. Pressure groups distract by substituting feeling for thinking. Ultimately, no national consensus has emerged on energy policy, environmental protection, disarmament, and other critical issues.

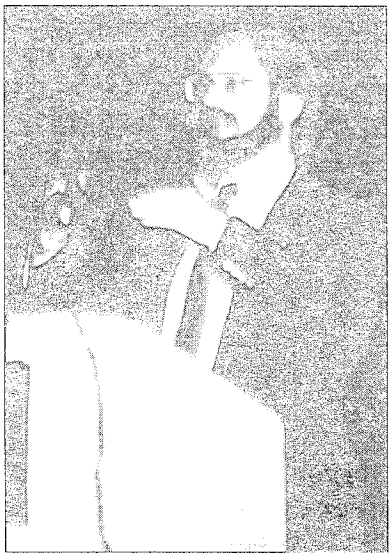
He noted that the teachers educated during the Eisenhower era are nearing retirement, leaving America unprepared for the critical challenges of the next century. Piel called on the Office of Management and Budget to "leverage" the level of teaching by augmenting the $200 billion the states spend with up to $100 million to spur excellence. "Education must be a federal enterprise. It is worthy of our national attention," he said.

"American society needs to redeem its responsibility to its children. We need to liberate the teaching of science and mathematics."—*S.R.D.* □

The Star in the White House

By Lee J. Rickard

Saturday morning's session on "Astronomy and Pseudoscience" was surely one of the best sessions of the conference, with talks rich in factual detail and speakers clearly adept at public presentations. The session was chaired by Philip Ianna, an astronomer from the University of Virginia. He has been in the news recently for his discovery of a possible brown dwarf, a star too small to sustain nuclear fusion. He is also well known to CSICOP members as the coauthor, with Roger Culver, of *The Gemini Syndrome*, a popular anti-astrology textbook (recently republished by Prometheus as *Astrology: True or False?*). His only real task Saturday morning, though, was to keep the enthusiastic response of the audience from carrying the session over into the afternoon.



Fraknoi: Astrology questionable on many levels

Andrew Fraknoi warmed up the audience with a review of *What Joan Said*, the recently published memoir of Nancy Reagan's astrologer, Joan Quigley. The executive director of the Astronomical Society of the Pacific, and a CSICOP fellow, said he could only wade through the turgid text as a public service. Quigley apparently considers herself to have been the dominant (albeit somewhat benign) factor on virtually all of President Reagan's policy decisions. Having now heard her case presented by both friend and foe, I am inclined to think that if, as suggested by a member of the audience, there are times when debunking is done better by ridicule than by scientific argument, we may be content to let the astrologers do the job themselves. To judge by Fraknoi's exegesis of her book, Quigley may have done just that.

The astronomer went on to present his list of the Ten Most Embarrassing Questions for believers in astrology—a devastatingly effective series:

(1) For those who only follow sun signs (as in the newspapers): Do you really think that the same prediction will fit a full twelfth of all the people in the world?

(2) Why is it the time of birth, and not the time of conception, that determines your astrological nature?

(3) If it is true, as astrologers suggest in answer to the above, that celestial influences only begin at birth, then what property of the womb protects the fetus from the stars? What protective characteristic does the womb possess that is more impervious to celestial influence than, say, the walls of the hospital?

(4) Why aren't astrologers richer? You often hear about how astrology can be used to time stock purchases to great effect. (Sydney Omarr always likes to say: "Millionaires don't use astrology; billionaires do!") But the average annual earnings of astrologers are actually quite low; the few high earners are the ones with syndicated newspaper columns.

(5) If you need to account for all planetary influences to get accurate readings, then why were early horoscopes (produced before the discovery of the planets Uranus, Neptune, and Pluto) considered correct? (I could not help adding later a quote from Joan Quigley's appearance on *The Phil Donahue Show*. When asked why astrological forecasts are sometimes inaccurate, she said: "It's the fault of the astronomers; they haven't discovered all of the planets yet!")

(6) A point often made by Carl Sagan: Isn't the assignment of characters by accident of birth as much a form of bigotry as making such assignments of character on the basis of skin color, etc.?

(7) One of the consistent patterns in history is that science tends to converge toward agreement on old questions, while religions tend to diverge, lending greater importance to finer distinctions among sects. Hasn't astrology diverged over time, making it more like a religion than a science?

(8) If astrology is carried by some known natural force, then why is it that the planets dominate? The forces known to science depend on the relative sizes and distances of their sources (for example, gravitational forces increase with the mass of the attractor, and decrease with the square of its distance). Yet when you assume such dependencies for the forces acting on the newborn, you find that the dominant effects ought to be those arising from mother, obstetrician, and hospital building! (This is worked out in detail in Culver and Ianna's book.)

(9) If, in answer to the above, it is said that range is not relevant to astrological forces, then why do they not include the effects of more distant but considerably more massive celestial objects, like galaxies?

(10) Finally, how do you account for the fact that when empirical tests of astrological predictions are made—and particularly when such tests are devised with the agreement and even participation of professional astrologers, such as Shawn Carlson's investigation (reported in *Nature* in 1985)—the astrological predictions are never confirmed?

Astronomical catastrophes have had a significant effect on the history of the solar system, including the earth, according to the next speaker. David Morrison, another CSICOP fellow and currently chief of the Space Science Division at NASA Ames Research Center, based his presentation on modern "catastrophist" ideas in space science on his recent book *Cosmic Catastrophes*, which he coauthored with Clark Chapman. (The book is published by Plenum Press, and the authors wrote a synopsis for the Winter 1990 issue of the *Skeptical Inquirer*.)

The last two decades of space exploration, and in particular the Mariner and Voyager flybys of all but one of the known planets in the solar system, have raised scientific awareness of the degree to which catastrophic impacts have affected planetary evolution, Morrison said. Perhaps the best known of these impact hypotheses is the one originally championed by Walter Alvarez, which identifies the large-scale extinction event at the

(Continued on page 12.)

Hyman, from page 4

personal experiences that lead them to believe that paranormal phenomena not only exist but are exploitable. Hyman noted the case of a retired general who said that his wife no longer allows him in the kitchen because all the spoons bend. The general claimed that he could cause a cloud to burst by pointing at it. Not only did he refuse to demonstrate these abilities, he assailed those like Hyman who ask for quantitative data in support of these claims by noting that he had "qualitative data" that were just as good as the scientific kind. "We have hospitals full of people who have those powers," Hyman observed.

Some of the areas of research are amusing. The CIA is involved in "radionics"—training psychics to look at photos of Soviet cars and have them tell where they are now and what is going on in them. (One can imagine the advantages not only for intelligence but for tracking mobile missiles!) The agency refused to present evidence that the technique works, but they told Hyman that they are looking into the efficacy of sticking pins in the tires in the photographs.

"Many, many branches of our government at some level have been involved in supporting, pushing, or trying to apply paranormal principles to military and intelligence purposes," Hyman said. "How much of that goes on I don't know and I suspect nobody in the government knows. One thing I do know is that a lot of pressure comes from outside the military—from Congress in particular." He noted that Pell had gotten several members of both chambers to cosponsor a bill to further psi research until *Newsweek* derisively labeled it "the Spoonbenders Bill."

Hyman spoke briefly about the complaint of the parapsychologists that they are expected to follow more rigorous standards than other scientists, and an accompanying complaint that skeptics aren't sufficiently familiar with their literature to claim a lack of evidence for psi. Over the years, Hyman said, he has done just that and found the field replete with errors in methodology, record-keeping, and protocols. "Until they do the experiments right, no nonparapsychologist is going to take them seriously."

Returning to the absent Pell, Hyman observed that none of the high-placed people in government pushing psi research know anything about the literature either. "They don't care about data. They have had compelling personal experiences," the psychologist concluded. "But having a compelling personal experience is not the same thing as seeing reality. You don't use your intuition to check on an intuition. This is what disturbs me about our government—they haven't dealt with scientific evidence but qualitative evidence."—*S.R.D.* ❑

Literacy, from page 1

This illiteracy is also prevalent among managing editors of daily newspapers and school board presidents, his poll showed. Some questioners in the audience disputed his methodology, which concentrated on those who did not "disagree strongly" and therefore might be biased, but most were disturbed that he could not show similar data from his samples showing strong belief in scientifically accepted ideas.

John Paulos, a math professor at Temple University and author of the book *Innumeracy*, entertained the attendees with examples of this particular form of scientific illiteracy. He wondered, for instance, if smoking would be so accepted by society if people realized that tobacco's death toll in the United States is equivalent to three jumbo jets crashing every day.

He used a simple statistical analysis to explain what he called the "Jeane Dixon Effect"—which depends on people forgetting predictions or dreams that do not come true. The quarter billion inhabitants of the United States will, on average, remember a half billion dreams every day. The chances are that at least a few will come true, and the innumerate among them may begin to believe that dreams predict the future.

He proceeded to give several fascinating examples of how little people comprehend the numerically measurable world they inhabit. Hair grows at .00000001 miles per hour, he noted. There is a 99-percent chance that you have inhaled a molecule expelled by the dying Caesar. In a group of 23 persons, the probability is 50 percent that two share the same birthday. There is a 99-percent chance that any two people in the United States are linked by two intermediaries.

Innumeracy can easily claim victims when scientific illiteracy is prevalent. A study once showed a strong correlation between spelling ability and larger foot sizes. Finally, he noted, someone pointed out that older students have larger feet.—*S.R.D.* ❑

Klass, from page 4

gag UFOs that used to be advertised in the back of comic books. According to Klass, they are nothing more than double exposures using an old Polaroid camera—which, in addition to having no shutter lock, produces no negatives—the first shot taken of a model against a black background, the second a horizon view from the Walters' backyard. All the photos are at dusk, necessary because too much light would drown out the initial image of the model.

The fakery seems obvious in some photos. The model is stationary, but the background moves. Blue beams allegedly from the UFO are brighter at the ground, indicating they are probably mundane spotlights. That should have been enough to keep the book from publication, but Ed's story is fantastic: the aliens speak to him in Spanish, warning of their coming. They project pornographic images into his brain. They beam him into the ship, then beam him back to earth, where his faithful wife immediately hands him a camera to get yet another shot of the ETs. "Can you imagine that. You've just been kidnaped by a UFO and miraculously are returned to earth. You see your wife. Do you tell her to flee? No, you ask her for a camera!"

By the way, Klass concluded, Ed spent two years in prison earlier in his life—for forgery.—*S.R.D.* ❑

Critical Thinking, from page 5

Schrock gave several examples from recently developed biology texts that, in attempting to develop critical thinking, actually give the wrong answers. This is more dangerous that incorrect facts in a standard text, he said, because students who arrive at conclusions through critical thinking that are erroneous yet are told they are correct are more likely to retain the fallacious knowledge. "They develop ownership of that answer—they think they solved it but they solved it wrong."

He gave several examples from actual books. One text, for instance, had students conclude that humans don't have exoskeletons because we are larger than flies; in fact, there are many insects with exoskeletons that are larger than small mammals. The real reason that humans don't have exoskeletons is that mammals were able to become more mobile and dexterous with endoskeletons.

He criticized another text aimed at high school students that asked readers to deduce why whales returned to the sea. The answer, he said, is too complex for that grade level and will either frustrate or confuse the students. Another text led students to believe that mosquitoes are "flying hypodermic needles," with just one tubule that enters the skin, leading to fears that the insects can transmit diseases such as AIDS. In fact, Schrock said, there are two tubules, one that injects the anesthetic that causes the itching, and one that draws in the blood. Only a few organisms, such as the protozoan that causes malaria, have the ability to migrate between the two systems.

As an example of a positive critical thinking exercise, he cited a text that asked students whether a finger that was extended had relaxed muscles or one that was curved did. Students confronted with the question invariably flex their fingers and observe them. "That's checking reality—it's like lab work—and that's what we've got to get kids doing more of."—*S.R.D. and Douglas McNeil* ❑

'Science Guy' Lightens up Audience

"I have a message," said Steve Nye, the Emmy Award-winning "Science Guy."

"Hey, lighten up. Relax," he told the audience of skeptics in the closing event of the 1990 conference. Nye supplied some much-needed comic relief, but he had a serious message. The battle against scientific illiteracy and pseudoscience will never be won by scorched-earth tactics.

Nye succeeded in lightning up the audience with a series of well-aimed jokes. He said that he had long-suffered from a social handicap: "I'm an engineer." He noted that his home state of Washington was the earthly home of Ramtha, the entity channeled by J.Z. Knight, and observed sardonically that the citizens had chosen Bigfoot as its centennial mascot. "Hey, we make 747s there. We don't exactly have hippies sitting around riveting."

Nye: Enlightening speech

Chasing after the paranormalists is bad, he said. "There's nothing to it, and it wastes our time. We need people to be excited about science." He observed that it would be good if the inborn cynicism of children could be left intact as they pass through adolescence. Children won't believe anything unless you prove it, he said. He quoted Carl Sagan as observing that "kids resonate to pure science."

"It's probably better to have a nation of critical thinking people than a nation of crazy people. But when we accuse people of being crazy or nuts, society won't listen to us." —*S.R.D.* ❑

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Astrology, from page 7

end of the Cretaceous period (in which the dinosaurs perished) with a strike by an asteroid roughly 10 kilometers in diameter.

The talk was partly linked to John Paulos's discussion of innumeracy on the previous day, because it turns out that part of the resistance of mainstream scientists (especially geologists) to the idea of impacts came from the difficulty of thinking about random events rather than uniformly operating processes. But Morrison also suggested that part of the slowness to give serious consideration to catastrophic hypotheses was attributable to the association of the concept with clearly pseudoscientific ideas, particularly those of Immanuel Velikovsky.

A side benefit of Morrison's presentation was a glimpse into the workings of scientific literacy in the press. A story carried by the Associated Press the previous day had stated that NASA satellite measurements had found no evidence for global warming over the past decade. Morrison checked NASA's press release and talked with the researchers; the agency had made no such claim. Indeed, the researchers said that they had repeatedly emphasized to the reporter that the measurements did not relate to the specific question of whether warming had occurred. Yet the erroneous interpretation was headlined in newspapers all over the country. (It is still persistently referred to, with some degree of scandal now being attached to the fact that the *Washington Post* "buried" it on page A26!; William Safire even said in his *New York Times* column that NASA has "refuted" global warming theory.)

Bernard Leikind wrapped up the session with an illuminating slide show demonstrating the remarkable variety of atmospheric optical phenomena, such as rainbows, glories, parhelia, and mirages. A number of descriptions of mystical experiences, such as Ezekiel's vision in the Bible, can be interpreted as accurate but prescientific reports of such phenomena, according to the General Atomics scientist. Although the point was not emphasized, I was particularly struck by the plausible identification of UFO stimuli with atmospheric phenomena whose observations have only become commonplace with the advent of flight. For example, the subsun—a brilliant reflection of the sun in the horizontally floating ice crystals within clouds—is only commonly seen now because you can only see it from above the clouds. It bears startling similarity to the "Foo Fighters" reported by pilots in World War II, a connection that I believe was initially made by Donald Menzel.

By emphasizing the great variety of generally unappreciated atmospheric phenomena, Leikind's show also exemplified the basic theme of the whole conference, the degree to which the superficial marvels of pseudoscience pall when confronted with the real majesty of nature. Scientific literacy does not lack its own elements of esthetic and spiritual satisfaction.□

Jahn, from page 4

Jahn has subjects attempt to influence the machine to generate a number higher or lower (per instruction) than expected. He also has subjects avoid trying to influence the machine to establish a "base line." His results have been that some subjects some of the time are able to push the number of successful attempts above what would be expected by chance over a long series of runs, while the base line stayed relatively constant. "There is a marginal effect," Jahn said. He claimed it was reproducible by showing a graph of 5000 trials each with 200 runs whose probability of being mere chance was on the order of 1 in 10,000. To date, he has conducted 50,000 trials with 20 operators (though, as mentioned, 30 percent of them have been with just two operators). Jahn claims that the results are "very operator specific"—he even called individual subjects' graphs "signatures"—and said that "some can and some can't" influence the machine.

Another experiment involving 9,000 marbles that fall down on pins and accumulate in bins showed similar results. When the machine has been calibrated, the distribution shows a normal Gaussian curve, he said. When his 25 subjects are asked to influence the marbles, more than would be expected seem to end up on the left end of the curve. Since three machines are used the results don't seem to depend on the device.

"My conclusion is that we have found that these operators—common people using common pieces of equipment—can produce marginal but statistically significant and replicable effects: one bit per 1000. This level, though marginal, could have an effect on engineering equipment. If you are willing to concede the data, you are going to have to redefine replicability in engineering. You are going to have to move the person, not only the experiment."—*S.R.D.*□