

Minutes CESE Annual Meeting, June 26, 2010

Out-going president, Jesse Johnson called the 14th annual CESE meeting to order on Saturday, June 26, 2010 at 1:10 p.m. at Anthropology lecture hall, room 163 at the University of New Mexico (UNM).

He asked those in the audience to introduce themselves.

Afterwards, Jesse began his presentation. Americans like the idea of fairness, he said, but it is not acceptable in science, if the explanations don't fit the data. Examples that lack data are global warming deniers, AIDS deniers, geocentrism, flat earth, 9/11 truthers, and creationism. Creationists, who want their notions presented in science classes, argue fairness and academic freedom, even though there is no evidence to support these ideas. There was little creationism activity in New Mexico this year, although we expect it in the future. Next legislative session is 60 days, and the current Rio Rancho school board has a creationist majority.

Fairness can work with regard to merit pay for teachers, which is expected to be implemented. Some sort of teacher evaluation would be necessary, but assessing a teacher based on raw test scores is unfair, as they can't control every aspect of a student's education. For example, students from advantaged demographic background could test well, in spite of a bad teacher, and this teacher could get a merit raise. Whereas, good teachers with students with bad demographics who test poorly could fail to receive merit pay, even lose their jobs.

Also unfair are growth models: it is easier to move up when you are at the bottom. However, when you are at the top, it is easier to move down.

A method of teacher evaluation that is fair would be to use data from New Mexico Standards-Based Assessment tests scores (NMSBA) to predict how well students ought to perform and compare that with how they actually perform. Teacher effectiveness lies in the area unexplained by demographics.

This same method of assessment can also be applied at the school level. It will allow us to identify those schools and teachers who are capable of closing the achievement gap. When identified, we can then find out what they're doing right and apply that knowledge to schools and teachers of similar demographic groups.

There are some drawbacks. This method will only work on subjects that are tested, and that could exclude areas such as art or P.E. Special education would also require special consideration. The "unexplained" area could also include the effectiveness of the principal, support staff, etc.

Jesse concluded with (1) science discriminates against viewpoints not backed by data; (2) we should look out for creationist activity; (3) merit pay for teachers is coming; and (4) merit pay and teacher evaluation must be as fair as possible.

Next on the agenda was Dave Thomas. Instead of performing his usual magic tricks, he began with something completely different, “Hoist with your own petard.” A petard, Dave explained, was a small bomb used to break up gates and walls to breach fortifications. It is no longer used in warfare. Today the expression means that one has been injured by a device meant to injure others. Dave used arguments developed by two different pseudoscientific movements.

First was a “9/11” truth petard by David Chandler, regarding the destruction of the north World Trade Center, titled “Downward Acceleration of WTC 1.” Chandler says, “The roofline of the North Tower appears to drop suddenly in what some observers loosely describe as ‘free fall’ or ‘near free fall.’ To measure the actual motion of the roofline, a high quality copy of a video by Etienne Sauret (similar to a version on YouTube) was used.”

Chandler concludes, “It is difficult to imagine how an upper block exerting a force of only 36% of its static weight could crush the larger, stronger, undamaged lower section of the building to the ground, when the building, at any level was designed to support several times the weight above it.

“The upper and lower sections of the building exert equal but opposite forces on each other, so the load on the lower section of the building is 36% of the weight of the upper block.”

Dave said this was incorrect: “Chandler looks at the collapse as an average over many seconds, and comes up with an acceleration of 2/3 of gravity, from which he wrongly gets an ‘impact force’ of only 1/3 of gravity, momentum/3. This is very wrong -- the actual impacts are 30 times momentum, not 1/3 times momentum. Basically, the collapse is fast (< 15 seconds), but also it's NOT ‘free-fall’. It starts with the breaking of just one floor, at which point a large chunk of tower (14 floors) accelerates from 0 m/s to over 8.6 m/sec. Then it impacts the next floor, with that 30 times mass of 14 floors’ force, and breaks the next (15th) floor with that momentum. This slows down the falling chunk.

“How much? Conservation of momentum, elastic collision, the 14 floors pick up one more (so 15 total), and the velocity can be found from $m_1 * v_1 = m_2 * v_2$, where $m_1 = 14$ floors of mass, $m_2 = 15$ floors, and $v_1 = 8.63$ m/s. So $v_2 = 14/15 * 8.63$ m/sec = 8.05 m./sec, a little less. That is the "resistance" that makes the collapse less than 'freefall'.

“This happens again and again and again. However, the 2nd floor doesn't start at REST ($v = 0$), but at the slightly reduced speed (8 m/sec). It takes less time to fall the 12 feet of one floor's height (3.8 meters), as on the chart (1st floor takes 0.88 sec, 2nd only 0.38 sec). This time, it accelerates up to an even higher speed (11.81 m/sec), then is slowed down by 15/16 to 11.07 m/sec.

“Chandler’s time step was too big to see the impacts/slight slowing. He just averages everything – several periods of true free-fall, interspersed with violent collisions that

slow down the falling mass, to come up with his curve (shown at the meeting on slide with a graph). His curve is not at all the same as true free-fall; it's as if gravity was reduced to 2/3 of normal.

“Each floor is crushed in a shorter time than the previous one, and the velocity increases from floor to floor. So it goes faster and faster, collapsing completely in less than 15 seconds, but it's not free-fall. There is resistance at every floor.”

Dave's model, on the other hand, looks at it as several periods of true free-fall sandwiched between slow-down accelerations (it's like one g for 0.88 seconds, then -10 g for a fraction of a second, then one g for 0.38 seconds, another brief slowdown of -15 g's, and so on). When Dave plotted what that works out to, it matches what Chandler has worked so hard to measure.

Chandler's physics is awful -- he underestimates the impact force by a factor of 100 ($30/(1/3) = 100$). But his measurements are useful, because they show what really happened (as per Dave's model).

Dave posted a YouTube video link, “Static versus Dynamic Loads in Under Sixty Seconds:”

<http://www.youtube.com/watch?v=YKMQzQ0savk>

Dave continued to the second petard. This involved a paper published in the *Journal of Evolutionary Biology* by P. Senter, of Fayetteville State University in North Carolina.

DOI: 10.1111/j.1420-9101.2010.02039.x

Senter said that it was important to demonstrate evolutionary principles in such a way that can't be countered by creation science. One way is to use creation science itself to demonstrate evolutionary principles.

Some creation scientists, Senter said, use classic multidimensional scaling (CMDS) to quantify and visualize morphological gaps or continuity between taxa, accepting gaps as evidence of independent creation and accepting continuity as evidence of genetic relatedness. He showed a graph that applied CMDS to a phylogenetic analysis of coelurosaurian dinosaurs.

Senter concludes, that according to one of their own statistical measures, baraminologists

(a creationist system that classifies animals into groups called "created kinds" or "baramin" according to the account of creation in the book of Genesis and other parts of the Bible. It claims that kinds cannot interbreed, and have no evolutionary relationship to one another...) Source: en.wikipedia.org/wiki/Baraminology

must consider Archaeopteryx and other basal birds – including the more typically birdlike Confuciusornis and Sapeornis – the genetic relatives of dromaeosaurids and other birdlike coelurosaurs, and possibly even compsognathid and tyrannosauroids.”

Or according to another source:

<http://chickenoreggblog.wordpress.com/2010/07/21/beating-the-creationists-at-their-own-game/>

Senter “takes on the creationists on their own terms, using a statistical method developed by creationists to visualize morphological gaps in the fossil record, to show that actually, there aren’t any morphological gaps in the fossil record between basal birds (including Archeopteryx) and a range of non-avian dinosaurs. These findings will come as no great surprise to evolutionary biologists who have long accepted that birds evolved from dinosaurs and that Archaeopteryx has both bird-like and dinosaur-like features. However, Senter’s rationale for doing this study was that if you can demonstrate evolutionary relatedness between species under creationist’s criteria, then they will be obliged to accept the results.”

Dave concluded his presentation with a question. “What is a nitrate?”

Answer: Much cheaper than a day rate.

Afterwards, Jesse introduced next year’s slate of officers:

Rebecca (Becky) Reiss, president
Terry Dunbar, vice-president
Marilyn Savitt-Kring, secretary
Jerry Shelton, treasurer
Jesse Johnson, past president

Board members at large:

Marshall Berman, Steve Brugge, Cindy Chapman, Lisa Durkin, Jack Jekowski, Kim Johnson, Marvin Moss, Ken Whiton, and Dave Thomas.

There were no new nominations. The slate was approved, and Jesse handed the presidential gavel to Becky.

Jerry Shelton presented the June 2010 treasurer’s report:

- 1) \$968 in the checking account.
- 2) \$17,355 in the savings account (\$3141 belongs to NMSR, about \$1600 belongs to Eva Thaddeus’ grant, and the balance of \$12,614 belongs to CESE.)

3) \$308 in the PayPal account.

CESE's new president, Rebecca Reiss is a geneticist and Associate Professor of Biology at New Mexico Tech. She opened with a comment about an article that appeared in *Huffington Post* by Osagie K. Obasogie, titled "Reports of My Death Have Been Greatly Exaggerated: Race and Genetics Ten Years After the Human Genome Project."

http://www.huffingtonpost.com/osagie-k-obasogie/reports-of-my-death-have_b_617121.html

The article shows that the eugenics movement still poisons the discussion on race and how little the general public understands genetics. Ten years after the human genome project was completed, no disease has been cured including cystic fibrosis whose gene also has been sequenced.

Geneticists talk about ethnicity as information about a person's genetic make-up – it's not about one's race. This is the beginning of evolutionary (or personalized) medicine. The heart disease drug BilDil is more effective in people of African descent.

Becky presented a 1904 quote by Sir Francis Galton:

"I see no impossibility in eugenics becoming a religious dogma among mankind, but its details must first be worked out sedulously in the study. Over zeal leading to hasty action would do harm, by holding out expectations of a near golden age, which will certainly be falsified and cause the science to be discredited."

And that is exactly what happened in the eugenics movement in 1911, Becky explained. Eugenics was used to justify laws against interracial marriage, immigration limitation, forced sterilization of lower socio-economic individuals, and myths of racial purity. But it all contradicts what we understand about genetic diversity: more is better.

The intelligent design community has distorted the history of the eugenics movement so badly that they don't even give the right person credit. It was not Charles Darwin who originated the eugenics movement, it was his cousin, Sir Francis Galton, Becky said.

Becky displayed a slide with a quote from "Dissent from Darwin," a creationist website:

"We are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life. Careful examination of the evidence for Darwinian theory should be encouraged."

<http://www.dissentfromdarwin.org/>

The solution is education. There are:

Science Education Partnership Awards (SEPA)

National Center for Research Resources (NCRR)
National Institutes of Health (NIH)

<http://grants.nih.gov/grants/guide/pa-files/PAR-10-206.html>

And the current partners are (1) New Mexico Tech; (2) New Mexico State University; and (3) National Center for Genome Resources, Bioinformatics Education.

Becky would like to apply for a grant, but first we need to devise methods that would improve science education. The NIH wants ideas that work and that are based on real data. And all this data are sitting in New Mexico. Potential partners and their roles are CESE (with its data and the *NMSR Science Watch* radio show) and the Fractal Foundation's outreach program. The due date of the grant is May 2011, and its duration is 3-5 years, with renewals possible. We have a year to put this together. Becky's goal is to improve science education and raise CESE's profile.

Becky introduced guest speaker Jonathan Wolfe, *Fractal Foundation* founder and recommended his "First Friday Fractals" shows at the NM Museum of Natural History and Science's planetarium.

"Jonathan Wolfe earned his doctorate in visual neuroscience from the University of Pennsylvania in 1996. He first discovered the beauty of fractals while a student at the Albuquerque Academy in 1987, and he has been eagerly teaching people about fractals ever since. He first brought fractal education into schools in 1999 at Alameda Elementary School. The enthusiasm for math, science and art shown by children as young as 6 inspired him to continue teaching fractals, and in 2003 he helped form the Fractal Foundation."

Source:

<http://fractalfoundation.org/about-us/jonathan-wolfe/>

Jonathan's work on fractals is not so much research as popularization of science. However, scientists *are* doing research on fractals in areas such as biochemistry, chemical engineering, and solid state physics. Fractals are more than just fluff.

His main goal is to use their beauty to inspire and generate interest in math and science. We are visual, Jonathan explained, and we respond to beauty. Fractals combine art, science, and math. Natural fractals tell the story of how they're created.

He has been focusing on outreach activities. Since 2003, 27,000 kids and more than 17,000 adults were taught fractals, including more than 620 teachers. (They even bring inflatable planetariums to elementary schools.) Since 2006, all 150 "First Friday Fractals" shows at the planetarium have sold out. So tickets for these events must be purchased far in advance, Jonathan said. He has heard that scalping occurs.

Sponsors include PNM, United Way, NMPED, the Museum Foundation, Sandia Labs, Albuquerque Community Foundation, Urban Enhancement Trust Fund, Clear Channel, XIL1NX, Intel, Xilinx, and Resolution Graphics.

The Fractal Foundation uses marketing and advertising, which scientists don't like to do, even though it works, Jonathan said. Over \$100,000 has been raised for promoting math and science.

Jonathan wants to change the culture; that is, he wants students to think that being a scientist is cool and exciting. So his target audience is elementary school students, as fractals really fascinate them. By the time students reach high school, it might be too late.

Albuquerque is the "fractal capital of the world," Jonathan said. However, fractals are spreading worldwide. Similar foundations will soon be formed in Canada, Australia, and elsewhere.

Lesson plans for teaching fractals are available on his web site. And they correspond to New Mexico's science standards.

<http://fractalfoundation.org/index.php?s=equations+fractal>

The fractal shows are 2/3 entertainment and 1/3 education. Fractals are a never-ending pattern, complex, but easy to make, and there is no limit to their size. They can be 3-D, constructed of items like marshmallows and toothpicks in a tetrahedron shape. There is a big portable model in Nevada made of bats and fake baseballs.

The Fractal Foundation built the world's largest fractal at the Albuquerque Convention Center last March. The Guinness Book of Records rejected this because "there is not enough interest." Jonathan said he would "poke" them again. The Foundation wants to continue the project next year attempting to break their previous record.

A free open source program that generates fractals can be downloaded from Jonathan's website. He didn't write it, but he wants us to try it:

<http://fractalfoundation.org/resources/fractal-software/>

The 2010 Albuquerque Fractal Challenge is a contest for NM elementary, mid-school, and high school students to design a fractals. More information on this contest can be found at:

<http://fractalfoundation.org/resources/fractal-challenge/>

One of the 2008 winning fractals, designed by Rachel Washington, has been installed on a building at 3rd and Silver and is 30 inches tall. She was a 5th grader and a hero in her school. She admitted that she didn't used to like math.

Half of the winners have been elementary students, and 7/8 of them are girls. Some of their pictures are on display at the State Fair. Clear Channel has donated billboards with a simple equation:

Algebra = art

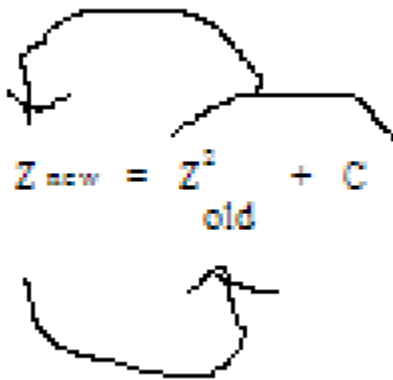
with the student's name on it.

Channel 7 aired a two-minute segment also. Video can be viewed at:

<http://www.koat.com/video/21321604/index.html>

Jonathan wrote these equations:

$$Z_{\text{new}} = Z_{\text{old}}^2 + C$$



C is a two dimensional number. This equation repeats for every pixel.

Fractals are everywhere – in broccoli, cauliflower, trees, sea shells, flow of rain, lightning, hurricanes, galaxies, in our lungs, brains, blood vessels. There are conceptual fractals, as a diagram of ancestry or evolution.

There are industrial applications. In engineering, fractals appear in the cooling circuits of computer chips and in cell phone antennas.

Jonathan concluded by saying his foundation is on Facebook. An e-mail list is available on his website as well as a “store” where items such as ties and greeting cards can be purchased.

We adjourned for refreshments

Respectfully submitted,

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