Empowering Reality, Rationality, Creativity, Empathy
Scientific and Engineering Facts, Truth, Democracy?
Statistical Mechanics, Demons, and Democracy

Joe Andrade
University of Utah Dept. of Bioengineering

Who am I?
Why should you listen to me?
Born 1941; 75 years old
Univ of Utah Faculty 1969-2012
Professor of Bioengineering, Materials Science, Pharmacy, Distinguished Prof.
Dean of Engineering: 1983-87
Chair of Bioengineering
Science without Walls; The Leonardo; The CALL
Emeritus Prof. 2012-present
Ran for Congress, Dist. 2 Utah, 2012; Lost; The RUN
Amateur Novelist: State Change: A Chemical Fantasy
Novel #2: Deliver Us From Evil - Pending

The 2017 IBE Annual Conference theme -
Convergence -
Transdisciplinary integration of life sciences, physical sciences, and engineering for developing deeper understanding of complex living systems (creating the science of new biology) and for engineering novel solutions to address the grand challenges of our time - to promote a framework of enabling science with network of partners from all fields of life sciences, physical sciences, engineering, etc.
But need also to consider Humanities, Social and Behavioral Sciences - and especially Politics and Government

1998 1993 2005
Hard Rules -- “Soft” Rules

• The Hard Rules -- The Sciences
  – The way the physical and natural World works;
  – The Rules of the Game -- apply everywhere, all the time; to all; no favorites; no supernatural stuff.

• The “Soft” Rules -- The Humanities
  – Societies and Cultures;
  – Philosophies and Religions;
  – Politics and Law.

BUT… soft eventually hardens…

E. O. Wilson:
  Consilience: The Unity of Knowledge, 1998

Carl Sagan:
  Science as a Candle in the Dark,
  (subtitle of A Demon-Haunted World)

Cosmos, 1993

The Beginning:
April, 1983: Dr. David Gardner, President, University of Utah:
"Our nation is at risk…The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and as a people.

A high level of shared education is essential to a free democratic society and to the functioning of a common culture…citizens must be able to reach some decisions or to make some judgments, often on short notice and on the basis of conflicting or incomplete evidence.

America is at risk."

Twenty years -- a generation later -- the situation is no better.

How Ignorance Became a Virtue
The Scientific and Engineering Community has been largely uninterested and uninvolved in the education and awareness of the general public.

The lack of effective science and technology education in the K-12 years over many decades has resulted in:

- an electorate which is largely scientifically, technologically, and numerically/mathematically illiterate,…
- an electorate which can not deal objectively with a wide range of issues, and
- decreasing numbers of students electing to study the sciences.

It's not about 'Science' – it's Ideology - Belief

Mike Noel, Kanab, State Legislator,
BA Biology, UC Berkeley

Denialist, Believer

"The issue is NOT Science, the issue is BELIEF. If you choose to Believe in something very strongly and you choose to adopt a position very strongly - no amount of Science will change your Belief. It takes a private revelation...to really change...We must understand that rationality is quite rare...We must identify those totally irrational legislators...and get rid of them."

Joe Andrade UU Conf 2-2010

Working 'with' Legislature, I learned:

It's not about 'Science' – it's Ideology - Belief

http://www.youtube.com/watch?v=-L6ofvMaRpw
Run My One-Year Experiment in Democracy
by Joe Andrade

Awareness and Exposure

"Most of the population is semantically sheltered and isolated - 'protected' from issues, concepts, and problems. I tried to break through the very right, conservative echo chamber in which most Utahns reside. As people hear these words spoken and written - by people and candidates which otherwise seem to be reasonable, informed, educated, and interested - the words will begin to seem less of a threat."

Engagement Needed

"One of the reasons our nation is in the mess it's in - where ideology rules and critical thinking is almost non-existent - is because the most educated in our society have chosen to be among the least involved. This is especially true in academia. Academic and professional apathy often prevails."

Assumptions, Fear, and Revelation...

"...most people know major changes are coming - they know their historical expectations are in flux. They are afraid of such change. They are afraid of the climate change they hear about and work to deny. They are afraid of impending drought. They are afraid of carbon fees or taxes. They are afraid of higher energy costs. They are afraid."

* Second Coming, Armageddon, Rapture ...from parents to youth... young adults...

My discussions with high school kids:
Rodrigo Rodríguez, chapter in *Politics of Panem*.

Collin’s message is clear:

quoting Katniss: “...look at the state they left us in, with the wars and the broken planet. Clearly, they didn’t care about what would happen to the people who came after them.”

Collins seems to believe that the work of building a more equitable world is a project that ultimately falls to the young.

...the goal of the dystopian genre to ‘place a mirror before readers, challenging them to examine the world they inhabit and the obstacles it places on the path to social justice’.

---

Angie Thomas

*The Hate U Give*

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**Why Write Fiction?**

Reality is so diverse, so complicated, so interesting - why waste time on fiction? on fantasy?

That was my position for most of my career.

But with age and time (gerontological wisdom?)

I realized fiction, especially novels, can reach many more people than fact-based media do: newspapers, papers, documentaries, texts.

I read and reread some novels that had major socio-political impacts. I learned you can say and stir in fiction things which might get you arrested and jail if said as fact (this was several years before the President of the United States endorsed “alternative facts”).

And I realized that if you self-publish you don’t need to be constrained by editors, lawyers, agents, or publishers.
So after many years of reading and study about mental constraints, rigidity, delusions, politics, plutocracy, voter and citizen apathy and misinformation, gerrymandering, and outright non-ethical, immoral, and even illegal behavior and actions, I devised a novel hypothesis and an ‘experiment’ to hopefully address our impending political catastrophe and resultant dystopia.

The first implementation of that hypothesis is State Change, a 450 page amateur novel in which a set of rigid, obstructionist political ideologues are illegally ‘treated’ to facilitate their transformation to more rational and reasonable citizens, officials, politicians.

The most effective, most pragmatic, most realistic solution is to directly change the minds of elected leaders and elected leaders.

Given the urgency of the problems which must be solved, those entrenched misleaders can only be rapidly changed by direct chemical means – by chemically illusory revelations and epiphanies.

That is the subject of this book.
"Perhaps, but remember engineers and physicians – especially surgeons – often tend to be conservative – they like things simple."

"[Charles Koch] extrapolated his engineering rules and laws directly into the public sector. He assumes that the simplistic ‘rules’ and assumptions applied by the father, by Ayn Rand, by Hayek are as reliable in the social arena as Newton’s Laws and the rules of chemistry are in the physical science arena."

"Engineers like bombs and circuitry?" Jay asked.

"Yes, in part, but engineers really like ..." "Rules – simple, reasonable rules," Bill interrupted. "Just like adolescents."

"Yes – the work is confusing and complex – and certain mentalities drive for simplicity, for rules, for order."

"And some of those people choose engineering."

"Yes – and that’s why a disproportionate number of active, ‘successful’, jihadists are engineers."

"And some of them become terrorists, Ayn Rand wannabees – and plutocrats."

"The book cites some psychology literature about the search for simplon – defined as exaggerated simplicity and oversimplification."

"Sounds like libertarianism, tea party patriots, and some engineers I know," Bill said. "And jihadists."
English has one word, TRUTH, with Two Definitions:
1. In accordance with fact or reality - the real world;
2. A firmly held opinion or conviction - as in the spiritual world.

TRUTH is What Is or What I Believe

Russian has two different words for TRUTH:

истина, несправедливость
Real, Unshakable, Factual Truth

Правда, волюнтарист
Surface, Subjective, Superficial Truth

"You can fiddle with the pravda all you want, but you can't change the istina."

Charles Blow: NYT 1-26-2017: https://nyti.ms/2kvMlzt
"Donald Trump is a proven liar. He lies often and effortlessly. He lies about the profound and the trivial. He lies to avoid guilt and invite glory. He lies when his pride is injured and when his pomposity is challenged.

Indeed, one of the greatest threats Trump poses is that he corrupts and curdles the absolutes of truth, facts and science.

It is no coincidence that the rise of Trump is concurrent with the rise of "fake news." It is no coincidence that his rise comes during an age of severely damaged faith in institutions."
<table>
<thead>
<tr>
<th>Major Science/IBE Societies:</th>
<th>Twitter handles and membership</th>
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<tbody>
<tr>
<td>Amer. Chem. Soc.</td>
<td>@AmerChemSociety 160,000</td>
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<tr>
<td>AAAS</td>
<td>@AAAS 120,000</td>
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<td>Union Concerned Scientists</td>
<td>@UCLSUSA 100,000</td>
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<td>Soc. for Biomaterials</td>
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</tr>
<tr>
<td>IEEE</td>
<td>@IEEEorg 400,000</td>
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Internet in a Minute!

Over 2 Million Google searches
over 300,000 Tweets
about 3 Million YouTube views
over 20 Million WhatsApp messages

If you Facebook, Tweet, post, blog, comment, like, follow -

“You are a publisher!” says Adam Sharp.
“You are part of the media”
Tweet: 140 characters. Better less - like a nano-abstract.
Letter to Editor - about 200 words.
Short articles - about 100 words.
We know how to write - briefly, succinctly, clearly.
So do it.

Other Tweeters and their Followers:
@HillaryClinton 17 M
@MichelleObama 7 M
@BarackObama 86 M
@realDonaldTrump 27 M
@POTUS 16 M
@FLOTUS 7 M
@TheEllenShow 66 M
@ladygaga 66 M
@Oprah 36 M
@LeaMCaprio 17 M
@StephenAtHome 13 M
@KatyPerry 100 M!
From a tweet, a March for Science is born

The idea for the protest started with a single tweet on April 2, 2017.

"Let's use this March 4 Science to show we are a majority of people who believe in science," wrote Doug Roy, a physics professor at the University of Maryland in Baltimore. "We can and should do something as a group."

The tweet was转发 by the account @Scicomm, which is a collective of scientists and science communicators.

These two tweets got a lot of traction and led to a big rally in Washington, D.C.

March for Science

EARTH DAY

APRIL 22, 2017

Step out of the lab and engage

We need to bridge the gap between science and the public. That's why we're embarking on a national March for Science. Join us on April 22, 2017 to show your support and push for evidence-based policies.

Let's stand together and demand that our leaders make evidence-based decisions that benefit all of us.
“...replacing just one coffee hour a month with an outreach activity is a reasonable goal.”

Gabrielle Kardon

In the case of Tweeting, direct your Tweet to one or 2 who need the input, the education. It may only be a ‘nano’ effect, but they add up. Be a Maxwell’s Demon via social media. Increase the Pressure!
“WHEN THE VOICES OF SCIENTISTS ARE NOT HEARD, THERE IS A PRICE TO PAY.”

Jane Nagelco, President, University of California
What can WE do? Don’t be apathetic or passive - Be Informed:

Local Paper, TV, Radio
State Paper - Governor, Legislature
NY Times - Science Times
Washington Post, LA Times
Wall St Journal and USA Today
New Scientist
The Economist

What Else?

Do you have teen age kids? Time for quality time!

What are they reading?
What are their concerns, interests?
Get them fact-checking
Teach them to separate fantasy from reality, to diagnose ignorance, to call out lies.

Follow your Congressperson, contact her regularly.
Ditto for Governor, local legislators
Correct local officials, reporters, politicians.
Don’t tolerate lies, BS, or hypocrisy - call it out.

How about 15 minutes/day - every day?!
And insist others know what they are talking about

KNOW what you are talking about:

And insist others know what they are talking about

Thanks

Discussion?
“Perhaps the sentiments contained [herein] … are not yet sufficiently fashionable to procure them general favor. A long habit of not thinking a thing wrong, gives it a superficial appearance of being right, and raises at first a formidable outcry in defense of custom. But the tumult soon subsides. Time makes more converts than reason.”

Thomas Paine

“Too much sanity may be madness – and the maddest of all – to see life as it is, and not as it ought to be.”

Don Quixote via Cervantes

If we appear to seek the unconventional, it has been said, then let it be known that we do so to avoid the uninteresting.

— Tom Hayden, Port Huron Statement

Too much sanity may be madness – and the maddest of all – to see life as it is, and not as it ought to be.

— Don Quixote by Cervantes

The New York Times

A Chelsea Manning-Wikileaks Opera, Seen in a New Light

B.D. Abramson

When you make art from current events, there’s a catch: Events change.

“Till Death Do Us Part” is a film about Chelsea Manning and WikiLeaks, in which a former intelligence analyst and a hacker come to known each other through the internet.

But the story of the two figures, who are both controversial, is not one of creative collaboration. They are both from the same background, and both have faced significant challenges in their careers.

However, the film is also about the power of art to bring people together.

The New York Times

Storms of My Grandchildren: The Truth About the United States Government and the Last Days of Martin Luther King Jr.

James Hansen

Science as a Contact Sport

Stephen H. Schneider

Both published 2009

Daniel G. Nocera
http://nocera.harvard.edu/DanielGNocera

He worked with Robert Krulwich of ABC News to develop the pilot that was used to launch the PBS NOVA show, ScienceNow, which is now a regularly scheduled science program on PBS. He also worked with Mr. Krulwich and the web designer OddTodd to develop a five part series on The Lifestyle of Carbon. He opened the Mountain Film Festival 2007 in Telluride CO, the Aspen Forum in Aspen CO in 2008 and 2009, and the World Science Festival in NYC in 2008. He sits on several advisory boards and is currently working with several artists in the U.S and abroad, actors and producers in Los Angeles and major business leaders in the U.S. to help them develop a position that contributes positively to the energy and sustainability challenge confronting this planet. In 2008, he founded Sun Catalytix, a company committed to bringing personalized energy to the non-legacy world.

The ‘new’ District 2 - brilliant gerrymandering

- Most of Salt Lake City, Bountiful
- Universities, College
  - UU, SUU, Dixe, Snow, Westminster
- Most of Western Utah
  - Tooele, Delta, Milford
- 2/3 of Southern Utah
  - St George, Cedar City, Kanab, Richfield
- National Parks and Monuments
  - Zion, Bryce, Capital Area.
  - Coralville (1 D), GEHH ...
- Major Military (not Hill AFB)
- South half of Great Salt Lake