

"What game-changing scientific ideas and developments do you expect to live to see?"

This is the question John Brockman, publisher of Edge.org, posed to more than 100 of the world's most influential minds. Exhilarating, visionary, sometimes frightening, but always fascinating, their responses provide an eye-opening road map of our near future.

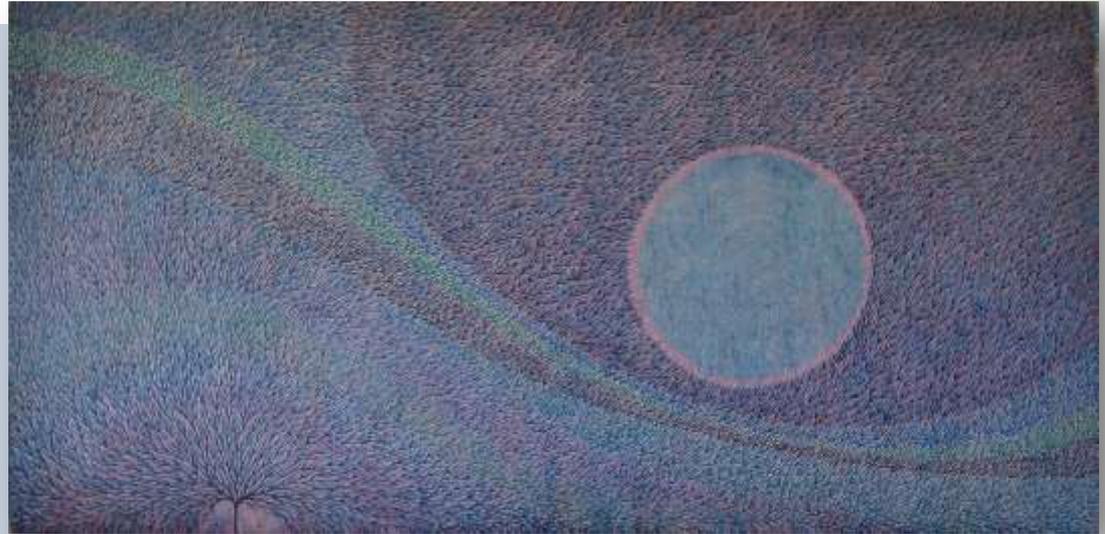
What Will Change Everything?

What will change you? Your world?

Writing for STEM, English Composition

Science and Technology Content for English Composition Courses

The following slides represent chapters read in the text, “This will change everything.” You have to write three 2,000 word responses/essays for the semester, all of which will be collected in a final portfolio. The questions are specifically designed for each chapter, or a combination of chapters. You have a choice on what you want to write about. (One of these you will present to the class.) For the most part, the



The Beginning Of Everything: Remembering Distance Oil on linen 90 x 180 cm
KATHRYN BRIMBLECOMBE-FOX

essay questions are in chronological order, or, as they appear in the text. There are some exceptions, however. You will have to match the question title below with the corresponding essay in the text, they are the same. For every essay, you will need a strong thesis statement. For every essay you also will need at least five outside sources, two of which must be supporting graphs, diagrams, charts, and a References page in APA format. **The first two essays must be selected from the material below in the PowerPoint. The final essay must be a question that you devise from the remainder of the readings in the text.** Good luck, I will collect your portfolio “to-date” at predetermined times throughout the semester. You should also think of these assignments as a lesson in time management. **If you work proactively, you’ll be in good shape. If you wait until the last minute, you will not. I can always tell when a paper is rushed. Good luck, I am always available for consultation.**

Responsibility Matrix

Assignment (60% of grade)

Three essays and a final, which may be a take-home depending on your level of involvement during the semester. Follow the essay guidelines for word count, format, and number of sources.

Attendance and Class Participation (40%)

Come Prepared and Participate: Attendance, completion of readings, participation in student-led class discussions, and completion of in-class writing assignments are a critical part of your grade. This part of your grade also includes a quiz on five vocabulary words taken from each essay. As you read each essay in the anthology, keep a notebook of words and definitions you do not know.

My style? I do not fail anyone. You will earn the grade you receive. Your fate is in your hands. Effort is directly related to your final grade.

The text book contains short, but challenging readings. Make sure you follow the order below for class. Be prepared to discuss the issues. Class participation is a large part of your grade.

(p. 115) Gregory Paul's "Becoming Robotic"

Preface: John Brockman

Introduction: Daniel Dennett

(p.1) Evolution Changes Everything, Scott Sampson

(p. 5) DNA; Writing the Software of Life, Craig Venter

(p. 182) Living to a Hundred and Fifty– Gregory Benford

(p. 186) Mastering Death – Marcelo Gleiser

(p. 189) No More Time Decay – Emanuel Derman

(p. 206) The Use of Nuclear Weapons Against a Civilian Population –
Lawrence Krauss

(p. 209) Deployment of a Significant Rogue Nuclear Device – Gerald Holton

(p. 210) Accidental Nuclear War – Max Tegmark

(p. 8) A Change in Who We Are, PZ Myers

(p. 10) The Robotic Moment, Sherri Turkle

(p.14) The Brain Machine Interface (BMI) – James Geary

(p. 135) Artificial Self-Replicating Meme Machines – Susan Blackmore

(p. 17) Breaking the Species Barrier – Richard Dawkins

(p. 20) Slippery Expectations – Corey S.Powell

(p. 25) The Full Flourishing of Solar Technology – Ian McEwan

(p. 27) Personal Genomics—Or Maybe Not – Steven Pinker

(p. 30) Our Genes Are Not Our Fate – Dean Ornish

(p. 32) A Forebrain for the World Mind – W. Daniel H

(p. 36) Future as Present: A Final Experiment – Ernst Poppel

(p. 39) But We Shall All be Changed – Frank Tipler

(p. 47) The Laptop Quantum Computer – Donald Hoffman

((p. 51) Undo the Present; Recall the Past – Seth Lloyd

(p. 43) The Credit Crunch for Materialism – Rupert Sheldrake

(p. 54) Rounding an Endless Vicious Circle, Alan Alda

(p. 58) The Feeling That Things Will Get Worse – Brian Eno

(p. 72) Avoiding Doomsday, Alexander Vilenkin

(p. 55) The Idea of Negative and Iatrogenic Science – Nassim Nicholas Taleb

(p. 60) Homesteading in Hilbert Space – Frank Wilczek

(p. 62) Revelation – Architect, Stefano Boeri

(p. 63) The Discovery of Intelligent Life From Somewhere Else –
Douglas Rushkoff

Read the article **"Is Google Making us Stupid"** by Nicholas CRR
published by *The Atlantic* and

**"The Reading Brain in the Digital Age: The Science of Paper vs.
Screens"** by Ferris Jabr, that appeared in *Scientific American*

(p. 65) A Cure for Humankind's Existential Loneliness – Paul Saffo

(p. 68) AI and Intellectual Mastery – John Tooby and Leda Cosmide

(p. 72) Avoiding Doomsday, Alexander Vilenkin

(p. 76) Escaping the Gravity Well – David Dalrymple

(p. 79) Synthetic Biology with Interplanetary Reach – Dimitar
Sasselov

(p. 81) Life (or not) On Mars – Rodney Brooks

(p. 84) A Separate Origin for Life – Robert Shapiro

(p. 88) A Shadow Biosphere – Paul Davies

(p. 91) Laboratory Earth Colonies – John Gottman

(p. 94) Interstellar Viruses – George Dyson

(p. 97) Computers Are the New Microscopes – Terrence Sejnowski

**(p. 99) Silicon Immortality Downloading Consciousness into
Computers –** David Eagleman

(p. 102) The Implementation of Life in Engineered Materials – Neil
Gershenfeld

(p. 104) Decoding the Brain – Gary Marcus

(p. 107) Cheap Cryonic Suspension of Brains – Bart Kosko

(p. 111) Superintelligence – Nick Bostrom

(p. 123) Thinking Small: Understanding the Brain – Irene Pepperberg

(p. 119) The Synchronization of Brains – Jamshed Bharucha

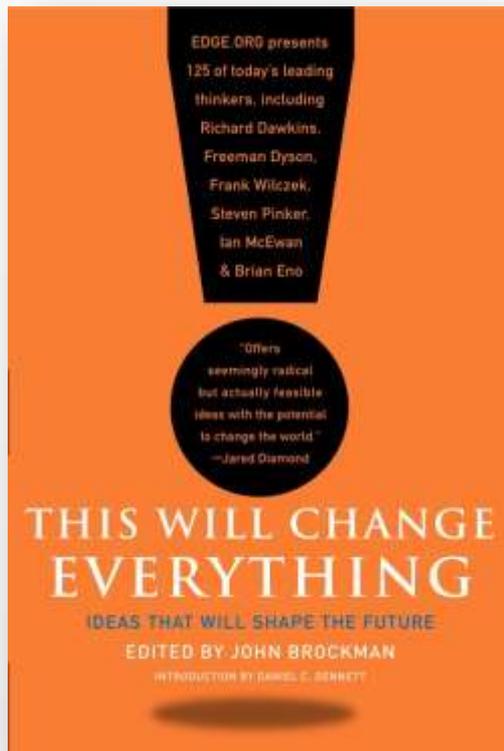
(p. 128) Never-Ending Childhood – Alison Gopnik

(p. 132) The Ebb of Memory – Kevin Slavin

The readings above represent only half the book. You will be required to write one (final essay) of the 2,000 word essays on one or more of the remaining pieces in the book. Look for titles in the table of contents that look interesting, develop a question, run it by me for approval.

Remaining Readings

(Choose one, design question, submit to me for approval, and write one 2,000 word essay.



Malthusian Information Famine – Charles Seife
Reading Minds – Kenneth Ford
True Lie Detection – Sam Harris
Radiotelepathy: Direct Communication from Brain to Brain – Freeman Dyson
Little Changes Make the Biggest Difference – Barry Smith
Neuronally Expressed Messages – Peter Schwartz
A New Kind of Mind – Kevin Kelly
The Age of Reputation – Gloria Orrigi
Cracking Open the Lockbox of Talent – Howard Gardner
Culture – Timothy Taylor
Molecular Manufacturing – Ed Regis
Resizing Ourselves – Dominique Gonzalez-Foerster
A The Actual, the Possible, and the Unimaginable – Marc Hauser
Computing the Embryo – Lewis Wolpert
Homo Evolutis – Juan Enriquez
The Open Universe – Stuart Kauffman
West Antarctica and Seven Other Sleeping Giants – Laurence Smith
Conserving the Climate: Will Greenland's Melting Ice the Deal? – Stephen Schneider
Climate Will Change Everything – William Calvin
Molecular Manufacturing and Climate Change – Eric Drexler
The Mastery of Climate – Stewart Brand
The Breakdown of All Computers – Anton Zeilinger
The Growing Perception of a Clash Between Safety and Liberty – Dan Sperber
Adopting Rationality and Sustainability – Patrick Bateson
Fusion Expectations – Roger Highfield
Green Oil – Alun Anderson
Attempts at Geoengineering – Oliver Morton
Why Don't Running Shoes Biodegrade? – Daniel Coleman
The Atmosphere – Nicholas Christakis
At Last: Technology Will Change Education – Haim Harari
Inexpensive Customizable Interactive E-Texts – David Myers
On Basketball and Science Camps – Stephon Alexander
A Web-Empowered Revolution in Teaching – Chris Anderson
Wisdom Reborn – Roger Schank
Tracks and Clusters – David Gelernter
The Mobile Phone – Keith Delvin

Energy and Economics: The Road to Civilization 1.0 – Michael Shermer
Undoing Babylon – Daniel Everett
Soul Travel for Selfless Beings – Thomas Metzinger
Inside Out: The Epistemology of Everything – Tor Norretranders
Changes in the Changers – Garrett Lisi
Neurocosmetics – Marcel Kinsbourne
Neurophenomics + Targeted Stimulation = Psychological Optimization? – Brian Knutson
Celebratory Self-Reengineering – Andy Clark
A Different Kind of Male Subjectivity – Tino Sehgal
Hidden Persuaders – Helen Fisher
A Lively Gamete Market – Henry Harpending
Immortal Cognition, Boundless Happiness – Marco Iacoboni
A Farewell to Harm – Karl Sabbagh
God Need Not Actually Exist to Have Evolved – Jesse Bering
Proof of the Riemann Hypothesis – Clifford Pickover
The Reality of Time – Lee Smolin
The Existence of Additional Spacetime Dimensions – Gino Segre
Black Holes: The Ultimate Game Changer? – Paul Steinhardt
We Are Learning to Make Phenotypes – Mark Pagel
The Next Step in Human Health Care – Ian Wilmut
Broadening the Spectrum of Infectious Causation – Paul Ewald
Biological Markers for Mental Illness – Eric Kandel
Recognizing That the Body is Not a Machine – Randolph Nesse
The Organism Itself as the Emergent Meaning – Brian Goodwin
Faster Evolution Means More Ethnic Differences – Jon Haidt
Africa – James O'Donnell
Epistemology Will Change the World – Lera Boroditsky
Social Media Literacy – Howard Rheingold
The Decline of Text – Marti Hearst
The End of Analytic Science – Mihaly Csikszentmihalyi
Coordinated Computations Power Will Change Science – Lisa Randall
Carniculture – Austin Dacey
Exploitability – David Buss
Post-Rational Economic Man – David Berreby
Nothing Will Change Everything – Richard Foreman

Beyond Boolean Logic, Digital Manipulations and Numerical Evaluations – Verena Huber-Dyson
People Who Can't Intuit in Six Dimensions – Robert Sapolsky
Massive Technological Failure – David Bodanis
Happiness – Betsy Devine
Our Brave New Map of the World – Christine Finn
The Unmasking of True Human Nature – Aubrey De Grey
And if the Big Change Doesn't Arrive? – Carlo Rovelli
"Everything" has Already Changed – Kai Krause
The Slow-Motion Revolution – Robert Provine
Why Human Nature Will Rebel – Nicholas Humphrey

How to think for this class ...

In this class we will NOT be looking for answers. Our quest will be for the next important question. During our class discussions, I'll ask you from time-to-time, "What is the next question?" as it relates to our discussion. Pay attention to the way that you are thinking when you are searching for questions as opposed to searching for answers.



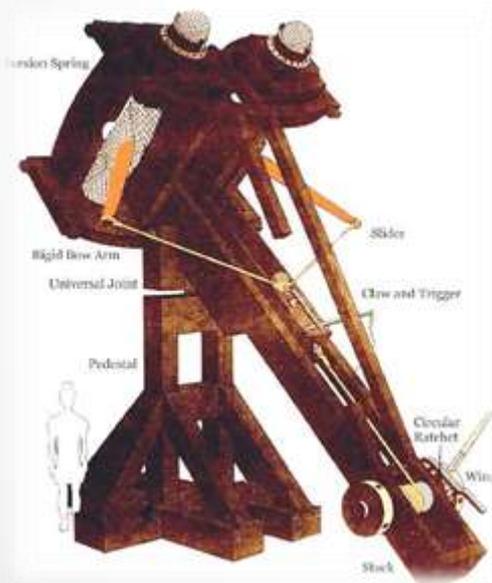
Our biggest question?

What does it mean to be human today? Tomorrow?

**Being human is a Given.
Preserving, perpetuating
or changing our
humanity is a choice.**



Is it science vs. the humanities? Do you, as students, sometimes divide your fellow students up into “artsy” types and “science/math types?”



VS.?



The Questions in the context of the “either/or” dichotomy-driven media culture.

Conventional/Popular View of Science =

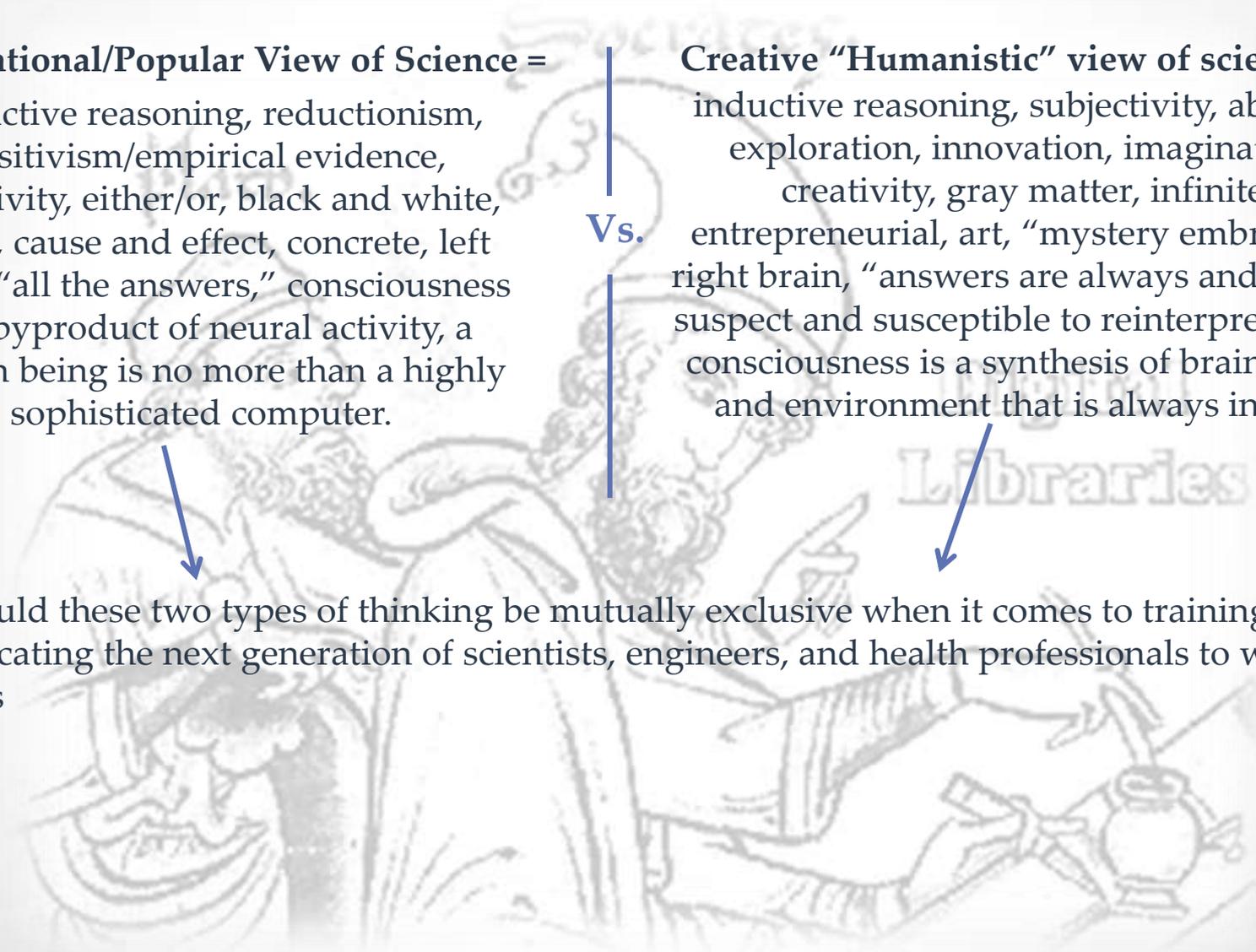
deductive reasoning, reductionism, positivism/empirical evidence, objectivity, either/or, black and white, finite, cause and effect, concrete, left brain, “all the answers,” consciousness is a byproduct of neural activity, a human being is no more than a highly sophisticated computer.

Vs.

Creative “Humanistic” view of science =

inductive reasoning, subjectivity, abstract, exploration, innovation, imagination, creativity, gray matter, infinite, entrepreneurial, art, “mystery embraced,” right brain, “answers are always and forever suspect and susceptible to reinterpretation,” consciousness is a synthesis of brain, body, and environment that is always in flux.

Should these two types of thinking be mutually exclusive when it comes to training, educating the next generation of scientists, engineers, and health professionals to write?
This

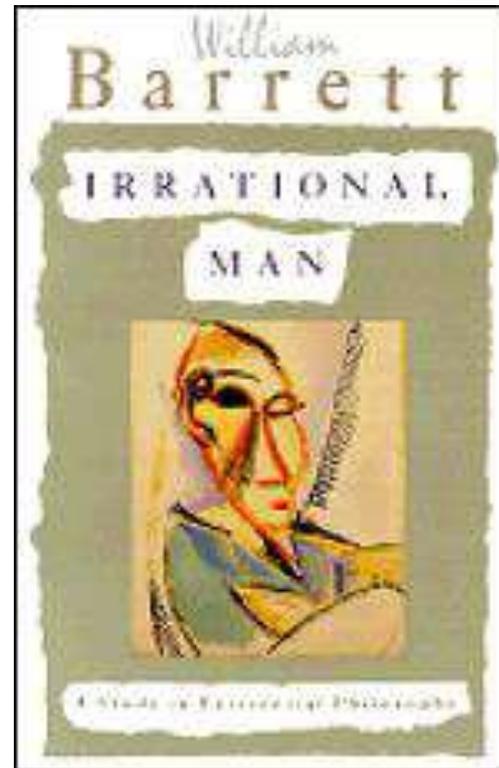


The Questions???

Has the battle for specialized training in education won out? At the expense of humanities? Are the questions the humanities asks outdated? Or needed now more than ever?

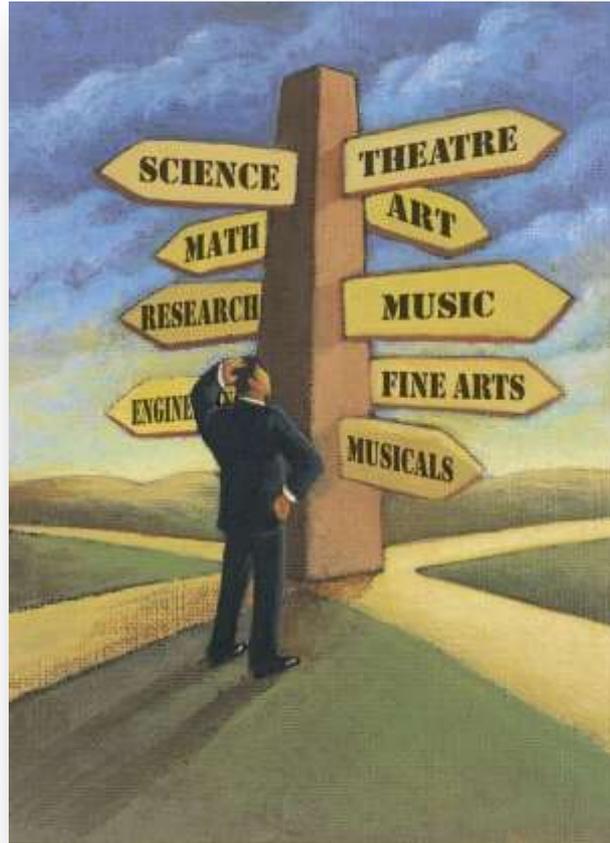
“Specialization is the price we pay for the advancement of knowledge. A price, because the path of specialization leads away from the ordinary and concrete acts of understanding the terms of which man actually lives his day-to-day life.”

—William Barrett, *Irrational Man*



The Questions???

Science seems to have an “everything is empirical, everything can be reduced” image problem with many in the humanities and the humanities seem to have a “we will never know everything there is to know about any one thing, let’s party with subjectivity, and, yes, emotions matter” image problem with those in the sciences.



Is our responsibility to teach future STEM professionals austere methods in writing that only lend themselves to analytical organization, linear sequencing, and reductionist rhetorical strategies? Or, should we also explore the iconic humanities question when we develop our curricula/assignments — What does it mean to be human? — a question that lends itself to imagination, creativity, mystery in various contexts? Today, is there a better context than science and technology in which to ask this question?

Everything seems to keep coming at us at an accelerated, non-linear rate ...



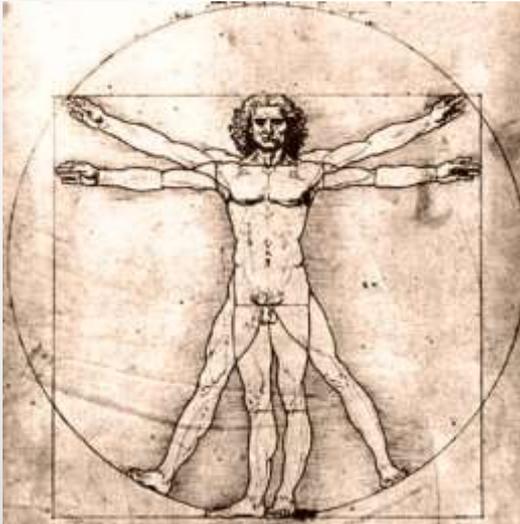
“An analysis of the history of technology shows that technological change is exponential, contrary to the common-sense ‘intuitive linear’ view. So we won’t experience 100 years of [scientific and technological] progress in the 21st century — it will be more like 20,000 years of progress (at today’s rate). The “returns,” such as chip speed and cost-effectiveness, also increase exponentially. There’s even exponential growth in the rate of exponential growth.” --Ray Kurzweil

<http://www.youtube.com/watch?v=EX69E-eoWVM> Ray Kurzweil: The Law of Accelerating Returns 4:00 – 7:00

The Questions?

Previous to the 20th Century, science and technology were products of the metaphysical culture, the humanities tradition that—within political, economic, and social contexts—inspired critical and imaginative thought, argumentation, exploration into the pervasive question What does it mean to be human?

Today, is science and technology still part of this culture? Or, because of the accelerated, exponential rate at which technological change occurs, are we proceeding at a rate that precludes the possibility of asking? Even in the 20th century, we discussed, but did not necessarily vote on: gas combustion engines, the pill, computers, etc ...



Our biological bodies are inadequate, antiquated, dysfunctional, inappropriate for the challenges of any progress we can now readily conceive. We need technical updates, new ways to define health and advancement. It's only through science and technology that this can happen. Will we leave the old ideas of what it means to be human behind?

Science and Technology Content for English Composition Courses

“We are on the cusp of a twenty-first-century scientific renaissance. Science is driving our culture and conversation unlike ever before, transforming the social, political, economic, aesthetic, and intellectual landscape of our time. Today, science is culture. As global issues—like energy and health—become increasingly interconnected, and as our curiosities—like how the mind works or why the universe is expanding—become more complex, **we need a new way [or a return to the 19th century] of looking at the world that blurs the lines between scientific disciplines and the borders between the sciences and the arts and humanities.**”

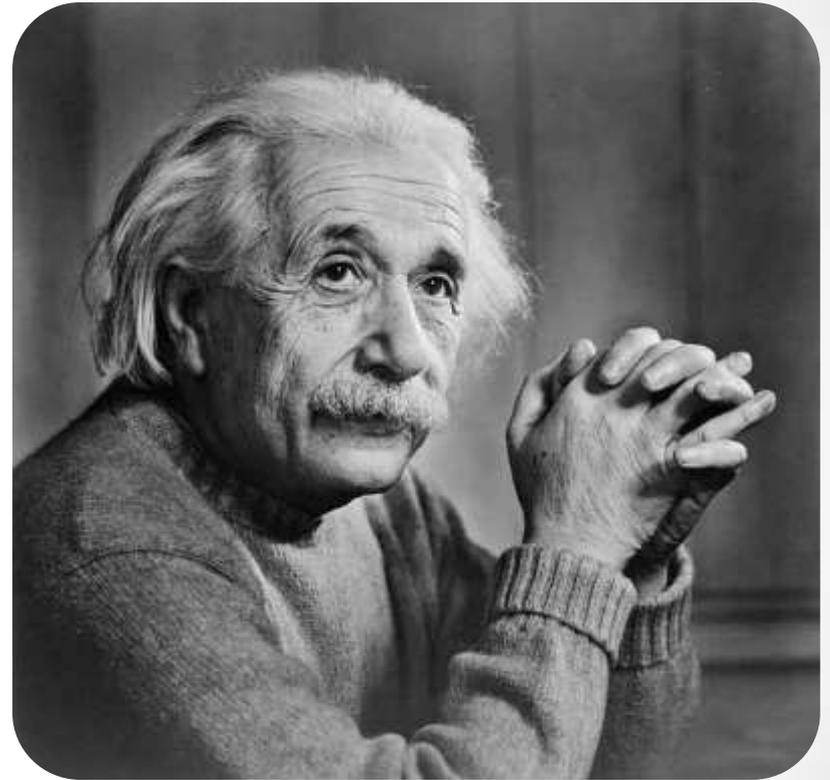
Adam Bly
Science is Culture



Science and Technology Content for English Composition Courses

Imagination is more important than knowledge, for knowledge is limited to all we know and understand, while imagination embraces the entire world, and all there ever will be to know and understand.

—Albert Einstein



(p. 115) Read Gregory Paul's "Becoming Robotic" first. It's a good summary of some of the issues we will be touching on this semester. Gregory hints at implications, but essentially admits he does not know what will happen if these technological fruitions come to pass. Some quotes from this text to keep in mind:

- "... advancing technology [may] render death optional."
- "Evolution, whether biological or technological, has been speeding up over time , as the ability to acquire, process, and exploit information builds upon itself. Human minds adapted to comprehend arithmetic growth tend to underestimate exponential future progress."
- Researchers recently reported in *Scientific American* "That we may soon be replacing diseased and damaged parts at will, perhaps indefinitely. ... If assorted body parts ravaged by age can be reconstructed with tissues biologically as young and healthy as a child's, then those with the will and resources will reconstruct their entire bodies."
- "Even better is stopping and then reversing the very process of aging."
- "With computer power doubling every year or two, cheap personal computers should match the raw processing power of the human brain in a couple of decades, and then leave it in the dust."
- "If and when the initial medical imperative is met, elective implants will undoubtedly be used to upgrade normal brain operations."
- "The replacement of humanity with a more advanced system will be yet another evolutionary event—on the scale of the Cambrian Revolution or the Permian and K-T extinctions that killed off the nonavian dinosaurs and produced the advent of humans and the Industrial Age."

Preface: John Brockman: Brockman writes, "In 1991, I suggested the idea of a third world culture which consists of those scientists and other thinkers in the empirical world who, through their work and expository writing, are taking the place of the 'traditional intellectual' in rendering visible the deeper meanings of our lives, redefining who and what we are. And, that they do so with the understanding that they are to be challenged." Reflect on what Brockman means when he claims that scientists devoted to empirical evidence are replacing the traditional thinkers that we used to turn to for insight into the human condition? Those like writers, philosophers, clerics? Make Brockman's claim that "New tools equal new perceptions. Through science we create technology and in using our new tools we recreate ourselves" part of your answer.



Introduction: Daniel Dennett: Write this 2,000 word essay only **AFTER** you've read the book. Dennett writes, " Our species stroll through Design Space is picking up speed. Recreational sex, recreational eating, and recreational perception (hallucinogens, alcohol) have been popular since Roman times, **but we are now on the verge of recreation self-transformation that will dwarf the modifications the Romans indulged in.** When you no longer need to eat to stay alive, or procreate to have offspring, or locomote to have an adventure-packed life, when the residual impacts of these activities might simply be turned off by genetic tweaking, there may be no constants of human nature left. Except, maybe, our incessant curiosity." He also writes, "The snowball has started to roll downhill and there is probably no stopping it. Will the result be utopia or dystopia?" Take a position on utopia or dystopia. Answer how the world we become utopic or dystopic and why. Document in MLA or APA style, set up a Works Cited page.

What's coming ...

<http://www.youtube.com/watch?v=8eprl7c0rks> Designing Humanity - Genetic Engineering, 3 min

<https://www.youtube.com/watch?v=1Ugo2KEV2XQ> The coming transhuman era: Jason Sosa at TEDxGrandRapids, 15 min.

<https://www.youtube.com/watch?v=D5ShvYrYnxo> Future of the Mind, Michio Kaku, 13 min.

<http://www.youtube.com/watch?v=ofHhzzTA6bk> Dr. Michio Kaku on His New Book, "Physics of the Future: How Science Will Change Daily Life by 2100

<http://www.youtube.com/watch?v=fhJoSoqtiPg> - Michio Kaku on the Future of Science – 7:30

<http://www.youtube.com/watch?v=dTi4v3HveqE> Michio Kaku: The Dark Side of Technology 6 min

https://www.youtube.com/watch?v=VAh_vOWi-VY "Questions W/ Answers and Questions W/O Answers": Dr. Alan Lightman, 58:20

Method ...

<https://www.youtube.com/watch?v=e8-ugU0bpJs> Is science value- and emotion-free? - EO Wilson, 5 min

<https://www.youtube.com/watch?v=YltEym9H0x4> – Richard Feynman on knowing, 4min

<https://www.youtube.com/watch?v=9kirzr6lnSs> – Richard Feynman, Disrespect for Respectable, 9 min

<https://www.youtube.com/watch?v=sAfUpGmnm4> – Feynman, the way nature works, 6 min

Humanity/Existence ...

<https://www.youtube.com/watch?v=qzQBFIldRPk> E.O. Wilson explains the meaning of human existence, in 6 min.

<https://www.youtube.com/watch?v=lx26k8LTCdI> E.O. Wilson: Science, Not Philosophy, Will Explain the Meaning of Existence, 9 min

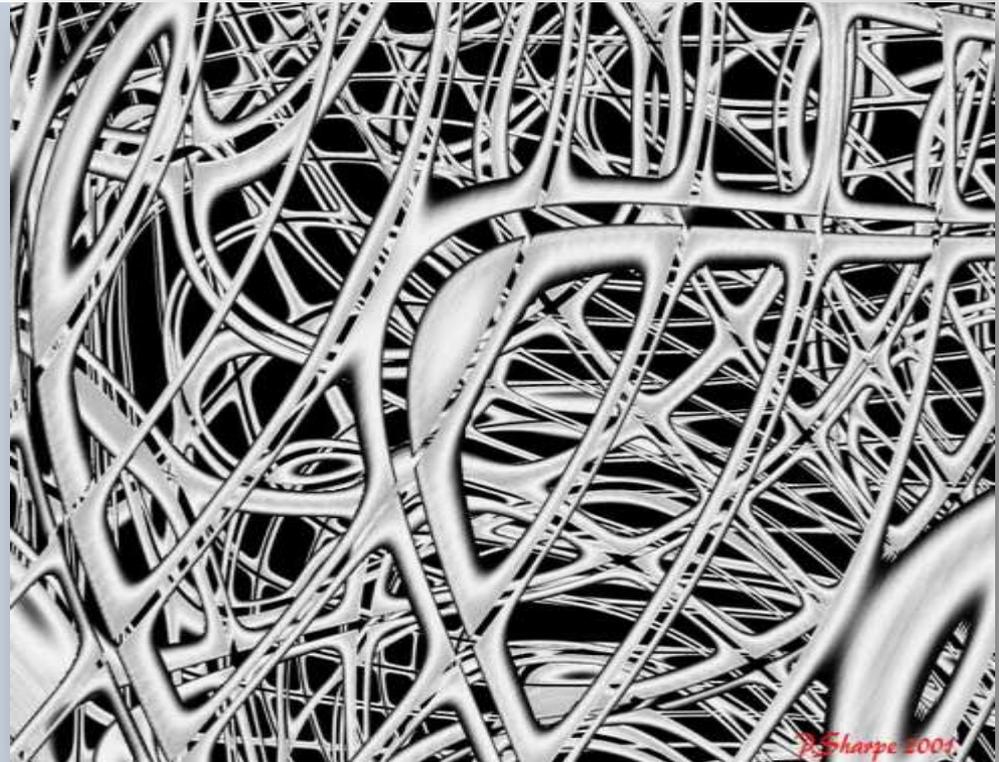
<https://www.youtube.com/watch?v=4Qhlp-X3EHA> Dialogue: What is the Role of Science in Morality? 35 min.

(p.1) Evolution Changes Everything,

Scott Sampson: First a definition of complexity might be useful: Mitchell Waldrop, author of *Complexity*: writes:

The balance point — often called the edge of chaos — is where the components of a system never completely lock into place, and yet never completely dissolve into turbulence either ... The edge of chaos is where life has enough stability to sustain itself and enough creativity to deserve the name life. The edge of chaos is where new ideas and innovative genotypes are forever nibbling away at the edges of the status quo and where the entrenched old guard will eventually be overthrown. The edge of chaos is where

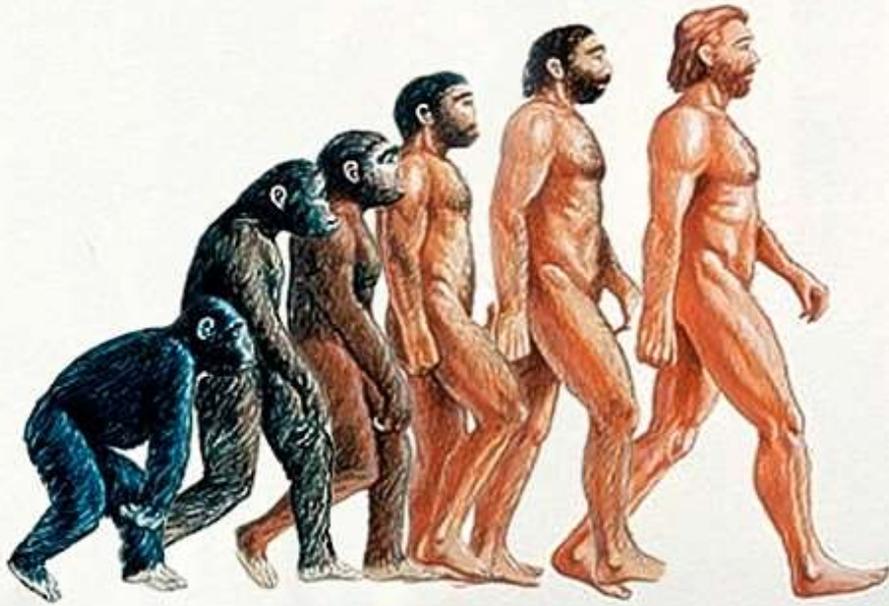
centuries of slavery and segregation suddenly give way to the Civil Rights movement of the 1950s and 60s; where seventy years of Soviet communism suddenly give way to political turmoil and ferment; where eons of evolutionary stability suddenly give way to wholesale species transformation. The edge is the constantly shifting battle zone between stagnation and anarchy, the one place where a complex system can be spontaneous, adaptive, and alive.



<http://www.youtube.com/watch?v=bN2N7gqAax0> TEDxCanberra - Boho Interactive - Chaos, complexity, balloons and bunnies, 18 min.

http://www.youtube.com/watch?v=jS0zj_dYeBE TEDxRotterdam - Igor Nikolic - Complex adaptive systems, 16 min.

<http://www.youtube.com/watch?v=BjveRsCxypU> Jaron Lanier on the future of the web, 5:30



“Complexification” Sampson writes, reflects the reductionist world view that has driven science for four centuries, including, Darwin’s natural selection, the discovery of penicillin, and a myriad of other examples. A more creative, inductive approach includes the idea of evolution as a “unification,” that the “numerous and dramatic increases in complexity, it turns out, have been achieved largely through a process of integration, with smaller wholes becoming parts of larger whole. Again and again we see the progressive development of multipart individuals from simpler forms. Thus, for example, atoms become integrated into molecules, molecules into cells, and cells into organisms. At each higher, emergent stage, older forms are enveloped and incorporated into newer forms, with the end result being a nested, multilevel hierarchy. With these ideas in

mind, think about what Sampson says about the future of human consciousness: “Reductionism has led to stunning advances in science and technology; however, its dominant metaphor, life-as-machine, has left us with a gaping chasm between the human and non-human worlds. With ‘nature’ (the non-human world) reduced merely to resources, humanities ever-expanding activities have become too much for the biosphere to absorb. We have placed ourselves on the precipice of a devastating ecological crisis, without the consciousness for meaningful progress toward sustainability. **We are the first humans to face the prospect that humanity may have a severely truncated future.**” Sampson claims that consciousness is profoundly challenged at this point in history and that if it does not keep pace we will become, simply extinct, or we will extinguish ourselves. Are we ignorant for not seeing our potential demise? Why or why not?

<http://www.youtube.com/watch?v=kCHUrh6WSI4> Stephen Jay Gould on evolution and its teaching, 24 min.

<http://www.youtube.com/watch?v=aUFOlyt7ErE> – Richard Dawkins on Evolution [FULL] 27 min.

http://www.youtube.com/watch?v=lkexKLCak5M&list=PLD8E09BDA2899D14D&index=4&feature=plpp_video The Human Family Tree, Nat Geo – 45 min.

<http://ieet.org/index.php/IEET/more/consc20140920> Can Science Explain Consciousness, IEET, 35 min.

(p. 5) **DNA; Writing the Software of Life**, Craig Venter: Venter is one of science's leading, progressive thinkers and creative minds. He writes, **"Science is changing dramatically once again, as we use all our new tools to understand life and perhaps even to redesign it.** The genetic code [what we, through natural selection, have embodied and perpetuated and passed on] is the result of over 3.5 billion years of evolution and is common to all life on our planet. We have been reading the genetic code for a few decades and are gaining insight into how it programs for life. In a series of experiments to better understand the code, my colleagues and I have developed new ways to chemically synthesize DNA in the laboratory." In other words, Venter and his colleagues are using computers and chemicals to actually create life in the laboratory. His claim is that, "We can start with genetic information and four bottles of chemicals and write new software of life to direct organisms to



processes that are desperately needed, like the creation of renewable biofuels and the recycling of carbon dioxide. **As we learn from 3.5 billion years of evolution, we will convert billions of years into decades and change not only how we view life, but life itself.**" Venter wants to use his research for positive, what seems like ethically sound causes. But, is there a possibility that others can use this research for unethical purposes? Or that the research inadvertently turns out to cause more damage than good? Write an essay that looks at the negative impact of creating life in the lab. Be serious, don't write an essay on Frankenstein. Where and how could a negative scenario be possible? Focus on one implication and elaborate.

<http://www.cbsnews.com/video/watch/?id=7369820n> Venter on 60 Minutes – 14 min.

http://blog.ted.com/2010/05/21/unveiling_synth/ Venter on creating Synthetic Life – 18 min.

<https://www.youtube.com/watch?v=BAprizg9gMc> [BBC Documentary 2015] Bionics, Transhumanism, and the end of Evolution - Full LENGTH+ HD, 50 Min.

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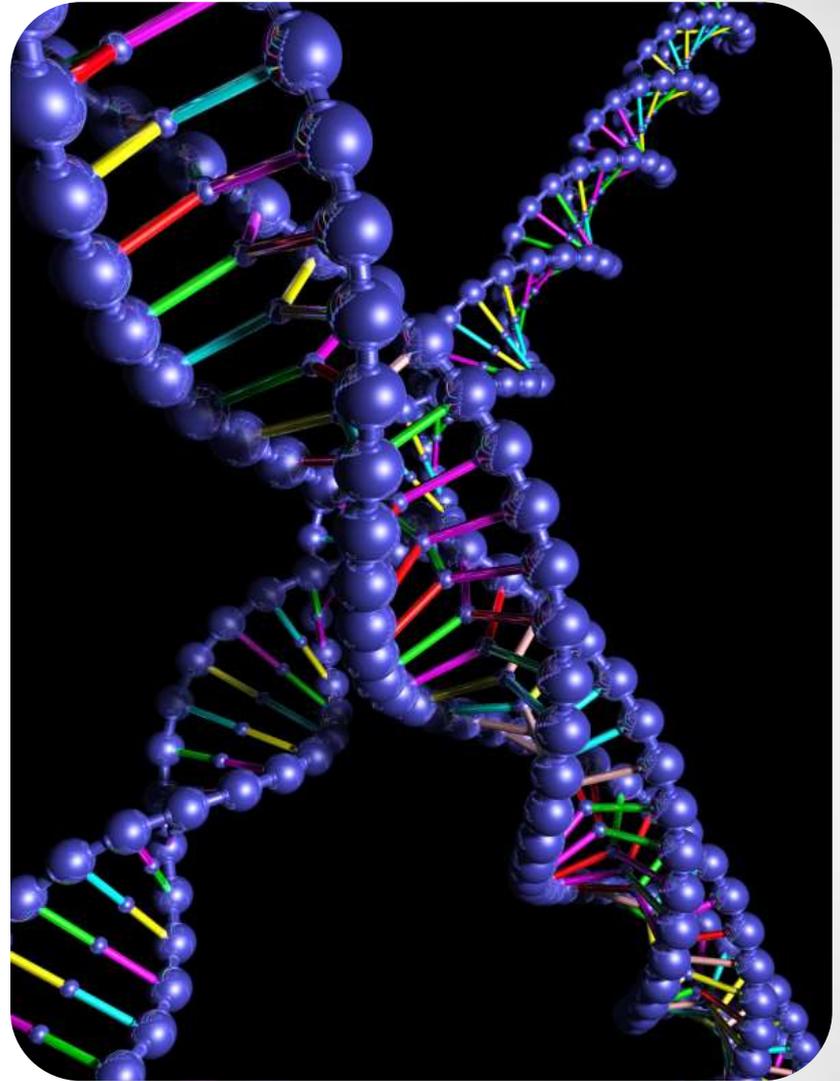
**THIS BABY
WILL LIVE TO BE
120***



May, 2013 Issue

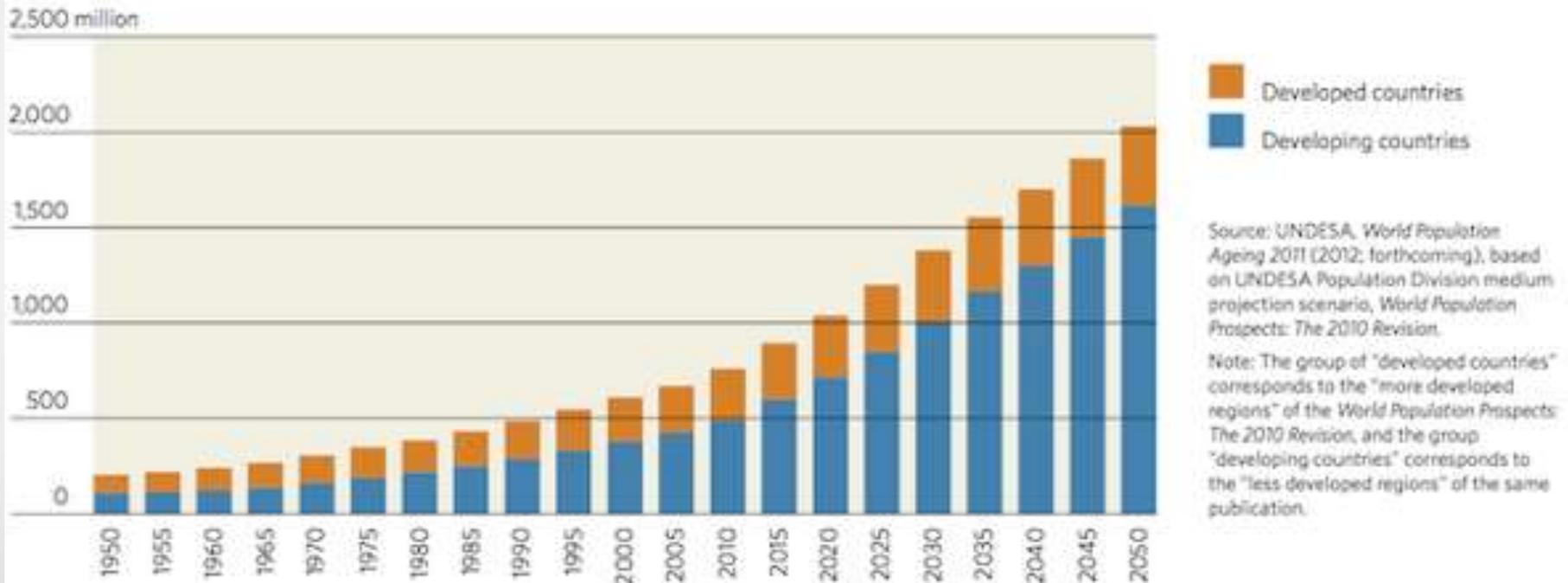
*** It's not just
hype**

New Science
Could lead to
Very long lives



***Average
lifespan in
1900 = 45**

Number of people aged 60 or over: World, developed and developing countries, 1950-2050



February/March, 2015



Living Forever: (p, 182) Living to a Hundred and Fifty– Gregory Benford; **(p. 186) Mastering Death –** Marcelo Gleiser; and **(p. 189) No More Time Decay –** Emanuel Derman: There is, in fact, a significant amount of serious research that focuses on extending life. When you think about it, isn't that the role of modern medicine anyway? Genetic engineering, tissue engineering, nanotechnology, artificial intelligence? Will we be extending life as we know it, or a new and different form of life? How would we live a life without death? As Derman and the others ask in the above short essays? For this challenge, write an essay that answers this question? Would you want to live for 500 years? Why or why not?

<http://www.youtube.com/watch?v=8eprl7c0rks> Designing Humanity - Genetic Engineering, 3 min

<http://www.youtube.com/watch?v=qa14xjYR1bE> Human Enhancement 10 min

<http://www.youtube.com/watch?v=3PAj2yorJig> TRANSHUMAN - Do you want to live forever? 23 min

In this prophetic 2003 talk -- just days before Dolly the sheep was stuffed -- biotech ethicist Gregory Stock looked forward to new, more meaningful (and controversial) technologies, like customizable babies, whose adoption might drive human evolution. Dr. Gregory Stock's levelheaded look at the hotspots where tech and ethics connect (or short circuit) have made him a popular guest on TV and radio. He directs the Program on Science, Technology, and Society at UCLA

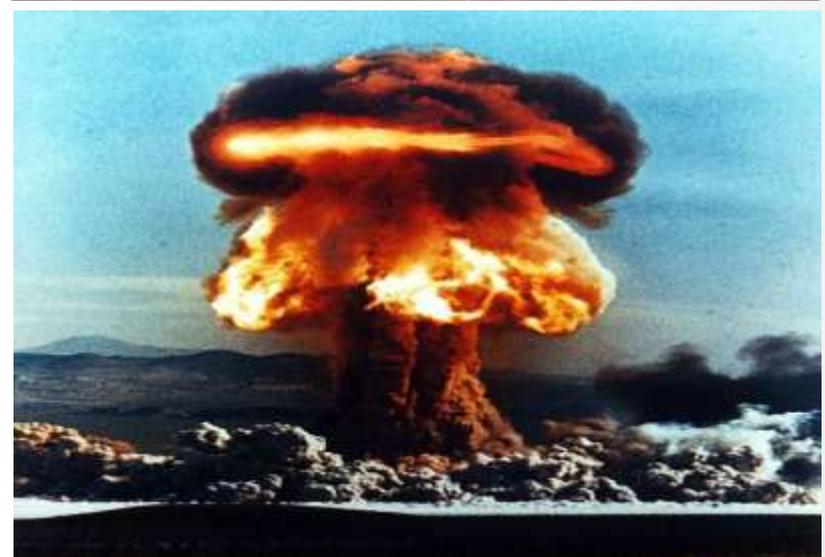


Cambridge researcher Aubrey de Grey argues that aging is merely a disease -- and a curable one at that. Humans age in seven basic ways, he says, all of which can be averted. Aubrey de Grey, British researcher on aging, claims he has drawn a roadmap to defeat biological aging. He provocatively proposes that the first human beings who will live to 2,000 years old have already been born.

http://www.ted.com/talks/gregory_stock_to_upgrade_is_human.html Gregory Stock: To upgrade is human

http://www.ted.com/talks/aubrey_de_grey_says_we_can_avoid_aging.html Aubrey de Grey says we can avoid aging

Destroying ourselves. Carl Sagan said man is the smartest AND the most stupid animal on the planet: (p. 206) The Use of Nuclear Weapons Against a Civilian Population – Lawrence Krauss; (p. 209) Deployment of a Significant Rogue Nuclear Device – Gerald Holton; (p. 210) Accidental Nuclear War – Max Tegmark: Of all the essays in this collection, with all the prognostication and forecasting they make, these are, perhaps, the scariest and most concerning. After World War II and the use of nuclear weapons on Hiroshima and Nagasaki, the United States and what was then the Soviet Union engaged in a nuclear arms race, what was then defined by the acronym MAD, meaning mutually assured destruction. No one would dare initiate a first strike because that would trigger retaliation, and this kind of exchange would literally destroy the planet and human life would be over. There have been several close calls, the Cuban missile crisis for one. And many believe, given a cynical interpretation of human nature and other variables, like the range of terrorism that exists today, that the use of nuclear weapons in the future is inevitable. Write an essay on whether you think nuclear weapons will be used in the future? How much damage will occur? Could we stop it? Be sure to address the reasons for your position including a strong thesis.



http://www.youtube.com/watch?v=TI3_0D2h8BY Archive footage of Hiroshima bombing 1 min.

http://www.youtube.com/watch?v=g_Aa8GOBYU0 Hiroshima Aftermath 1946 USAF Film, 17 min.

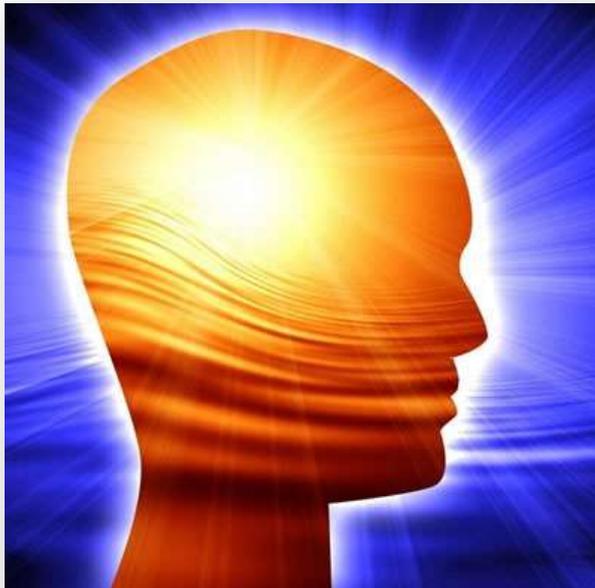
<http://www.youtube.com/watch?v=i4k2skbJm8> Atomic Alert (1951) Elementary Version, 10 min.

<http://www.youtube.com/watch?v=MDaiO9n5wEM> 'I'd drop atomic bomb on Hiroshima again if needed' - Enola Gay last survivor, 11 min

Cormac McCarthy's *The Road*

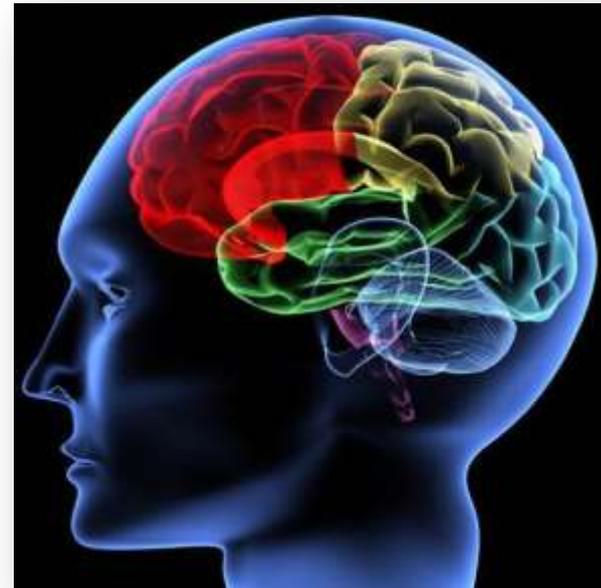
(p. 8) **A Change in Who We Are**, PZ Myers: Myers writes, “We are in the midst of an ongoing revision of our understanding of what it means to be human. We are struggling to redefine humanity and it’s going to radically influence our future.” He goes on to define two revolutions, one in developmental biology, the other in neuroscience. “Mind is clearly a product of the brain,” he writes, “and the old notion of souls and spirits are looking increasingly ludicrous. Yes these are nearly universal ideas, all tangled up in people’s rationalizations about an afterlife and ultimate reward or punishment and in their concept of self.” He feels that “the idea of soulessness and mind as a by-product of nervous activity” will be horrifying to most people. Is he right or wrong?

Mind/Consciousness



Vs.?

Brain



<http://www.youtube.com/watch?v=z1Z7Uda7mwo> Through the Wormhole- What is a Thought? 2 min

<http://www.youtube.com/watch?v=j-Xf54dEhgA> Mystery of the Self, Early Philosophers Part 1 8 min, advance to 6 min

<http://www.youtube.com/watch?v=CLwnqDvIXqI> - Sam Harris vs. Deepak Chopra (debate): Consciousness and the Brain, 5 min.

(p. 10) The Robotic Moment,
Sherri Turkle: This essay extends the ongoing discussion of what will happen when robots become “smarter” than humans, or, in this case, emotionally relatable. “Sociable technologies,” Turkle writes, “come onstage as toys, but in the future they will be presented as potential nannies, teachers, therapists, life coaches, and caretakers for the elderly.” A small extension it seems before robots also become friends and lovers. Write an essay on whether you would or would not consider having a robot as a friend or lover. Why or why not? Be real with your answer.



<http://www.youtube.com/watch?v=mdYSStF4fqc> DARPA Building Real Life Terminators Military Robots, 6 min

<http://www.youtube.com/watch?v=45yWLgI40wM> Robot Wars – USA, 15 min

<http://www.youtube.com/watch?v=IPVOPzYiCeg> Michio Kaku: How to Stop Robots From Killing Us – 4min

http://www.youtube.com/watch?v=AY4ajbu_G3k The Future of Robotics and Artificial Intelligence (Andrew Ng, Stanford University, STAN 2011) 16 min ✓✓

<http://www.youtube.com/watch?v=PkkuVBPCsFE> Dan Barry on the Future of Robotics, 15 min

<http://www.youtube.com/watch?v=PBEwZvD9Yow> The future of robots: Martijn Wisse at TEDxDelft 2012 , 12 min

<http://www.youtube.com/watch?v=L2KpYRCUjmQ> Ralph Merkle - The Future of Nanotech, 9 min

Recognize this man?



<http://geminoid.dk>

http://www.dailymotion.com/video/xhg0jt_ultra-realistic-human-looking-robot-revealed_news Zoom.in United Kingdom, 2 min

<http://www.youtube.com/watch?v=UIWWLg4wLEY> AI robot, 3 min.

<http://www.youtube.com/watch?v=IhVu2hxm07E> realistic robot can hold conversations and answer questions 2min

(p.14) The Brain Machine Interface (BMI) –

James Geary: Geary predicts the day when we will see “robots that have biological components” and cites examples that already exist, of monkeys (and now humans) who can control prosthetics with their mind, just as if it were an appendage made of tissue and bone. In the future robots will have “wetware” to go along with their hardware and humans will have hardware to go along with their organic bodies. In the article, he cites Duke University Neuroscientist Miguel Nicolelis who claims “the human body is going to be very different 100 years from now. In a century’s time, you could be lying on a beach on the east coast of Brazil, controlling a robotic device roving on



the surface of Mars, and be subjected to both experiences simultaneously, as if you were in both places at once. The feedback from that robot billions of miles away will be perceived by the brain as if you were up there.” Wow! Really? Do a “BMI” keyword search on any search engine. Write a reflective response on your own predictions of whether humans and robots will increasingly merge to the point where it might be hard to tell them apart.

<http://www.youtube.com/watch?v=AYTf6qAwe98> Neurorobotics: Brain Machine Interfaces, 9 min

<http://www.youtube.com/watch?v=Uk-ARPD7y70> Robots that are controlled by the mind! 7:30 min

<http://www.youtube.com/watch?v=wACltn9OpCc> Robot with a biological brain, 4 min.

The question of genes, memes, temes, robots, and self-awareness.

(p. 135) **Artificial Self-Replicating Meme Machines** – Susan Blackmore: Read this essay very carefully, it has huge implications and challenges some of the concepts that we previously relegated to the realm of science fiction. Blackmore outlines the evolutionary influences of genes, memes, and “temes,” or technological memes. Blackmore claims, temes and their copying machinery are here now. But she writes, quite insightfully, “We thought we were creating clever tools for our own benefit (these technological devices that have become memetic), but in fact we were (are) being used by blind and inevitable evolutionary processes as a steppingstone to the next level of evolution. “When memes coevolved with genes, they turned gene machines into meme machines. Temes are now turning us into teme machines.” She goes on to claim, like so many others, that our biological bodies are too needy and inefficient when it comes to the future of evolution and that eventually, because we are, in essence, “being used by blind and inevitable evolutionary forces, we will evolve into digital beings that can self replicate and will not require the needy variables in the physical environment (air, water, certain temperatures, food etc ...) that current humans need to survive. Decide whether you agree or disagree with her future of the human race prognosis.

MEME = an idea, behavior, style, or usage that spreads from person to person within a culture.

CULTURAL INFORMATION
PRACTICE OR IDEA OR CONCEPT
THEORIES PRACTICES HABITS SONGS
NATURAL SELECTION
EXAMPLES MIGHT INCLUDE THOUGHTS IDEAS
CHARLES DARWIN'S IDEAS
SELF-PROPAGATING
SURVIVAL AND COMPETITION INFLUENCE THEM
MEME

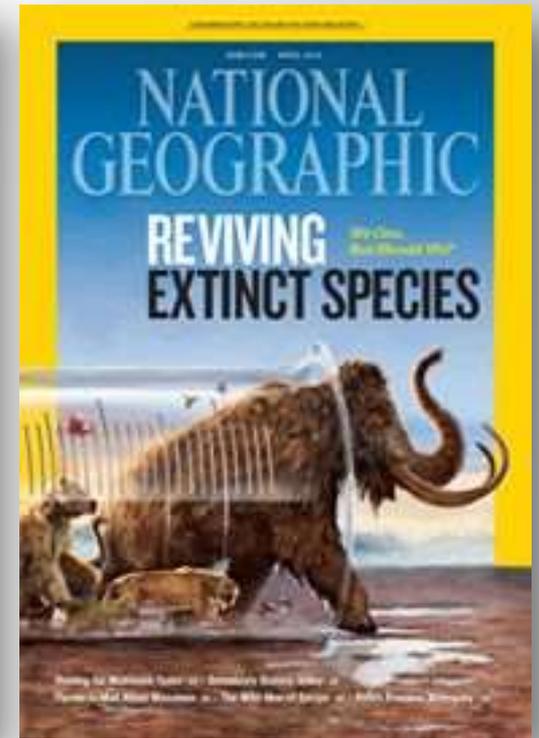
<http://www.youtube.com/watch?v=xCzb6SuyriU> Richard Dawkins on memes - Cannes Lions 2013, 3:30 min.

<http://www.youtube.com/watch?v=KzGjEkp772s> Dan Dennett: Dangerous memes, 17 min.

<http://www.youtube.com/watch?v=IMkHYE9-R0A> Hod Lipson: Robots that are "self-aware" 8min

http://www.youtube.com/watch?v=fQ_9-Ox5Hz4 Susan Blackmore: Memes and "temes" 21 m

(p. 17) **Breaking the Species Barrier** – Richard Dawkins: In the beginning of Dawkins' essay, he claims that “our ethics and our politics assume, largely without question or serious discussion, that the division between human and ‘animal’ is absolute.” In this essay, argue whether you believe this statement is true or false, that the division between humans and animals is absolute. Why or why not?



SCIENTIFIC AMERICAN™

Efforts to Resuscitate Extinct Species May Spawn a New Era of the Hybrid

What does de-extinction mean for biology and the environment? By [David Biello](#)

<http://www.youtube.com/watch?v=d-ZCuNKnxNE> Hybrids-Genetically Crossing Humans and Animals, 15 min

<http://www.youtube.com/watch?v=AdzepK-LVtU> The Age of Transitions (full length documentary), 58 min

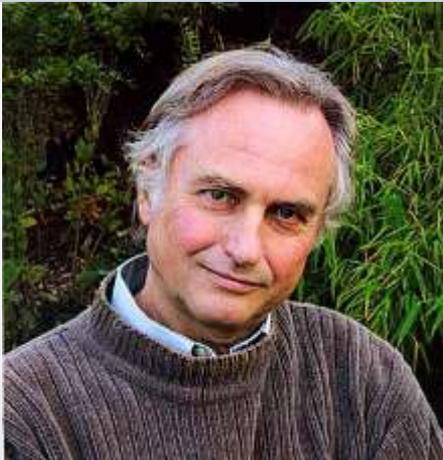
<http://www.youtube.com/watch?v=CcnTdO47p0Q> Trans-Humanism / Genetic Modification of all Life / Nano-Technology / HAARP / Geoengineering – Film, 1:37:00

Human-Animal Hybrids, Human Cloning and Bizarre Genetically Engineered Life Forms— Is This the Dark Future that We Are destined For?

<http://futurestorm.blogspot.com/2010/12/human-animal-hybrids-human-cloning-and.html>

Are we headed for a dark future where "Watchers technology" is fully unleashed? Will it be a future where "man-made life" and bizarre human-animal hybrid creatures are free to roam and breed and spread across the face of the earth? Such notions would have once been too bizarre for most science fiction novels, but genetic engineering technology has advanced to such a degree today that it is really hard to say what "life" will look like on earth in the coming decades. At this point there are very few restrictions remaining on fields such as nanotechnology, biotechnology, synthetic biology, cloning

and genetic modification. All over the world, scientists are feverishly combining different kinds of animals together, adding plant genes to certain animals, and even putting human DNA into plants and animals. Life as we know it is literally changing, and it is very hard to tell what the future is going to look like if all of this continues.



Richard Dawkins

By all means let's be open minded, but not so open minded our brains drop out.

Isn't it sad to go to your grave without ever wondering why you were born? Who, with such a thought, would not spring from bed, eager to resume discovering the world and rejoicing to be part of it?

I am against religion because it teaches us to be satisfied with not understanding the world.

http://www.youtube.com/watch?v=tD1OHO_AVZA Richard Dawkins vs Cardinal George Pell on Q&A (10-4-2012) – 1hr

(p. 20) Slippery Expectations – Corey S.Powell: Powell, ranking in order of probability, lists the following: The real end of oil; Genetically engineered kids; Life detected on an exoplanet; Synthetic telepathy; Life spans past two hundred (or a thousand); Conscious machines, Geo engineering; Desktop fusion; Communication with other universes; Anti gravity devices; ESP verified. Select one of the above that you agree or disagree with. In this essay, defend your choice.



Transcendent Man: Ray Kurzweil

<http://www.youtube.com/watch?v=5MeWBIKYOvw&list=PL477C6362A7B388FA&index=3> Neil deGrasse Tyson: Living and Longevity - 2min

<http://www.youtube.com/watch?v=APB7IbVwPr0> Through the Wormhole, longevity, 3:35

<http://www.youtube.com/watch?v=f4ov1CqqMuM> 100 Years and Beyond: Increasing Human Life Expectancy – 9 min.

<http://www.youtube.com/watch?v=qHQ7bUAQVUE> The Ethics of Genetically Engineering Children - Arthur Caplan – 6min.

<http://www.youtube.com/watch?v=p2PAJo0NpSE> Genetically Engineered Ethical Super Babies? 4:40

<http://www.youtube.com/watch?v=788ng7Oq2vM> Engineering Our Children- 14min

<http://www.youtube.com/watch?v=iLWm0kc4L98> Genetic Engineering on Children has already begun 1:30

(p. 25) The Full Flourishing of Solar Technology – Ian McEwan. Write an update on the latest in solar technology as a renewable energy source.



<http://videos.howstuffworks.com/discovery/32254-future-car-solar-cars-video.htm> Future Car: Solar Cars, 2:46

<http://www.bing.com/videos/search?q=peak+oil&view=detail&mid=D32CC91B474D9FDF33C6D32CC91B474D9FDF33C6&first=0&FORM=NVPFVR> Peak Oil, 2 min

<http://on.aol.com/video/peak-oil-and-global-warming-516926341> 3:30



(p. 27) **Personal Genomics – Or Maybe Not** – Steven Pinker. Pinker writes about the unpredictability of prognostication based on technology. Then he writes of 5 positive outcomes of the coming market consequences of personal genomics: Personalized medicine; An end to genetic disease; Universal health care; An end to genophobia; Empowering medical consumers. Pick one of these and write on whether you feel his speculation will come true.



Steven Pinker

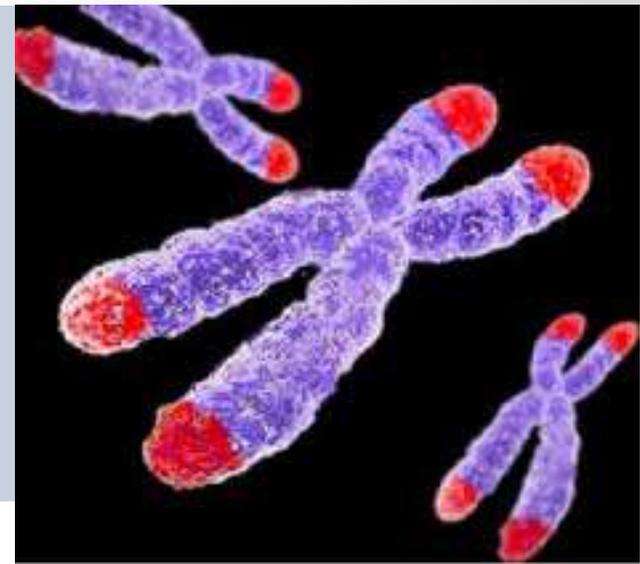


<http://www.youtube.com/watch?v=Ofm-q7oBr3Q> Steven Pinker on Human Evolution - 5:28

<http://www.youtube.com/watch?v=jiJrM3GX-Qg> NOVA scienceNOW : 39 - Personal DNA Testing, Art Authentication, Capturing 52 min

<http://www.youtube.com/watch?v=PhoVcL7Ssmk> Code For Life: The Human Genome, 10:30

(p. 30) Our Genes Are Not Our Fate – Dean Ornish: Ornish writes: “New studies show that ... comprehensive lifestyle changes may change expression in hundreds of genes in only a few months- “turning on” (up-regulating) disease-preventing genes and “turning off” (down-regulating) genes that promote heart disease, oncogenes that promote breast and prostate cancer and genes that promote inflammation and oxidative stress. These lifestyle changes also increase telomerase, the enzyme that repairs and lengthens telomeres—the ends of our chromosomes, which control how long we live.” This assignment is relatively easy but requires strategic elaboration. For this essay, report words how telomeres work?



<http://www.youtube.com/watch?v=6mhL4bOMmCI> What's a Telomere and Why is it Important to the Aging Process, 10 min

http://www.youtube.com/watch?v=1Bngws_cWho Telomeres and Aging, 12 min Ted Talks

<http://www.pbs.org/wgbh/nova/body/epigenetics.html> NOVA, Epigenetics, 13 min. How environment influences our genetic expression.

(p. 32) A Forebrain for the World Mind – W. Daniel Hillis: Hillis writes that the world brain, the internet, needs a “forebrain with conscious goals, access to explicit knowledge, and the ability to reason and plan.” What do you think will happen when computers reach a point of “consciousness” and they can “reason and plan?”

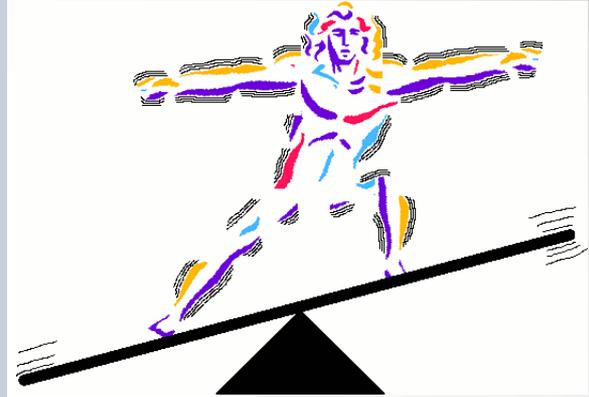
<http://www.youtube.com/watch?v=Q2JD5xg6weE> The Hard Problem of AI: Selection from Matrix Science Documentary Part 1 of 2, 8:17

<http://www.youtube.com/watch?v=ON115e1yamU> The Hard Problem of AI: Selection from Matrix Science Documentary Part 2 of 2, 5 min

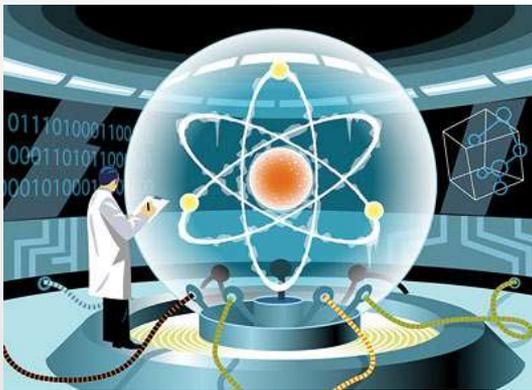
<http://www.youtube.com/watch?v=uwnRMpJzjmI> LIVING WITH ROBOTS -- Honda - The Power of Dreams, 8:30

<http://www.youtube.com/watch?v=pu5EQCMXox0> The Android Prophecy - 60 minute Documentary Trailer, 5:30

(p. 36) Future as Present: A Final Experiment – Ernst Poppel: In his “species experiment,” Poppel maintains that, after final evaluation by the “gods” that “...planet 2 was much better at maintaining the stability of the environment. Why/ The species on planet 2 had always to monitor the consequences of actions of the other species” when it comes to regulating available resources. Examine Poppel’s argument carefully. Is the outcome he predicted for planet 2 accurate? That both intelligent species would work together in some kind of harmonious way (even though they could not communicate to each other) to achieve homeostasis (look this word up!)



<http://www.youtube.com/watch?v=0kxsviCkS40> Homeostasis, 7 min.



(p. 39) But We Shall All be Changed – Frank Tipler & **The Laptop Quantum Computer** – Donald Hoffman & **(p. 51) Undo the Present; Recall the Past** – Seth Lloyd: All three of these pieces delve into the future of computers, the next generation of computation and its implications. Using one example from each piece (this is for all you computer geeks!), explain what a quantum computer is and then offer, and elaborate on, an example of an outcome. What will one implication of quantum computing look like?

<http://www.youtube.com/watch?v=sICXOwOwS4E> Explaining Quantum Computing, 5:40

http://www.youtube.com/watch?v=rUWfod_8JsM Michio Kaku: How to Program a Quantum Computer, 5 min

This is a 2,000 word assignment. Find two articles OR two You Tube videos on consciousness. One must take the position that consciousness is simply a product of neural brain activity and that it, consciousness, only occurs inside us a result of the neural activity in our brains, that our brains are simply highly functioning computers that we can figure out by going through the scientific process of reduction.

The other must take a different position, that consciousness is a product of our brains, bodies, and the environment, that we gain consciousness as we engage the world and life, that this is what causes consciousness, that there is a strong element of subjectivity and variation and agency, and that “objectivity” is an illusion because everything is always changing and in flux.

Summarize the first article, then summarize the second. Use one direct quote from each. In the remainder of your essay, with a strong thesis, decide which position you agree with and three reasons why. These three reasons should be worked into your thesis.

CONSCIOUSNESS

No scientific theory of the universe can be said complete if it doesn't explain consciousness. –Piero Scaruffi



LIFE IS THE WAY THE ANIMAL IS IN THE WORLD

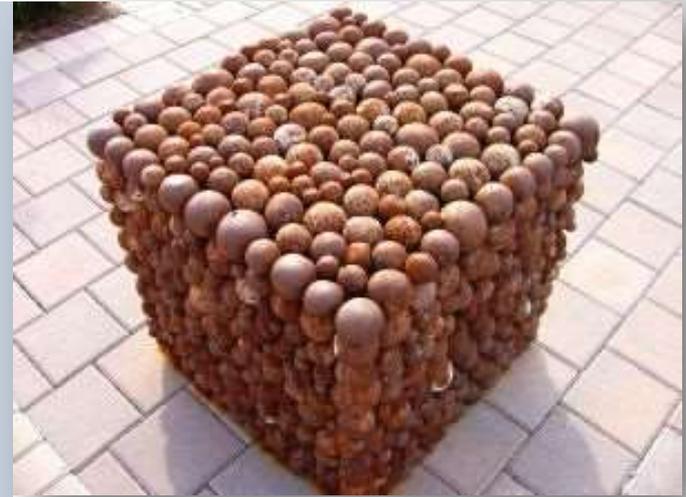
A Talk with [Alva Noë](#) [11.12.08] Topic: [MIND](#)

The problem of consciousness is understanding how this world is there for us. It shows up in our senses. It shows up in our thoughts. Our feelings and interests and concerns are directed to and embrace this world around us. We think, we feel, the world shows up for us. To me that's the problem of consciousness. That is a real problem that needs to be studied, and it's a special problem.

<http://edge.org/conversation/life-is-the-way-the-animal-is-in-the-world> Alva Noe 16 min.

<http://www.youtube.com/watch?v=Qn7sRT1se1I> Dr Mario Beauregard: BRAIN WARS The Scientific Battle Over the Mind, 25 min

(p. 43) **The Credit Crunch for Materialism** – Rupert Sheldrake: Sheldrake claims, “Materialists are sustained by the faith that science will redeem their promises, turning their beliefs into facts . Meanwhile, they lie on credit.” And, “the fundamental proposition of materialism is that matter is the only reality.” When you think about it, all the great scientific discoveries of the past, the ones that have allowed us to live longer, healthier lives, have been discoveries based in materialism. In other words, empirical, quantifiable, knowledge (not necessarily absolute) that has been gleaned from empirical evidence. This is what has led to advances in health care. But, when this “materialist” notion smacks up against concepts like consciousness and subjective experience, it runs into all kinds of resistance. Write on whether you think the physical actions/reactions of the brain, the brain’s neural activity, is totally responsible for the mind’s activity. Use an example from the essay.



Materialism: In philosophy, the position that nothing exists except physical objects and forces that are perceptible and measurable. Materials deny the existence of spirit, soul or mind as a separate type of reality, and they look for physical explanations of all phenomena- for example, by explaining thoughts or emotions in terms of chemical reactions in the brain.

Idealism: In philosophy, any view that the material world is in some way dependent on the mind that perceives it. Idealist thinkers do not necessarily deny that material objects exist, but claim that they cannot be known to exist independently of the human mind. Berkeley, Hegel, and Kant were all idealist thinkers. Idealism is opposed by Realism and materialism.

Hank Pellissier, *Ethical Technology*

Will “the self” survive because it can provide people with a greater sense of happiness? Or is it - perhaps along with the constructs “Free Will” and “Determinism” - doomed to the dustbin of history? Should cyborgs, avatars, and a rewired human brain be developed with a stronger or weaker sense of self?

<http://www.youtube.com/watch?v=jTWmTJALe1w> Consciousness, Qualia, and Self (V.S. Ramachandran), 8min

<http://www.youtube.com/watch?v=TvmOjGMnap8> What Is Consciousness? - What The Bleep Do We Know, 5 min

<http://www.youtube.com/watch?v=zGv1Nay2z-U> What is the self? 3min

<http://www.youtube.com/watch?v=RgfFFRFPvyw> Closer To Truth asks Jaron Lanier: What's the Meaning of Consciousness? 8:40

<http://www.youtube.com/watch?v=CPGvu8IT8HY> Closer To Truth asks Daniel Dennett: Can Brain Explain Mind? 12:30

● <http://ieet.org/index.php/IEET/more/consc20140920> Can Science Explain Consciousness, IEET, 35 min.

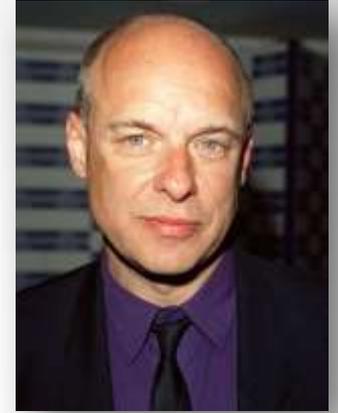


<http://sciencefriday.com/playlist/#play/segment/8986> Alan Alda on Science Friday, 7 min audio



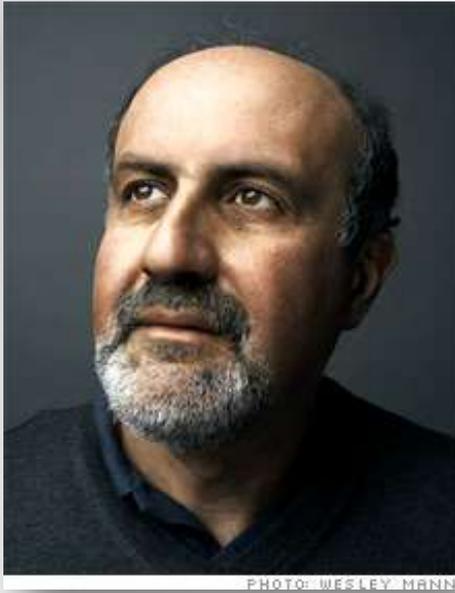
(p. 54, 58,72) **Rounding an Endless Vicious Circle, Alan Alda and The Feeling That Things Will Get Worse – Brian Eno and Avoiding Doomsday, Alexander Vilenkin:** Alda writes: “We keep rounding an endless vicious circle. Will an idea of technology emerge anytime soon that will let us exit this lethal cyclotron before we meet our fate head on and scatter into a million pieces? Alda thinks not. He is cynical about human nature’s ability to save itself and is more likely to destroy itself. Eno captures a pervasive feeling that many have today, that we are in “end times.” Do you have the “feeling” Eno writes about? That “resources [become] scarce [and] will be rapidly exhausted as everybody tries to grab the last precious bits. Freeloaders and brigands and pirates and cheats take control. Survivalism rules. Might makes right.” And Vilenkin writes, “It is a matter not *if* but of *when* the [final] disaster will strike,” that the only way for humans to survive is colonize space, which is very unlikely to happen. Decide how you think the world will end. Will humankind destroy itself or will it succumb to a natural disaster? If so, research what kind of natural disaster and why you think it will occur. What are the scientific probabilities?

<http://www.youtube.com/watch?v=jkae8a7gklQ> Is the Universe Fine-Tuned for Life and Mind? (Alexander Vilenkin), 11 min



<http://www.youtube.com/watch?v=9y3H1fuxXE8>, The Birth of the Long Now Foundation - Brian Eno, 3 min

http://www.youtube.com/watch?v=Od4c_b1PLj4, Curiosity: How Will the World End? | Looming Disaster, Yellowstone, Samuel Jackson, 2:30

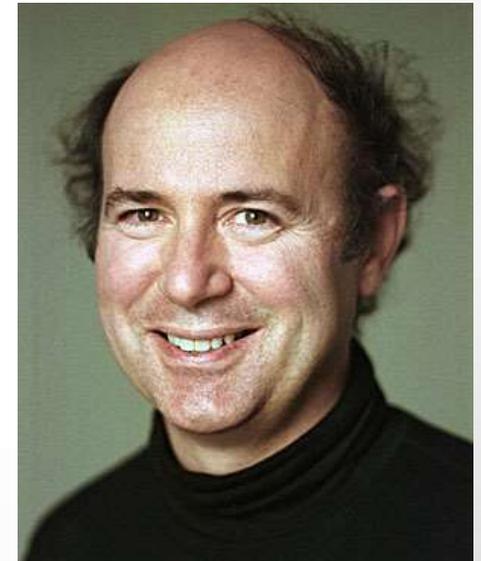


(p. 55) The Idea of Negative and Iatrogenic Science – Nassim Nicholas Taleb: Taleb writes about iatrogenics, “doing harm” and why no one has called out the field of medicine for a very poor track record. Use Taleb’s idea of how to really evaluate success based on understanding the limits of our knowledge. Find a specific example in the history of medicine where practitioners failed to “do no harm” and actually harmed patients, where, to use Taleb’s language: “Doctors, driven by the beastly illusion of control, spent a long time killing patients instead of considering that “doing nothing” could be a valid option.” Report on what you find.

http://www.youtube.com/watch?v=E3bu_7Bfatg 10 Questions for Nassim Taleb, 6 min.

(p. 60) Homesteading in Hilbert Space – Frank Wilczek: Wilszek writes: “Evolution, in its patient blindness, managed to develop photosynthesis; with mindful insight, we will do better.” Explain how photosynthesis works and then describe an energy source that is currently being developed with the “mindful insight” Wilszek claims.

<http://www.youtube.com/watch?v=k0SXx6axMJE> Superconductivity: a far-reaching theory, Wilczek, 9:30





(p. 62) Revelation – Architect, Stefano Boeri: Short but poignant. “What will change everything? Discovering that someone from the future has already come to visit us.” List and explain 10 characteristics of someone from the future.



Bosco Verticale (Vertical Forest) is a project for metropolitan reforestation that contributes to the regeneration of the environment and urban biodiversity without the implication of expanding the city upon the territory. The first example of a Bosco Verticale composed of two residential towers of 110 and 76 meters height, will be realized in the centre of Milan,

(p. 63) The Discovery of Intelligent Life From Somewhere Else – Douglas Rushkoff: Rushkoff feels that everything we are doing in genetics, nanotechnology, and artificial intelligence will only result in incremental change, that for the human race to truly be affected and create an “us,” something would have to happen to us externally. Describe what he means by this?



http://www.youtube.com/watch?v=cdawqlu0_JU TOC 2013: Douglas Rushkoff, "Present Shock, 115 min

Johannes Kroemer
Douglas Rushkoff, author of “Present Shock: When Everything Happens Now.

SCIENTIFIC AMERICAN™

The Reading Brain in the Digital Age: The Science of Paper vs. Screens

Ferris Jabr

the Atlantic

Is Google Making Us Stupid?

Nicholas Carr

Rushkoff's work with time and life in the digital age raises some interesting questions and is related to work done by others. How are we different as a result of digital technology? Read the **article "Is Google Making us Stupid"** by Nicholas CRR published by *The Atlantic* and the piece, **"The Reading Brain in the Digital Age: The Science of Paper vs. Screens"** by Ferris Jabr, that appeared in *Scientific American*. Select one of these texts, take two examples (quotes) from whatever narrative you choose, create a thesis statement based on not just if you agree or disagree with what the author is saying, but why or why not, and defend your thesis.

The articles for this This
2,000 word option are on
the Website:

www.writingforstem.com



<https://www.youtube.com/watch?v=MtLVCpZiINs> Sherry Turkle Alone Together, 16.5 Min

http://www.youtube.com/watch?v=W86P_FX6PdI Nicholas Carr: The Internet Weakens Deep Thinking, 5 min interview

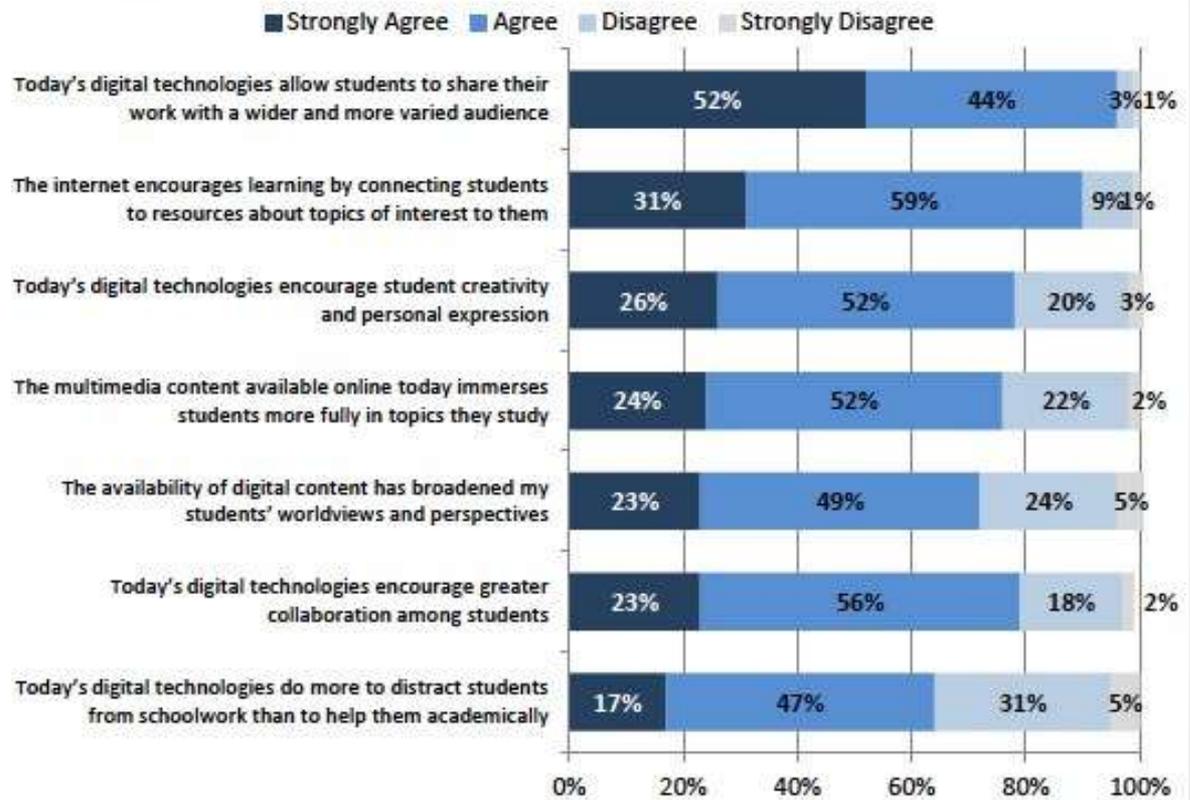
<http://www.edge.org/video/the-age-of-the-informavore> THE AGE OF THE INFORMAVORE, Edge.org, 30 min

<http://video.pbs.org/video/1402987791/> Frontline: Digital Nation, 1hr, 26 min.

A Pew Research Center [survey found](#) that nearly 90 percent of teachers believe that digital technologies were creating an easily distracted generation with short attention spans. About 60 percent said it hindered students' ability to write and communicate face to face, and almost half said it hurt critical thinking and their ability to do homework. Also, 76 percent of teachers believed students are being conditioned by the internet to find quick answers, leading to a loss of concentration...

For many, technology has become a catalyst for distraction and off task behavior with students, tweeting, or prowling through Youtube when they're supposed to be listening to the teacher or doing classwork promotes a lack of focus. Too many rapid shifts in attention, has been blamed for a loss in the ability to handle complex and challenging tasks.

Teachers' views of the impacts of today's digital ecology on student learning



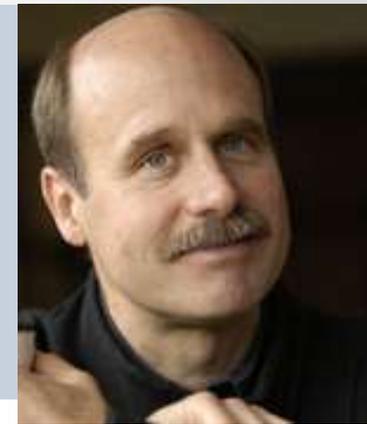
Source: The Pew Research Center's Internet & American Life Project Online Survey of Teachers, March 7 to April 23, 2012, n=2,462 middle and high school teachers.

Quick access to information can lead to a lack of critical thinking about sources and quality of information, as well as an inability to “mine for data” many students will likely click one or two pages into a Website, but no further. This means that in addition to creating concentration problems, students who multitask too much develop a tendency toward skimming rather than in-depth reading and analysis. This, more than anything, will hurt grades and the development of the intellect.

Commonly referred to by educators as the “[Wikipedia problem](#)” technology can create an expectation of easy access to information and instantaneous answers. Today students’ idea of learning about a topic is to believe what they read in online. Alas, Wikipedia has become the modern day concept of research and is considered acceptable by too many educators. Teacher reported that students are distracted constantly. Their memory is highly disorganized. Recent assignments suggest a worsening at analytic reasoning. Further, they wonder if we are creating people who are unable to think well and clearly.

I had my students read "Is Google Making Us Stupid?" at the start of the school year for the past couple of years. Across the board, they say that Carr is selling their generation short. They feel that they can do both deep reading and the shorter, connective bursts of reading online – the two aren't mutually exclusive. To use Carr's analogy, they like to jet ski and scuba dive. Like Joel's students, mine can be absorbed in digital composition or the free reading of actual books for up to (and over) an hour. Actually the length of their attention spans in my classroom often correlates to those times when the conditions for sustained learning aren't present (e.g. the day before Christmas vacation, the days when teacher doesn't have his act together, emergency preparedness drill days). So I disagree with this and see it as an attention-span awareness issue. – National Writing Project teacher

(p. 65) A Cure for Humankind's Existential Loneliness – Paul Saffo: Saffo claims we are inherently lonely, that somehow, our cultural existence has come to mean isolation, that there are no real outlets to satisfy this loneliness, that this “vast” and “aching” existential loneliness “compels our faith in gods whose existence lies beyond logic or proof.” I want to stop here when it comes to Saffo’s entry, and ask this question: “How much do you rely on logic or empirical (look this word up) proof to value what you believe to be true? What other forms of thinking do you use to form what’s true for you? Do you use faith? Does faith conflict with logic or empirical evidence? If so, what compels you do believe something is true?”



<http://www.youtube.com/watch?v=MjET9kCldzo> Futurist Paul Saffo on technology and innovation, 23 min.

<http://www.youtube.com/watch?v=Fs12Y2mGDHY> Big Think Interview With Paul Saffo, 12 min



(p. 68) AI and Intellectual Mastery – John Tooby and Leda Cosmide: Tooby and Cosmide are assuming the latest research into how our minds respond to external stimuli, that free will is an illusion, is true. They write: “Because we are in a theater, with our roles and our lines largely written for us by our mental programs, we are credulously swept up in these plays ...” Compare the current scientific view with the more conventional philosophical or religious view of “Free Will.”

<http://www.youtube.com/watch?v=iRIcbsRXQ0o> Free Will Sam Harris, 12 m

<http://www.youtube.com/watch?v=VQxji0COTBo> Steven Pinker: Free Will, 2m

(p. 72,76) Avoiding Doomsday, Alexander Vilenkin and Escaping the Gravity Well – David Dalrymple: In order for human survival to be imminent, both of these thinkers call for, perhaps via genetic modification, the expansion of human civilization into our Milky Way galaxy. Respond to this question: Will human civilization have the foresight and be proactive enough to plan our way to future habitats, or will we only think of doing so when our current environment pushes us to, when we have destroyed enough of our surroundings to make it impossible to live on earth?

http://www.youtube.com/watch?v=jTL_sJycOAA What if You Were Born in Space?, 13min

(p. 79) Synthetic Biology with Interplanetary Reach – Dimitar Sasselov: Sasselov has wildly optimistic views on how synthetic biology can create entirely new life forms with amazing adaptive abilities. (Remember Venter’s research above?) Write an essay that defines one positive implication of pursuing the field of synthetic biology. Focus on one implication.



<http://www.youtube.com/watch?v=rD5uNAMbDaQ&list=PLCF1C64C9A05EF1C9> Synthetic Biology Explained, 6:30

<http://www.youtube.com/watch?v=iRO0-fMIW9I&list=PLCF1C64C9A05EF1C9> Synthetic Biology - Inventing the Future, 42 min



(p. 81,84) Life (or not) On Mars – Rodney Brooks and **A Separate Origin for Life** – Robert Shapiro: Brooks writes that the discovery of life elsewhere in the galaxy will have profound effects on, not just science, but also philosophy and religion. And Shapiro says, “[Religion reduces its] narratives to cherished folk tales, with a message as relevant today as the science of Aristotle. Write an essay on what would happen to religion if life was discovered elsewhere. Develop a strong thesis and be detailed.

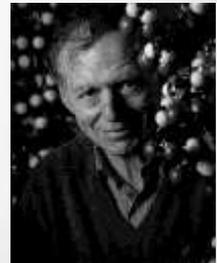


<http://www.youtube.com/watch?v=CjiRb1sy0sQ> Stephen Hawking - Encountering Intelligent Life, 7min

Bill Maher’s Religilous

<http://www.youtube.com/watch?v=Hv6U2BtdFGc> Christopher Hitchens on Science vs Religion, 16 min

(p. 84) In another perspective on Shapiro’s **A Separate Origin for Life** essay, he writes: “Nobel laureate scientists have regarded the universe as meaningless and pointless, with our life representing an accidental anomaly that will disappear sooner or later.” Decide whether and why you agree or disagree with this statement.



<http://www.youtube.com/watch?v=O1xDzLTroIo> Robert Shapiro Ph.D - Air date: 09-18-08, 58min

Biological Determinism ???

(p. 88) **A Shadow Biosphere** – Paul Davies: Davies writes, “The assumption that, given half a chance, life will win out, is sometimes called biological determinism.” And, “I believe there is a strong likelihood that Earth possesses a shadow biosphere of alternative microbial life representing the evolutionary products of a second genesis.” The history of humankind is one where humans believe they were always the center of the universe, the most intelligent, most important, most significant life forms to exist. This is reinforced via notions of religion and science. Davies is suggesting that every way in which we have discovered and defined life so far is based on the human model. I’m suggesting that this adds an arrogance to how we look at the “importance of our existence.” What if there are other life forms that have developed on earth, a different kind of microbial origin resulting in a different tree of life than our own? What would be the cultural implications of this discovery?



<http://www.youtube.com/watch?v=bwkw39Euc64> Paul Davies (1 of 3) - Beyond Belief 2006, 13 min



(p. 91) **Laboratory Earth Colonies** – John Gottman: Gottman take a “look back” on the next two centuries and introduces some of the social-psychological issues involved in galactic colonization. Two points are made. One, that anthropologist Peggy Sanday discovered that any hierarchical social structure could not last without external threat, and the “approaching” problem was to figure out how to “foster creative collaboration and minimize self-interest.” It certainly seems we face this challenge today, especially in politics and social issues. Focus on one of these issues, figure out a way to resolve it that would make all sides if not necessarily completely happy, content with the result.

<http://www.youtube.com/watch?v=GCwNnnUIQ60> Galactic Civilizations II Official Trailer, 2min

(p. 94) Interstellar Viruses – George Dyson: As he recounts his conversation with Joseph Teller, Dyson claims, "...[T]he form of life that will prove to be most successful at propagating itself will be digital life." This is a simple question. Can "life" be "digital?"



<http://www.youtube.com/watch?v=4QqP2OpLbQE> BookTV: George Dyson, "Turing's Cathedral: The Origins of the Digital Universe", 10min

(p. 97) Computers Are the New Microscopes – Terrence Sejnowski: "By 2015," Sejnowski writes, [computer] power will begin to approach the neural computation that occurs in the brain. Come up with your own question.

(p. 99) Silicon Immortality Downloading Consciousness into Computers – David Eagleman: Eagleman believes that our first foray into immortality will come via downloading our bio-chemical-neurological brain selves into "digi-land" where it will respond, evolve, and grow just like our biological selves, that we will "inhabit virtual worlds like the Matrix." The human brain has been called the single most complex entity in the universe. In the previous chapter, Sejnowski quoted Charles S. Sherrington's dream of seeing brain activity as an "enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern though never an abiding one; a shifting harmony of subpatterns." For this essay (use a quote in The Observer article below, one from the Kaku video below to help support your answer): Is it realistic to think that one day computers will be so advanced that they can replicate the human brain in its entirety of non-abiding, harmonious subpatterns? The brain, which, it can be said, is never the same from one moment to the next?

The Observer

2050 - and immortality is within our grasp

Britain's leading thinker on the future offers an extraordinary vision of life in the next 45 years

[David Smith](#), technology correspondent, [The Observer](#), Saturday 21 May 2005

<http://www.youtube.com/watch?v=tT1vxEpE1aI> Michio Kaku: Could We Transport Our Consciousness Into Robots? 4min

Supercomputers could render the wetware of the human brain redundant. Aeroplanes will be too afraid to crash, yoghurts will wish you good morning before being eaten and human consciousness will be stored on supercomputers, promising immortality for all - though it will help to be rich.

These fantastic claims are not made by a science fiction writer or a crystal ball-gazing lunatic. They are the deadly earnest predictions of Ian Pearson, head of the futurology unit at BT.

'If you draw the timelines, realistically by 2050 we would expect to be able to download your mind into a machine, so when you die it's not a major career problem,' Pearson told The Observer. 'If you're rich enough then by 2050 it's feasible. If you're poor you'll probably have to wait until 2075 or 2080 when it's routine. We are very serious about it. That's how fast this technology is moving: 45 years is a hell of a long time in IT.'

Pearson, 44, has formed his mind-boggling vision of the future after graduating in applied mathematics and theoretical physics, spending four years working in missile design and the past 20 years working in optical networks, broadband network evolution and cybernetics in BT's laboratories. He admits his prophecies are both 'very exciting' and 'very scary'.

He believes that today's youngsters may never have to die, and points to the rapid advances in computing power demonstrated last week, when Sony released the first details of its PlayStation 3. It is 35 times more powerful than previous games consoles. 'The new PlayStation is 1 per cent as powerful as a human brain,' he said. 'It is into supercomputer status compared to 10 years ago. PlayStation 5 will probably be as powerful as the human brain.'

The world's fastest computer, IBM's BlueGene, can perform 70.72 trillion calculations per second (teraflops) and is accelerating all the time. But anyone who believes in the uniqueness of consciousness or the soul will find Pearson's next suggestion hard to swallow. 'We're already looking at how you might structure a computer that could possibly become conscious. There are quite a lot of us now who believe it's entirely feasible.'

'We don't know how to do it yet but we've begun looking in the same directions, for example at the techniques we think that consciousness is based on: information comes in from the outside world but also from other parts of your brain and each part processes it on an internal sensing basis. Consciousness is just another sense, effectively, and that's what we're trying to design in a computer. Not everyone agrees, but it's my conclusion that it is possible to make a conscious computer with superhuman levels of intelligence before 2020.'

He continued: 'It would definitely have emotions - that's one of the primary reasons for doing it. If I'm on an aeroplane I want the computer to be more terrified of crashing than I am so it does everything to stay in the air until it's supposed to be on the ground.'

'You can also start automating an awful lots of jobs. Instead of phoning up a call centre and getting a machine that says, "Type 1 for this and 2 for that and 3 for the other," if you had machine personalities you could have any number of call staff, so you can be dealt with without ever waiting in a queue at a call centre again.'

Pearson, from Whitehaven in Cumbria, collaborates on technology with some developers and keeps a watching brief on advances around the world. He concedes the need to debate the implications of progress. 'You need a completely global debate. Whether we should be building machines as smart as people is a really big one. Whether we should be allowed to modify bacteria to assemble electronic circuitry and make themselves smart is already being researched.'

'We can already use DNA, for example, to make electronic circuits so it's possible to think of a smart yoghurt some time after 2020 or 2025, where the yoghurt has got a whole stack of electronics in every single bacterium. You could have a conversation with your strawberry yogurt before you eat it.'

In the shorter term, Pearson identifies the next phase of progress as 'ambient intelligence': chips with everything. He explained: 'For example, if you have a pollen count sensor in your car you take some antihistamine before you get out. Chips will come small enough that you can start impregnating them into the skin. We're talking about video tattoos as very, very thin sheets of polymer that you just literally stick on to the skin and they stay there for several days. You could even build in cellphones and connect it to the network, use it as a video phone and download videos or receive emails.'

Philips, the electronics giant, is developing the world's first rollable display which is just a millimetre thick and has a 12.5cm screen which can be wrapped around the arm. It expects to start production within two years. The next age, he predicts, will be that of 'simplicity' in around 2013-2015. 'This is where the IT has actually become mature enough that people will be able to drive it without having to go on a training course.'

'Forget this notion that you have to have one single chip in the computer which does everything. Why not just get a stack of little self-organising chips in a box and they'll hook up and do it themselves. It won't be able to get any viruses because most of the operating system will be stored in hardware which the hackers can't write to. If your machine starts going wrong, you just push a button and it's reset to the factory setting.'

Pearson's third age is 'virtual worlds' in around 2020. 'We will spend a lot of time in virtual space, using high quality, 3D, immersive, computer generated environments to socialise and do business in. When technology gives you a life-size 3D image and the links to your nervous system allow you to shake hands, it's like being in the other person's office. It's impossible to believe that won't be the normal way of communicating.'

(p. 102) The Implementation of Life in Engineered Materials – Neil Gershenfeld: Gershenfeld writes about integrating elements with electronic, magnetic, optical, chemical, or mechanical properties (biotechnology, nanotechnology, information technology, manufacturing technology) in a way that “forward” engineers, as opposed to reverse engineers, life (especially the brain) as a better way of understanding life. Define reverse engineering, then define forward engineering. Decide which approach we should allot research funding. In other words, which will benefit us the most in understanding human life?



<http://www.youtube.com/watch?v=0Zx5FUtpa0k> Neil Gershenfeld Enriching Life Key Note Presentation GGCS 2013, 16min

(p. 104,107) Decoding the Brain – Gary Marcus and **Cheap Cryonic Suspension of Brains** – Bart Kosko: Notice the difference in prognostication (predictions). Marcus opens his essay by saying, “Within my lifetime (or soon thereafter), scientists will finally decode the language of the brain.” This means in the next 40 years or so. Yet Kosko claims, “Some future biocomputing technology may extract and thus back up this defining neural information or wetware. But no such technology is in sight despite the steady advances of Moore’s Law doubling of transistor density on computer chips every two years or so.” Construct an essay that answers the question: Can any scientist, with a high level of accuracy, predict when we will have the technology to do anything? (Be careful, sometimes it takes longer, sometimes it comes quicker than expected.)

(p. 107) Cheap Cryonic Suspension of Brains – Bart Kosko: If you could easily afford it, would cryogenically preserve your brain immediately upon death? Why or why not?



"The Jameson Satellite" tells how Professor Jameson has his body sent into orbit where it remains frozen for millions of years until, with humankind extinct, aliens repair his brain and bring him back to life. Ettinger recognized that Jones had missed an obvious point: instead of hoping aliens will one day repair one's frozen body, human breakthroughs in technology may one day make it possible for physicians to repair the brain and revive someone frozen in the past.

Cryobiology and Cryonics

Cryobiology is the science that studies the preservation of biological materials by cooling them to cryogenic temperatures. [Fear of the inevitable death](#) led many people to sign up for cryonics, the cryopreservation of people after they die in hope they can be brought back to life in the future. Cryonics was first proposed by Robert Ettinger, inspired by Neil R. Jones's [science fiction](#) story "The Jameson Satellite."

<http://www.youtube.com/watch?v=bb07pKsCojI>, Cryonics, Clinical/animated 3min

● <http://www.youtube.com/watch?v=MULjw8Arm88&list=PL2E9326CA8DAAD535&index=7> Life after Death (Cryonics)/real body, 5min ●

(p. 111) Superintelligence – Nick Bostrom: Bostrom claims that, one day, machine intelligence will outperform human intelligence in every conceivable way, an argument we've heard from many significant, well-respected sources. He lands, like many do, at the end of his essay in that sticky place where no one knows if the ultimate result of enhancing machine intelligence will end up as a utopian or dystopian (for better or worse) scenario for humans. Come up with three factors or stopgaps that, given the advances in machine intelligence, we can implement to prevent machines from making human lives obsolete or even subjugated.



http://www.ted.com/talks/nick_bostrom_on_our_biggest_problems.html Nick Bostrom on our biggest problems, 16 min

(p. 123) Thinking Small: Understanding the Brain – Irene Pepperberg: The premise of this essay is the premise of every essay based on the future of the brain: Will we ever completely understand it? Most researchers think that we will, that this is a foregone conclusion. But there seems to be something about the brain that is not quantifiable, can't be measured or controlled. Or can it?
(p. 125) Controlling the Brain's Plasticity – Leo Chalupa. Even Chalupa's essay seems to indicate we will one day understand the malleable actions of billions on neurons conducting trillions of activities. Decide whether you agree or disagree that we will one day completely understand the brain? Why or why not?

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<http://www.youtube.com/watch?v=Z41BTeAU7DI> Michael Merzenich: Growing evidence of brain plasticity, 23 min

(p. 119) **The Synchronization of Brains** – Jamshed Bharucha: Bharucha writes, “Understanding how brains synchronize (conform to ‘herd’ sensibility) to form larger systems of behavior will have vast consequences for our grasp of group dynamics, interpersonal relations, education, and politics. It will influence how we make sense of—and manage—the powerful unifying forces that constitute group behavior.” But, there’s another side to this idea, which calls for the necessity of aberrant behavior. These concepts are summed up by the reporting of David Dobbs who writes in an Atlantic Monthly article *The Science of Success*: “Most of us have genes that make us as hardy as dandelions: able to take root and survive almost anywhere. A few of us, however, are more like the orchid: fragile and fickle, but capable of blooming spectacularly if given greenhouse care. So holds a provocative new theory of genetics, which asserts that the very genes that give us the most trouble as a species, causing behaviors that are self-destructive and antisocial, also underlie humankind’s phenomenal adaptability and evolutionary success. With a bad environment and poor parenting, orchid children can end up depressed, drug-addicted, or in jail—but with the right environment and good parenting, they can grow up to be society’s most creative, successful, and happy people.” For this essay, read Dobb’s article at <http://www.theatlantic.com/magazine/archive/2009/12/the-science-of-success/307761/>. With a strong thesis, compare Bharucha’s brain synchronization concepts and Dobb’s ideas about orchid children. Decide whose ideas make for a better future for humanity and why. Work in one quote or paraphrase from the article adjacent.

Parenting

How to raise an 'orchid child' to blossom

ANNE McILROY

Dec. 31, 2010 updated Jan. 01, 2011

A brown van with a small laboratory in the back pulls up at Connie Low’s home in Vancouver and a research assistant welcomes the nine-year-old inside. Soon, she is playing a frustrating computer game while machines monitor changes in her heart rate and breathing and assess other signs of stress.

The questions and tests are designed to identify “orchid children,” the 15 to 20 per cent of youngsters who are highly sensitive to their environments and very reactive to stress. This makes them more vulnerable to health and behaviour problems if they live in stressful conditions, preliminary studies have found. But with careful attention and nurturing, they can thrive and excel.

It is a new theory, a revolution in thinking that recasts genetic vulnerabilities as potential strengths. The University of British Columbia’s Tom Boyce, Anthony Herdman and their colleagues want to learn what is different about the genes and brains of orchid children, as well as the factors in their lives that help them do well.

Are mentors, for example, important? What about feeling like being part of a school community or playing a sport? One day, the work could lead to new screening tools, programs or teaching approaches designed to spot orchid children and help them bloom.

So far, the scientists have assessed 200 eight- to 10-year-old volunteers from a wide range of socioeconomic backgrounds. They plan to do 200 more by the end of the school year. They collect DNA samples and measure each child's response to stress. Connie is asked to prepare and deliver a five-minute speech about herself, both good things and bad, and to imagine she is speaking to her class rather than to research assistants and technicians. The research assistant also asks her to count backwards, by 3, from 200.

"There will be some who aren't responsive at all, some who are exceedingly responsive and a whole bunch in the middle," says Dr. Boyce, who is also part of B.C's Child & Family Research Institute. The exceedingly responsive ones are the orchid children.

The children are also asked to perform a number of tasks designed to allow researchers to learn about their brains. The video game, called flanker fish, is used to assess how well they can focus their attention. Some of the children, although not Connie, are asked to perform other tasks on the computer while a machine measures the electrical activity of their brains.

Dr. Boyce and his colleagues are focused on children, but American psychologist Elaine Aron studies adults who were very likely orchid children in their youth. She started the work two decades ago when she asked for student volunteers who were introverted and easily overwhelmed by stimulation, like being in a noisy place.

She found these individuals, up 15 to 20 per cent of the population, had much in common: They startled easily, were sensitive to pain, deeply moved by art and sensitive to bright lights, strong smells and coarse fabrics.

Since then, Dr. Aron, who works at Stony Brook University in New York, has written a number of books about highly sensitive people.

She now calls the trait sensory-processing sensitivity and says something similar is found in other animals, including fruit flies, dogs, cats and horses. Individuals with it are more likely to watch and observe a situation before plunging in.

In humans, highly sensitive individuals tend to notice more about the people around them and their physical environment, she says, but they are also easily overwhelmed. They are often seen as shy, but that is learned behaviour, she says, not part of the trait. She has also found that they are not always introverts.

She and her colleagues, including Canadian Jazzia Jagiellowicz, have started to use brain imaging to probe how highly sensitive adults process the information their eyes, ears and other senses bring in to the brain compared to control groups.

Although Dr. Aron's experiments have been exclusively with adults, she says anecdotal evidence suggests that highly sensitive children learn better from a gentle correction than a strong punishment. "They know when they have done something wrong," she says.

She has also come up with a questionnaire that parents can use to assess their children.

Dr. Boyce says Dr. Aron's work has gone a long way toward helping highly sensitive adults understand themselves, but that there is not yet a lot of evidence on how to help children. He is also a pediatrician and recommends that his highly sensitive young patients have a set of daily routines.

"They do better when they know what is going to happen," he says. "As well, being highly nurturing and caring with these kids is a highly important part of parenting."

But he is hoping the study now underway will provide doctors, teachers and parents with more information to help orchid children succeed.

Evidence suggests that when they grow up in families and communities high in stress and adversity, they are more prone to health problems, including respiratory illnesses, and are more likely to show symptoms of depression and anxiety or have problems controlling their behaviour. But if they grow up in a protective and nurturing environment, they have lower rates of illness than less reactive children.

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

According to the theory, the genes that make them so reactive to stress also make them responsive to positive influences and sensitive to social and emotional cues. So their higher risk of illness and behaviour problems is coupled with enormous potential. "They can really blossom into extraordinary people," says Dr. Boyce.

Parents' watch list

American psychologist Elaine Aron has developed a check list to assess whether children are highly sensitive to their environments.

Does your child...

- Notice the slightest unusual odour?
- Prefer quiet play?
- Complain about scratching clothing, tags in clothes or seams in socks?
- Startle easy?
- Perform best when strangers aren't around?
- Feel things deeply?
- Notice when others are in distress?
- Have trouble falling asleep after an exciting day?
- Is your child...
- Sensitive to pain?
- A perfectionist?
- Bothered by noisy places?



<http://abcnews.go.com/video/playerIndex?id=4437413> Genes Linked To Stress Response?

Redford Williams, M.D., Duke University

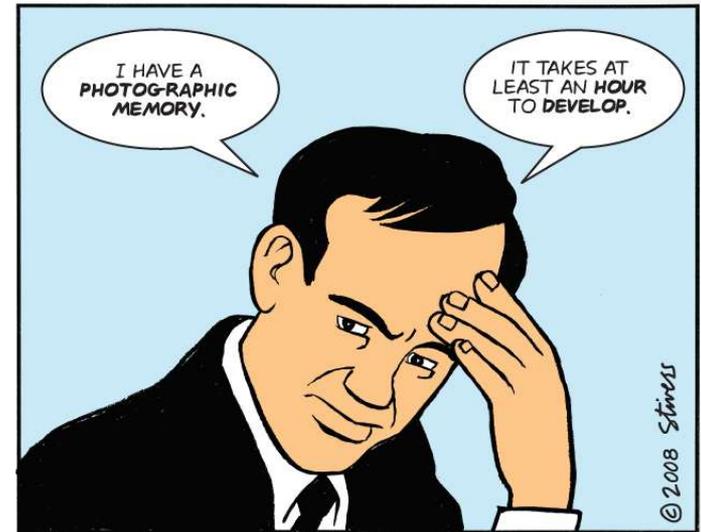
<http://www.youtube.com/watch?v=BjjvimJRevQ> Epigenetics

(p. 128) Never-Ending Childhood – Alison Gopnik: Gopnik elaborates on how recent research in neuro-plasticity and genetic regulation can extend the period in which we learn, in effect, the period we remain dependent children in a learning mode. Her hypothesis seems sound, that by extending the period we learn, we will thereby be smarter and more knowledgeable. The reason why we have the current structure of puberty, adolescence, education, graduate around 18, go to college or find a job, is because we've fashioned our world to accommodate young people spending more time in school. It works out, the world is "ready" for young people to become "dependent" when they are in their mid-20s or so. What Gopnik is suggesting is that the future may even prolong this process further, that we will create a better world if young people remain in the clutches of formal education longer, so they can learn more, become smarter and more knowledgeable. Is she correct?



<http://www.youtube.com/watch?v=TVRnbkHyXYk> Alison Gopnik ideaCity10 Children from an evolutionary perspective, 21 min

(p. 132) The Ebb of Memory – Kevin Slavin: Slavin's main premise echoes many of those who feel that we no longer need or require the kind of memory we once did, that in this digital age, everything is being recorded and stored for us. Write an essay that answers this question: What would a world be like if everyone relied on digital technology for their memory? In other words, what would happen to humankind if we replaced our current memory, the ability to register, mutate, and forget our memories?



<http://www.youtube.com/watch?v=vYYE195t7ew> DLD 2012 - Memories Are Made Of These, 107 m

<http://www.youtube.com/watch?v=7R2jE7VAzC8> Google's Effects on Memory, 4:30m