

In Learning

Reality & Unreality

[GO TO SESSION 8](#) (follow the go to's);

[cartoon1](#); [cartoon2](#)

NB: The internet links in this document work. The link to Videos and Pictures will only work if you place the contents of the data disk in the same directory as this document.

This content of this document was updated on March 7, 2010. In deference to English majors, the content was also updated for spelling and grammar to the extent permitted by law and Microsoft Word

Presented by

Greg Burke, MD, PhD
Joe Brophy FSA

New London Town Hall

Mondays, 1:30pm – 3:30pm

January 18th 2010
Thru
March 8th 2010

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Subjects and Questions: Members are asked to review this list and posit additional questions that we should attempt to cover.

1. **Nature of reality:** causality, entropy, time, space, matter (including dark), energy (including dark), existence, nature, consciousness, awareness, intelligence, soul, being, nothingness, complementarity, complexification? **Phenomenological Reality:** subjective, private experiences, curiosity, inquiry, personal interpretation of events, shapes, reality as seen by one and only one individual; deemed [spiritual](#).
Check out: [Reality](#)
2. **Math:** Why does math seem to be so fundamental to our understanding of the world? What is the cognitive basis of math? Invented or discovered? Does math exist independently of consciousness? How does one explain the epicycles of Ptolemaic cosmology (i.e. an elegant mathematical construct to support a false theory of the universe)? Russell, fl 1910: pure math is the subject in which we do not know what we are talking about, or whether what are saying is true.
3. **Consciousness:** What is it? Where is it? Is it immortal? Is it in our head or can it extend beyond our body? Can computers become conscious? What is the purpose of consciousness? Can we ever understand the machines we build? Can we ever understand the inner working of the mind? How can a Quantum Wave Collapse produce consciousness? Can the conscious become aware of nothing – **Herbert Benson MD, [The Relaxation Response](#)**. What is the role of microtubials? What is the impact (per Hammeroff) of dendrite to dendrite linkages?
4. **Logic and Knowledge:** What are the ways we know things? Induction, Deduction, Intuition, Revelation? What are the limits in the use of logic and formal systems for describing reality? Paradoxes? Incompleteness? Can we objectively describe reality or are we limited to our own brain-embodied modes of thought? Has our brain evolved to help us survive; can the mind breakout from whatever constraints exist and understand reality? How does knowledge and solutions emerge with the brain; REM sleep?
5. **Religion:** Creation /cosmology, nature and role of God, nature of the soul, afterlife? Has the idea of God evolved? Is there a "God" instinct? [Who are the “Brights” and the “Supers.”](#) **Did God Die? Read:** The Case for God, Karen Armstrong: Chapter 12 – [The Death of God](#).
6. [Paranormal](#): Is there a role for the paranormal? Has science shed any light on paranormal experiments?
7. **Metaphysics:** Ontological “urge” or “purge.” The nature of causality and entropy. The nature of Time: Tensed metaphysics (time is objective) vs. tense-less metaphysics (only a measurement tool)?
8. **Science:** Role of observation: stochastic vs. reductionism, emergence, and materialism.

9. **Revolutions and the Enlightenment.**
10. Einstein and quantum mechanics - looking for **Grand Unified Theory**
11. **Problems with current science models.** What are the inconsistencies? Why hasn't string theory produced results; will it ever?
12. **Intelligent Life:** Are we alone in the universe? Could Tegmark possibly be correct?
13. **Anthropic Thinking:** How has what "we thought" been solely a function of HOW we think? (Dawkins, Pinker, de Chardin, Kurzweil, Lackoff. others)
14. **String Theory:** What is a fundamental vibrating string. Is string theory the DNA of biology?
15. What have been the common issues: metaphysics, epistemology, physics, consciousness, religion; dualism vs. materialism? Supernatural? What does each class member think and where does our current thinking (as individuals now) FIT IN WITH THE HISTORICAL RECORD?
17. **Evolution of Homo Erectus/Sapiens:** New theory presented currently in three parts on NOVA. A three part narrative is provided in the class notes – disk 3. [See Narrative 1](#); [Narrative 2](#); [Narrative 3](#). **Homo heidelbergensis** may be the direct ancestor of both [Homo Neanderthalensis](#) in [Europe](#) and Homo sapiens. The best evidence found for these hominins date between 600,000 and 400,000 years ago. H. heidelbergensis stone tool technology was very close to that of the [Acheulean](#) tools used by [Homo erectus](#). See new findings in NOVA 3 part series on Homo Sapiens, or read the transcript given on Disk 3. Are our Brains Still Evolving, NOVA, <[microcephalin and ASPM](#)>?
18. **Virtual Reality;** Intelligent Computers; Cell Phone Revolution and Text Messaging; Will Computers compete with Humans, The Natural Computer-Human Interface; See link AND LISTEN TO THE END: [SCENE 1](#), [SCENE2](#)

Selected Topics and Scientists and Philosophers;

Deterministic chaos; Entanglement; Emergence; Evolution; Gödel's Incompleteness theorem; Inflation Theory (no, not economics!), Heaven; Local/Non-local Universe; Null Physics (Steady State), Planck time; Quantum tunneling; Religion instinct; Space; Speed of Light; String Theory, Time; Uncertainty principle.

Armstrong, Aquinas, aspect, Bell, Bohr, Bruno, de Chardin (complexification of consciousness), Copernicus (Heliocentric Solar System), Darwin, Dawkins, Descartes, Dennett, Einstein, Galileo, Gooselin, Gödel (what is true and what is provable are entirely different things), Guth,

Hammeroff, Hawking, Heisenberg (uncertainty principle), Hume, Kant, Kepler, Kurzweil, Lackoff, Mendlebrot (fractals); Newton, Pinker, Planck, Plato, Ptolemy (Earth centered Universe), Susskind, Turing (Universal Computer - Turing Machine), Young, Wright.

Syllabus/Outline: [as of January 6, 2010] This outline will undergo significant change during the next 30 days as we anticipate the interests and needs of the class, and as we attempt to stay a step ahead of the class. This outline is available at the <http://www.BrophyBlog.net> website site under **Downloads** with the caption “**Reality Outline and Syllabus.**”

Session 1: Overview: (Gödel’s Theorem may have shattered our hopes that logic would lead to a complete understanding of the universe. **Truth is simply bigger than Proof)**

1. SUGGESED HOMEWORK before first class: What does the class think about the definition of Reality found in Wikipedia? <http://en.wikipedia.org/wiki/Reality>
2. SUGGESTED HOMEWORK before first class: View the two DVDs provided covering topics “Beyond Einstein” and “Faith and Science.”
3. SUGGESTED HOMEWORK before first class: Try to read disk 3 in your computer and access many of the 100 plus papers and videos. You do not have to read them, just see if you whet your appetite for some of the topics. If you have trouble call JoeBrophy 863 9262, erhaps you can access his www.BrophyBlog.net for the same material. Good Luck!
4. SUGGESTED HOMEWORK before first class: Try to use www.google.com or www.bing.com. Pick one of the names or subjects and enter it in Google or Bing as a keyword and see where it takes you.

Session 1: SUGGESTED ORDER OF EVENTS & TOPICS (updated Jan 30, 2010)

1. Brophy/Burke: brief welcome and comments
2. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; if they delay classes, we will stay open and hold class.
3. Clarify Coffee Routine
4. Laboratory Sessions to view Videos at Library or Town Hall? Any Interest?
5. Laboratory Session: How to work the Internet or BrophyBlog.net? Does anyone need help?
6. Lending Library of Brophy/Burke books?
7. Profiles: discuss 4 given profiles? Brophy to introduce Burke with highlights [Hippocrates profile](#); Burke will clarify and expand his World View. If class is interested, it can continue with review of any one of the other three profiles Fergus, Augustine, Houdini.
8. Ask class to makes some notes on their World View Profile and expand it – this, of course, is entirely optional. All points of view are welcome and will be respected. Members who are willing can write up a profile in detail and it will be included

- anonymously in the Profile Notes.
Remember, does your profile represent your emotional beliefs or intellectual beliefs.
9. Assess or discuss whether we should lean toward lecture mode, or discussion mode. Members are encouraged to discuss what is on their mind. Members who want to take a more passive role of listening are encouraged to do so.
 10. Let's introduce ourselves and state what we would like to get out of the 8 week session. It is OK to be an active or passive class member; there is no requirement to do homework. In future sessions Class Members will be encouraged to share their World View, if inclined to do so.
 11. **Theme:** We live in a Weird World; and people have (respectfully speaking) relatively Weird Beliefs.
 12. View Dr Quantum 2 videos, about 10 minutes; [double slit experiment](#) and "[entanglement](#)".
 13. View simple video on [Einstein Relativity](#) (2 postulates), 5 minutes. (1) all uniform motion is relative – cannot tell if one is moving or standing still; (2) speed of light in a vacuum is the same for all observers undergoing uniform motion.
 14. View selected illusions: [Dancer Silhouette](#); [Inattention Blindness](#) Video [Pay attention and see if you can count 13 passes by the white team. [Necker Cube](#)?
 15. Discuss Wiki "Reality." Prompting slides/notes prepared by Burke. See Slide Show: "[Definitions of Reality BURKE](#)"

Definitions of Reality (referencing: Wiki Discussions)

Reality: Two Ontological Approaches

- **What appears:** [PHENOMENOLOGY](#), what (and how) it occurs in consciousness ([idealism](#) vs. [epiphenomenology](#))
- **What exists:** [REALISM](#), independent of the mind

Metaphysics vs. Epistemology vs. Science

- **[Metaphysics](#):** Study of what exists (idealism, materialism, dualism)
- **[Epistemology](#):** Study of nature and scope of knowledge ([empiricism](#), [rationalism](#), [constructivism](#))
- **[Science](#):** use of empiric data to construct models that can predict the future

Deduction vs. Induction

- **[Deduction](#):** Reasoning based on rules of logic and axioms.
Promises **Validity not Truth**
- **[Induction](#):** Reasoning from general fact to a conclusion. Does not guarantee truth, but **likelihood** (Hume and Popper)

Scientific Method Issues

- [Gödel's Theorem](#) (incompleteness of formal logical systems)
- Measurement Precision (sensitivity to initial conditions results in [deterministic chaos](#), weather)
- Popper's [Falsifiability](#) (problem with induction)

[Causality](#)

- Relationship between one event and another (necessary and sufficient)
- [Determinism](#) (orderly laws that specify transformation from one state to another that are in principle reversible, Newton's laws)
- [Indeterminism](#) (laws can only predict likelihood of outcome, quantum theory)
- Problem of [free will](#) in either case

World View - [WELTANSCHAUUNG](#)

- Framework of beliefs and ideas through which one interprets and experiences the world
- Belief vs. Truth (depends on what "is" is)
- What is my world view (try to write it down) (cerebral vs. feelings)
- We will revisit personal world views at end of course
- Class Rule: Each world view will be respected

Truths and Consequences of World View

- [Idealism](#) (mind or ideas)
- [Materialism](#) (only matter exists)
- [Dualism](#) (mind-body; good-evil)
- Other

Big Questions

- Time
- Space
- Matter, Energy
- Complexity (reduction vs. emergence)
- Consciousness
- Cosmology
- Life
- God

THE FOLLOWING SECTION HAS NOT BEEN REVIED WITH CLASS

1. **What do we mean by reality?** (What is *real*; in its widest sense, includes everything that [is](#), whether or not it is [observable](#) or [comprehensible](#). Einstein: A persistent illusion.

Copenhagen Interpretation: Observer creates reality.) **How can we know reality** (Observation); Though Experiments (Einstein); Non-computable sources (Penrose); Platonic Constructs – Forms; Intuition or Revelation? **Where do we know it** (in the brain, nervous system, soul, universal consciousness stuff; an illusion)? **What does it mean to know** (observing and learning vs. intuition; knowing that one knows; understanding; making associations; explaining to others. Paramecium to the Homo Sapiens.)? **What Metrics are available** for assessing whether something is Real? Shift from Qualitative to Quantitative in 16th Century Europe establishing leadership; clocks, maps, bookkeeping, precise algebraic and musical notation.

2. **Feynman, Richard:** “With regard to the questions of reality, quantum mechanics, consciousness, why math works, and ultimate causes of the universe - these problems are so hard and deep, that no one can tell whether there is a problem.”
3. **What have the Philosophers** told us about science, physics and religion? **What is Change** ([Parmenides](#), fl 500BC, everything is eternal; Instant of Change paradox; [Zeno’s Paradoxes](#))? **What is Causality?** Cause and Effect, [Contiguity](#) <Aristotle’s Law of Association>, [Existentialism](#)
4. **What have the Scientists** told us about science, physics and religion? God(s) were a partner; God is excluded from being a partner; and currently the ubiquitous role of consciousness and observation as a key to understanding reality. **Is there a role for Revelation? Can Art reveal a unique understanding of reality? Is Intuition anything different than a Good Guess?**
5. **Cognitive structures:** embedded in the [paramecium](#), the animal brain, the human brain, and in the stuff of the universe? (1) Paramecium can learn to be efficient, and exhibits intelligent behavior yet it contains no neurons or synapses. (2) mammals (3) from chimp to homo sapiens; (4) human: [Qualia](#). 10 billion neurons, each with between 1000 and 10,000 synapses linking to other neurons; thousands of dendrite to dendrite connections each with 10 million [microtubules](#); with the speculative role of white matter. (5) In the stuff of the universe, some believe that conscious occurs when the “**quantum wave function collapses.**” **What do we mean by Intelligence? Can/will computers and/or Internet become intelligent and conscious?**
6. **Role of metaphor** (figurative, symbolic language that directly connects seemingly unrelated subjects); **nature of mathematics** (science of patterns and relationships; models to predict; mappings to project; isomorphisms to compare; computations to measure reality; approximations to Platonic Forms)? **Nature of Logic** (reasoning for critical thinking; inductive and deductive arguments, axioms)? **How/why did mathematics support the [Ptolemaic Cosmology](#)** (earth at center of universe) which turned out to be false? By describing the motions of the planets as [epicycles](#)!
7. **Clockwork Theory of Universe:** Perfect universe wound up by God (Newton); Scholastics: Nicole de Oresme; conflict with Free Will), determinism vs. stochasticism, deterministic chaos, emergence, free will, supernatural. What does the Heisenberg Uncertainty principle mean for predicting the future?
8. Discussion

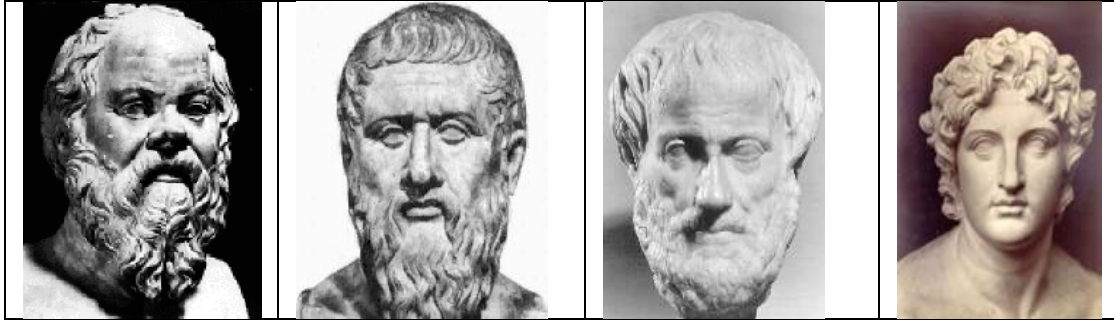
Session 2: SUGGESTED ORDER OF EVENTS & TOPICS (updated Jan 30, 2010)

1. Burke: brief welcome and comments

2. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; if they delay classes, we will stay open and hold class. In the event of emergency, call 911, and your location is “Town Hall, New London.
3. Clarify Coffee Routine; Laboratory Sessions to view Videos at Library or Town Hall? Any interest? Laboratory Session: How to work the Internet or BrophyBlog.net? Does anyone need help? Lending Library of Brophy/Burke books?
4. The Town Hall Management asks that you park in the Church parking lot and a path has been cleared through the snow bank.
5. Van Crawford has agreed to serve as Ombudsman for AIL. Your complaints about the conduct of the class should be directed to her. Van will also distribute and collect the Evaluation Forms that you will be given in the 7th session.
7. Does anyone have a burning desire to share their Worldview with the class? Has anyone prepared an anonymous write-up for future discussion? Ask class to make some notes on their World View Profile and expand it – this, of course, is entirely optional. All points of view are welcome and will be respected. Members who are willing can write up a profile in detail and it will be included anonymously in the Profile Notes.
8. Someone please take attendance.
9. Does anyone have suggestions for the conduct of our class or the substance of our class? Assess or discuss whether we should lean toward lecture mode, or discussion mode. Members are encouraged to discuss what is on their mind. Members who want to take a more passive role of listening are encouraged to do so.
11. **Theme: What happened to the Greeks? What a lineup: Socrates, Plato, Aristotle, Alexander.** It would seem that they raised all the important issues on both sides during an 80 year period or so, when perhaps they wrote it down. Many of those issues are being debated today. It has been reported that the Golden Age of Greece only lasted 25 years, during which period they constructed all the great temples of architecture.
Summary GREEK Link: [Pythagoras](#), [Euclid](#), [Aristarchus](#), [Democritus](#), [Socrates](#), [Plato](#), [Aristotle](#), and [Alexander the Great](#).



Pythagoras Irrational numbers Musical harmonics	Euclid of Alexandria 23 definitions, 5 axioms, 5 common notations	Aristarchus Heliocentric Universe	Democritus Atoms in Space
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Socrates Intellectual Inquiry, Socratic Method	Plato Epistemology; What Is an illusion? Reality?	Aristotle Polymath; Logic Nature abhors vacuum	Alexander Great Military conquest
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1. Interactive Link to All [Philosophers](#): [SHOW]
2. Colorful Overview of [Philosophy Movements](#) [SHOW]
12. Review 2 Profiles: [Houdini](#) and [Augustine](#) (5 minutes)
13. View selected illusions: Replay [Rotating Silhouette](#) which was broken last session.

[Two Dots Movement](#); Video; [The Facemask Illusion](#), the [Fusiform Gyrus](#) area of brain with disease [Prosopagnosia](#) (inability to read faces.) Optional: [Stepping Feet Illusion](#).
<Stepping Feet not shown>

Session 2: Historical Overview (limited scope to West class members are invited to discuss Eastern philosophies)

Suggested Readings from your data disk. East to read format with nice pictures.

[02 Time Line of Information 2500000bc-1000ad.pdf](#)

[03 Time Line of Information 1000ad-2009ad.pdf](#)

Time frame: Metaphysic and Scientific

1. **Pre-history** { **Common Ancestor** [300cc brain, Olduvai Gorge, Rift Valley, Tanzania, 8.5 mya, plate tectonics separated forest <west> and savanna <east>, SciAmer May 1994]; **Chimp-like** 400cc brain; **Habilis** [‘handy man,’ 650cc brain; Olduvai Gorge, Oldowan tools, flakes, 2.5 mya; mode 1 industry]; **Erectus** [900cc brain, West Turkana, Kenya, Acheulan tools, biface, use remainder of stone, ignored the flakes, 1.65 mya; mode 2 industry; new evidence NOVA 2009, see transcripts on disk, sudden increase in brain size may be related to bottle neck resulting from radical cyclical changes in lake regions in Chad area]; **Heidelbergensis** [1200cc brain; 800 to 250 ka; burial, tools; ochre; Heidelberg Germany, common ancestor to Neanderthal and Sapiens]; **Neanderthal** [1450cc brain size<perhaps proportional to bulky body size?>, 400 to 30 ka; burial rites, hunting tools, formidable

hunters, physique adapted to cold brutal climates], and **Sapiens** [1350cc brain size, 250 ka to present, subject to population bottleneck, estimated at 600 to 10,000 surviving Sapiens]; **Pinnacle Point, South Africa**, just east of Cape Town: [larger brain size, 162 – 70 ka; controlled use of fire to manufacture tools; harsh climate; diet included shellfish; more sophisticated culture; new evidence NOVA 2009, see transcripts]; **Out-of Africa** [1350-1400cc brain size, 60 ka; modern Sapiens]; **Cro-Magnon** [40 ka, clothing, engraving, sculpture, instruments]; **Stone Age Caves** [20 ka; burial, rite of passage; symbolic art]

a. note: mya=million years ago; ka=thousand years ago; cc=cubic cm.

2. **Greeks** { **Plato** [fl 400bc; Deductive, Platonic Forms and the Caves; shadows of reality; Demiurge: universe out of Chaos]; **Democritus** [atomism, fl 400bc]; [Bohr, fl 1900, atomic theory]; **Aristotle**, fl 350bc; inductive and deductive; [Logic, Boole fl 1850; fl 1910 - Whitehead, Russell; Gödel, fl 1932]; [Elements, Newton fl 1650; Einstein fl 1925]; [Causality, still relevant]; [Economics, Aquinas fl 1275, property, exchange, money]; **Euclid** [fl 300bc; axioms; not comfortable with infinity]; [non-Euclidean geometry: fl 1750ad, Gauss, Riemann, Bolyai, Lobachevsky]; **Aristarchus**, fl 300bc, heliocentric theory [Galileo, fl 1590ad]}
3. **Jews** { **Moses**, [fl 1400bc; The Gift of the Jews]}
4. **Romans** {[800bc to 500ad east-Rome; 1450ad west-Constantinople]; farmers turned engineers, martial culture; stoicism, law and order; government – senate=wealth in gold, polytheistic; created social vacuum followed by the need for Christianity: Awareness of *The Suffering Self*, Judith Perkins)
5. **Celts** {[from the Ur people, Russian steppes, 2500bc, ritual burial mounds, equestrians; Urnfield people in Switzerland 500bc]; [creative/ inventive/ feminist/ militaristic/ head hunters/ superstitious/ human sacrifice; polytheistic; written word prohibited; three levels in reality: spiritual/physical/symbolic; interactive continuum between physical and otherworld; Druids – learned class.]}
6. to **Scholastics** to **Renaissance**. {[**Plotinus**, fl 300ad, Neo-Platonism=Platonism + Mysticism.]; **Mysticism** [conscious [awareness](#) of an ultimate [reality](#)]; Aquinas, fl 1280ad, Dominican, [*Summa Theologica*: fusion of Aristotelian Rationality and Christian Faith; *Principles of Nature*: Form, Matter, Privatization; Economics: proto-Capitalism]; Duns Scotus, fl 1280ad, Franciscan: proto-communistic, church ownership of all}.

04 INTERACTIVE LINKS TO PHILOSOPHERS: A list of all the world class philosophers over the millennia with interactive links to summary information on each of them.

7. **05 ANCIENT AND MEDIEVAL PHILOSOPHY**: The graph shows the various philosophical schools over the millennia, and the key philosophers.
8. **05 THE ANCIENTS AND THE SCHOLASTICS**
9. **When did Metaphysics and Science begin to diverge?** Perhaps the Galileo Galilei, fl1600. three illegitimate children; loudmouth; theory and facts on the heliocentric theory. The issue of Papal Infallibility. The Conflict Thesis: *History of the Conflict between Religion and*

Science (1874), See: [Conflict Thesis](#). Specifically directed at Catholic Church rather than Protestants and Islam

10. 0650-0400bc: Naturalism (Ionians, Eleatic School, Pluralists, Atomists)
11. 0400-0350bc: Metaphysical Period (Sophists)
12. 0350-0050bc: Ethical Period (Stoicism, Skepticism, Eclecticism, Greek Science)
13. 0050-0900ad: Religious Period (Judaic Alexandrian School, Neo-Pythagorean School, Neo-Platonic School)
14. 0900-1400ad: Scholastic Philosophy (Mystics, Dialecticians)
15. 1400-1600ad: Beginning of Modern Humanism (Humanism)

16. 1600-2010ad: Modern & Contemporary Philosophy: includes – empiricism, Rationalism, Enlightenment, Kantian Criticism, Idealism, Positivism, Utilitarianism, Critical Idealism, German Psychologism, American Idealism, New Idealism, Pragmaticism, Evolutionism, Pragmatism, Psychoanalysis, Neo-Positivism, Existentialism, Intuitionism, Neo-Positivism, Phenomenology, Philosophical Hermeneutics, Neo-Realism, Frankfurt School, Critical rationalism, Cultural Theory, Structuralism, Postmodernism, Deconstructionism, Objectivism, The Revival of Classical Realism)

17. Cosmos: **Copernicus** [fl 1500, prelate, heliocentric theory after death]; **Kepler** [fl 1600, Laws of <elliptical> Planetary Motion; poisoned Tyco Brahe, arsenic, for astronomical data files]; **Galileo**[fl 1610; supported Copernican Heliocentric Theory; observed moons of Jupiter with Telescope; fathered 3 children out of wedlock]; **Newton** [fl 1687, *Principia*<gravity, 3 Laws of Motion>; *Biblical Hermeneutics*; deeply religious, comfortable with infinity; Time is uniform throughout universe]; Through Enlightenment.

18. Macro Universal Laws: Newton, Einstein

19. Micro Universal Laws: **Planck** (fl 1900, law of radiation, light is absorbed and emitted in discrete quantities<quanta>; Planck’s constant $h \sim 6.6 \times 10^{-34}$ Joules <one watt for one second>)/**Bohr**, fl 1915, Atomic Theory of Matter, not entirely correct but approximates Quantum Mechanics)/**Heisenberg** [Uncertainty Principle: probability of location plus probability of velocity = one; Live/Dead Cat]; **Einstein** [Speed of Light constant for all observers; $E=mc^2$ <matter and energy equivalence>; Spacetime<time is not uniform>; failed reconciliation of gravity with quantum mechanics – “God does not play dice with the Universe.”]

20. Logic: Whitehead-Russell/Gödel/Von Neumann/Turing

21. Local vs. Non-Local Universe debate: Experimental Realization of Einstein-Podolsky-Rosen-Bohm Gedankenexperiment. Bell Inequality. Alain Aspect experimental proof. Feynman: time is bi-directional in quantum realm. Penrose-Hammeroff: photons travel backward in time to maintain Locality.

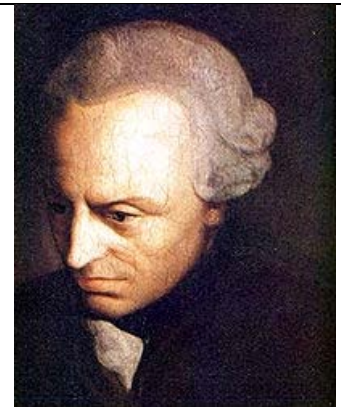
22. **Current Thinking:** Biocentrism; Quantum Reality; Criticisms of String Theory; String Theory/DNA analogy; Lackoff, “need to shed 2500 years of western philosophy; we got the mind wrong.”
23. Review of [Definitions of Reality](#), continued from Session 1: **Burke**
24. Overview of [History of Reality](#), through Cosmology, through Newton/Huygens: **Burke**
25. Overview of [Philosophers/Philosophy](#). **Burke**
26. **Einstein says time is a “persistent illusion.” Why is it an illusion? Is time a dimension or a mathematical construct? Are there four dimensions?**
27. Review of Special Relativity from Session 1: [Special Relativity Speaking](#). (airplane/ship) Review observers in [same frame of reference](#). Review observers in [different frames of reference](#).
28. Review picture of [sailing ship](#) and observers
29. View video on [Einstein Relativity](#) (Speed of Light Constant), Example of Clock Slowing Down by [Neil deGrasse Tyson](#). 5 minutes.
30. Discuss [Bertrand Einstein’s](#) reality vs. [Albert Einstein’s](#) reality. Can Einstein brothers travel away from Earth for 50 years near the speed of light and return without aging as much as people on earth?
1. **What is spacetime? Show a video about [spacetime](#).**
 2. **[Space-time](#):** We live in a three-dimensional Solar System: length, width and depth which produces a volume of space. Space is combined with Time in a mathematical Model which has four degrees of freedom: [l,w,d,t].
 3. Space Time Example: What Einstein meant. [Example](#).
31. **PostNewton:** VERY QUICK Overview of **Post-Newton:**

a. [Immanuel Kant](#) : we cannot know whether the world always existed or if it had a cause.

1787: **“Aristotle's system logic is complete and cannot be improved.”**

Then in ~late 1790s: Space is not objective or "real", but a product of the mind.*

* Have not verified from source writings.



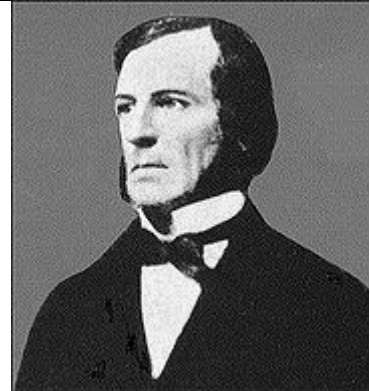
Kant believed himself to be creating a compromise between the [empiricists](#) and the [rationalists](#). The empiricists believed that knowledge is acquired through experience alone, but the rationalists maintained that such knowledge is open to [Cartesian doubt](#) and that reason alone provides us with knowledge. Kant argues, however, that using reason without applying it to experience will only lead to illusions, while experience will be purely subjective without first being subsumed under pure reason.

b. [George Boole](#): 1844: Boolean Algebra; (zeros and ones.) Father of Computer Science.

Math tools to parse logical statements:

All boys are mortal; John is a boy; John is mortal.

All girls are smart; John is smart; John is a girl??



c. [James Clerk Maxwell](#): 1864: Unified electricity, magnetism and optics under Maxwell's Equations.

Third greatest physicist behind Newton, Einstein.

Combined Laws of Electricity, Magnetism, Optics,

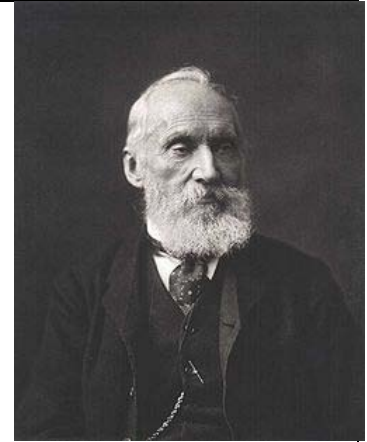


d. [Lord Kelvin](#): in 1900 speech: "dark clouds:"

-[Michelson-Morley](#) experiment failed;

-[Edison's](#) light bulb could not be explained using Newtonian mechanics. Bulb emits 10^{20} photons per second.

Enter: [Planck](#), [Bohr](#), [Heisenberg](#), [Einstein](#)



e. [David Hilbert](#): 1899: Axiomatization of Geometry. Set Goals for Mathematicians:

-Need a formal system of logic.

-Math must be "content" free

-System must be "finitistic" and simple

-**Hilbert didn't understand the new constructs**

Set the Stage for [Gödel](#), and [Von Neumann](#)



f. [Bertrand Russell](#): 1910: Principles of Mathematics*; Vol. 3 gets to the proof that $1 + 1 = 2$.

-Unleashed important [paradoxes](#).

*published with [Alfred Whitehead](#)

Set the Stage for [Gödel](#), and [Von Neumann](#)



g. [Thomas Kuhn](#): 1964: influential work: ^[1] [The Structure of Scientific Revolutions](#). 1. Remain [sensitive](#) to paradigm shifts; 2. allow subjectivity into one's work. 3. Observe something, 4. Invent a hypothesis; 3. make predictions; 5. test by experiments; 6. Repeat steps 3 thru 6 until there are no discrepancies between theory and experiment and/or observation



[GOTO GREAT PHYSICISTS:](#)

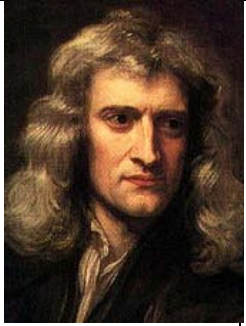


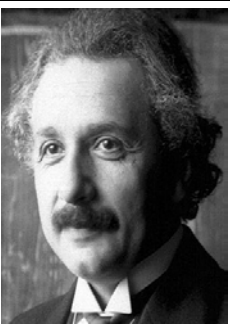

Session 3: Space and time

1. Brophy/Burke: brief welcome and comments
2. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; **if they delay classes, we will stay open and hold class.** In the event of emergency, call 911, and your location is “Town Hall, New London.
3. Clarify Coffee Routine; Laboratory Sessions to view Videos at Library or Town Hall? Any interest? Laboratory Session: How to work the Internet or BrophyBlog.net? Does anyone need help? Lending Library of Brophy/Burke books?
4. The Town Hall Management asks that you park in the Church parking lot and a path has been cleared through the snow bank.
5. Van Crawford has agreed to serve as Ombudsman for AIL. Your complaints about the conduct of the class should be directed to her. Van will also distribute and collect the Evaluation Forms that you will be given in the 7th session.
6. Does anyone have a burning desire to share their Worldview with the class? Has anyone prepared an anonymous write-up for future discussion? Ask class to make some notes on their World View Profile and expand it – this, of course, is entirely optional. All points of view are welcome and will be respected. Members who are willing can write up a profile in detail and it will be included anonymously in the Profile Notes.
7. Someone please take attendance.
8. Does anyone have suggestions for the conduct of our class or the substance of our class. Assess or discuss whether we should lean toward lecture mode, or discussion mode. Members are encouraged to discuss what is on their mind. Members who want to take a more passive role of listening are encouraged to do so.
- 9. If any member of the class would like to make a 15 minute presentation to the class on some aspect of Reality, please let us know. The class would be delighted.**
- 10. The purpose of the class is to provide class members with an expanded point of view and reference points, to help think outside the box, and hopefully to support your point of view of reality.**

11. Theme: What Happened to Physics? Did Something Go Wrong With String Theory? Can Cosmology and Reality be so complicated? No big answers, just more complexity. What's filling the Gap: Emergence; Spiritualism; Extended Consciousness?

12. View [Dr Schumacher \(Kenyon College\) video on Double Slit Experiment](#), 10 minutes): supports [Wave Theory of Light](#) over [Newton's Corpuscular theory of light](#). [James Clerk Maxwell also proposed a Wave Theory of Light](#). In 1905, Einstein produced the [Photoelectric Effect](#), earning him the Nobel Prize In 1922. The photoelectric effect led to important steps in understanding the quantum nature of light and electrons and influenced the formation of the concept of [wave-particle duality](#).

Great Physicists: ([RETURN](#))

				
Newton-Corpuscle	Huygens-Wave	Maxwell-Wave	Einstein-Particle	Bohr-Both

3. Please note that your study notes contain additional material on Cosmology. **Tom Vannatta**, a member of our class taught two AIL courses on cosmology, and a set of his slides are available at [Vannatta Cosmology](#).

4. [NOT SHOWN YET] Please note the following pdf document is on your data disk. [01 Time Line of Cosmology.pdf](#) * **IGNORE**, for time being, the last section on the wave theory of universe; heavy stuff, but most likely incorrect; otherwise the authors would have received a Nobel Prize by now

5. Interactive Link to All [Philosophers](#): [SHOW]

6. Colorful Overview of [Philosophy Movements](#) [SHOW]

Session 4: Quantum Theory: The physics of possibilities. (Richard Feynman: "... I think I can safely say that nobody understands Quantum Mechanics:)

1. Brophy/Burke: brief welcome and comments
2. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; **if they delay classes, we will stay open and hold class**. In the event of emergency, call 911, and your location is "Town Office, 375 Main Street, New London.

3. Clarify Coffee Routine; Laboratory Sessions to view Videos at Library or Town Hall? Any interest? Laboratory Session: How to work the Internet or BrophyBlog.net? Does anyone need help? Lending Library of Brophy/Burke books?
4. The Town Hall Management asks that you park in the Church parking lot and a path has been cleared through the snow bank.
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6. Does anyone have a burning desire to share their Worldview with the class? Has anyone prepared an anonymous write-up for future discussion? Ask class to make some notes on their World View Profile and expand it – this, of course, is entirely optional. All points of view are welcome and will be respected. Members who are willing can write up a profile in detail and it will be included anonymously in the Profile Notes.
7. Someone please take attendance.
8. Does anyone have suggestions for the conduct of our class or the substance of our class. Assess or discuss whether we should lean toward lecture mode, or discussion mode. Members are encouraged to discuss what is on their mind. Members who want to take a more passive role of listening are encouraged to do so.
9. **If any member of the class would like to make a 15 minute presentation to the class on some aspect of Reality, please let us know. The class would be delighted.**
10. **The purpose of the class is to provide class members with an expanded point of view and reference points, to help think outside the box, and hopefully to support your point of view of reality.**
11. **Theme: What Happened to cosmology? What happened to the Standard Model of the Universe? Was cosmology hijacked by Inflation Theory? Where did all the dark matter and dark energy come from? Dark stuff now accounts for 95% of the stuff of the universe. Why did all the pressure come from that that is causing our universe to expand at a much faster rate?**
12. **Feynman:** “...everything we know [about reality] is only some kind of approximation. The test of all knowledge is experiment.”
13. **Feynman:** The “[Uncertainty Principle](#)” was invented by [Heisenberg](#) to protect Quantum Mechanics, otherwise it would collapse. Fortunately (or unfortunately), no one has been able to measure both **location and momentum** at the same time.
14. **Feynman:** said [that Schrödinger’s Cat](#) was a joke.
15. **[Bomb Experiment](#) – Schumacher, Kenyon College (final version). At the end of the experiment, Dr. Schumacher mentions the photon is “not local.”**

16. **EPR Paradox:** [Albert Einstein](#) felt that there was something fundamentally incorrect with [quantum mechanics](#) since it predicted violations of locality. In a famous paper he and his co-authors articulated the [Einstein-Podolsky-Rosen Paradox](#). Thirty years later [John Stewart Bell](#) responded with a paper which stated (paraphrased) that no physical theory of local hidden variables can ever reproduce all of the predictions of quantum mechanics ([Bell's theorem](#)).
17. Review: "entanglement." [Bell's Inequality](#) called the most profound in science: Bell's Paper on [EPR Paradox](#); the universe is [non-local](#). <[Einstein -Local vs. Bohr-Non-Local](#)> Action at superluminal distance; verified by [Alain Aspect Experiment](#). Penrose argues that photons travel backwards in time; [Feynman](#) argues Time Reversal is OK in QM. Others argue that Universe is conscious, and some argue a case for a spiritual universe. Others argue that the consciousness is part of the stuff of the universe. **IS SPACE AN ILLUSION?**
18. **Example:** assume a big box with one million white and one million black socks thoroughly mixed up. If we pick a sock and it is black; **what is the probability of picking a second black sock to make a pair?**
19. **Review Definition:** "**Collapse of the Wave Function:** "Occurs when a quantum wave is "observed or measured. The wave collapses and becomes a particle. Much controversy surrounds this phenomenon. Stuart Hammeroff/Roger Penrose believes consciousness occurs in the brain when a quantum wave collapses.
20. **OPTIONAL:** View video on Dr. Quantum - [Quantum Tunneling](#) - Quantum Weirdness. Sun doesn't have enough energy to shine, except for tunneling. There is a small probability that a ball thrown against a barrier will go through the barrier.


Emergence: the concept has been in use since at least the time of [Aristotle](#).^[1] [John Stuart Mill](#)^[2] and [Julian Huxley](#)^[3] are just some of the historic luminaries who have written on the concept. In [philosophy](#), [systems theory](#), [science](#), and [art](#), **emergence** is the way [complex systems](#) and patterns arise out of a [multiplicity](#) of relatively simple interactions. Emergence is central to the theories of [integrative levels](#) and [complex systems](#).

A [termite](#) "cathedral" mound produced by a [termite colony](#): a classic example of emergence in nature.

[Video: Emergence – AMNH Presentation - Burke](#)



Session 5: Cosmology: The physics of possibilities. (Richard Feynman: "... I think I can safely say that nobody understands Quantum Mechanics:") (continue to [parallel universes](#))

1. Does anyone have suggestions for the conduct of our class or the substance of our class. Assess or discuss whether we should lean toward lecture mode, or discussion mode. Members are encouraged to discuss what is on their mind. Members who want to take a more passive role of listening are encouraged to do so.
2. **If any member of the class would like to make a 15 minute presentation to the class on some aspect of Reality, please let us know. The class would be delighted.**
3. **The purpose of the class is to provide class members with an expanded point of view and reference points, to help think outside the box, and hopefully to support your point of view of reality.**
4. **Theme:** We are running behind! We want to wrap up Quantum theory, and move by cosmology, to ENTANGLEMENT, EMERGENCE, INTUITION, AND CONSCIOUSNESS. Is Consciousness a fundamental property of the universe?
5. **DUALITY AND COMPLEMENTARITY:** [Wrap up great physicists.](#)
6. [Feynman](#): "...everything we know [about reality] is only some kind of approximation. The test of all knowledge is experiment."
7. [Feynman](#): The "[Uncertainty Principle](#)" was invented by [Heisenberg](#) to protect Quantum Mechanics, otherwise it would collapse. Fortunately (or unfortunately), no one has been able to measure both **location and momentum** at the same time.
8. [Feynman](#): said [that Schrödinger's Cat](#) was a joke.
9. [parallel universes](#): **A politically incorrect real example of Parallel Universe; SNL Hugh Everett** publish his doctoral dissertation while at Princeton about [Parallel Universes](#). The Many Worlds theory basically gives physicists permission to think of the entire universe as quantum mechanical. Everett took so much flak over his theory; he left the field of physics and worked on top secret projects for the Pentagon

10. Hulu - Saturday Night Live Parallel Universe. URL
11. [Light Bulb, Tunneling, Bell's Inequality](#); Limitations on our ability to see what is real. Who really understands **Bell's Inequality**? Why are there so few accurate explanations of how the experiments were completed? Do the journalists understand this stuff? How can we believe them?
12. [Observation](#): What do we mean by Observation? What causes the wave function to collapse? If a tree falls in the Forest; who hears it? Can humans by direct observation cause a wave function to collapse?

13. [Recently discovered Crystal](#): Discovered in 1800s; turned up in string theory in 1970s; now recently found in super cooled crystal. 248 dimensions, probably 245 are mathematical degrees of freedom.
14. [Hidden dimensions](#) in space.
15. Which way does the Earth revolve around the Sun? [Clockwise](#) or [Counterclockwise](#)?
16. Video showing: [Time Dilation Comparison](#) between two observers. One only has a limited number of heartbeats, so do not exercise. **Is time travel into the future possible?**
17. About 70% of human body is Oxygen, i.e. Hot Air? A 70 kg (155 lbs) person has about 2.3^{28} electrons, i.e. 2.3 with 28 zeros, <ten thousand, trillion cubed. **ALL TRAVELING AT THE SPEED OF LIGHT.**
18. Special relativity declares a law for all motion: *The combined speed of any object's motion through space and its motion through time is always precisely equal to the speed of light.*
19. Why is the speed of light constant? So the math works.
20. MEASUREMENTS: NEWTON VS EINSTEIN. [Time Dilation](#); [Volume](#). Taken from *Fabric of the Cosmos* by Brian Greene.
21. [Slit-Experiments](#): 2 slit; 3 slit which as 3 pairs of 2 slits; Changing vertical slits to horizontal slits. Pinpoint slits show up as circular interference patterns. Multi-slit experiments are called [Diffraction Grating](#).
22. Observation: What the eye sees; example of [color tone](#)
23. View selected illusions: [Alternate Bennham](#)'s Top; [Bennham's Disk](#) < **USE 38FPS** > makes the circular lines longer and tricks the receptors in the eye to see a longer frequency; [Friendly Face](#) – difficult to read emotions with upside faces; reading faces important to evolutionary success. [Focus – Blur](#) credibility of eye witness identification?
24. Observation: Music – [clarinet – only odd harmonics](#); ear makes up the difference
25. Observation: [Tone Generator](#) – Clarinet; example of a bagpipe;
26. **OPTIONAL**: [Richard Feynman](#) talks about Light; makes case for complexity; limitations of sensory input; potential for [PARANORMAL](#) events. *Genius: The Life and Science of Richard Feynman*, [James Gleick](#).
27. **OPTIONAL WHEN TO SHOW & MAKE VIDEO LINK**: [Edward Whitten](#) talks about String Theory; makes case for GUT and Nature of Time. <time becomes fuzzy at the Big Bang and becomes a meaningless question.> *Superstring Theory: Volume 1 & 2, Introduction* by [Michael B. Green](#), [John H. Schwarz](#), and [Edward Witten](#). Note Michael Green replaced Hawking as Lucasian Professor of Mathematics at Cambridge. [Stephen Hawking](#), a declared Atheist, believes that "the universe is governed by the laws of science. The laws may have been decreed by God, but God does not intervene to break the laws."^[42]
28. Issues: speed of light; time travel; is time continuous; dimensions of space; empty space, Planck, spacetime, curved space and gravity, block universe. multiverse, many worlds theory
29. Discussion
30. Origin of universe; fate of universe; finite, expanding, infinite; black holes; multiverse, many worlds; What's [Wrong with the Big Bang Model](#):

31. **Expanding Universe:** [Loaf of Bread](#) with Raisins Expands as it bakes. Shortly after the Big Bang, universe underwent rapid inflation, up to 10^{50} times in size, faster than Speed of Light. Currently, new discoveries and experiments show that the Expansion is Accelerating.
32. **Vacuums** in space, between water molecules, inside a proton? [Plato said no!](#)
33. **Red Shift of Stars, Galaxies:** What does it mean. Why is the Red Band on the outside of the [Rainbow](#)? Because the Red Wave Length is longer than the others.
Example of [Redshift](#) caused by expansion of universe.
34. **Null Physics:** New Theory: static or stationary universe. Considered junk science. Red shift is caused by tired photons. Einstein liked the idea of a static universe. Fritz Zwicky also thought it was a good idea but it might have flaws.
35. [String Theory and Membranes](#) (M-theory or Branes) by Brian Green, Columbia U.
36. [Current Cosmology Time Line](#)
37. [Current Cosmology Issues](#)
38. View video on Dr. Quantum - [Flatland](#)
39. **Review Definition: String Theory is the DNA of Biology.** Statement made by Leonard Susskind, CalTech, one of the pioneers in String Theory on Video: Beyond Einstein. String Theory may yield 10^{500} different "stable universes." [Alan Guth](#), MIT, pioneer of "Inflation Theory" has worked out the mathematics for his "Many Worlds Theory." Not to be confused with other World Theories.
40. Einstein's Thought Experiment with a [Moving Train](#):
41. Visualization of [Truck traveling](#) in Space Time: difficult to visualize.
42. **Curved Space Time:** Space is not really curved. The curved lattices (geodesics) around a sphere in space is a mathematical coordinate system. See [space time coordinates](#). See Brian Green example: [space time coordinates](#).

43.

Session 6 **Consciousness:**

44. Brophy/Burke: brief welcome and comments
45. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; **if they delay classes, we will stay open and hold class.** In the event of emergency, call 911, and your location is "Town Office, 375 Main Street, New London.
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49. Does anyone have a burning desire to share their Worldview with the class? Has anyone prepared an anonymous write-up for future discussion? Ask class to make some notes on

their World View Profile and expand it – this, of course, is entirely optional. All points of view are welcome and will be respected. Members who are willing can write up a profile in detail and it will be included anonymously in the Profile Notes.

50. Someone please take attendance.

51. **Emergence:** [Video Nobel Laureate Laughlin](#), Stanford, the Laws of Emergence, and Philosophy. Emergence the new frontier.
52. Intuition [Making a Decision](#) - Burke
53. [Experiment on Free Will](#):
54. Emergence: [Video David Chalmers](#), Australian National University; Consciousness part of fundamental stuff.
55. Feynman: [How people think](#).
56. Kahnemann: [Intuition and Reasoning](#)
57. [Map of Global Migrations](#) (interactive)
58. [Wikipedia Human migration map](#)
59. [Home Erectus Migration Map](#)
60. nova: [Becoming Human](#)
61. [History of Logic](#)
62. [What is Wrong with Cosmology?](#)
63. [Is the Universe Conscious?](#)
64. Discussion on Consciousness?
 - a. Definitions
 - b. How it is studied
 - c. Illusions
 - d. Can machines think and be conscious? Is thinking computational?
 - e. Kurzweil's Singularity, de Chardin Omega Point, Spinoza, Stuart Hammeroff's quantum consciousness?
 - f. Discussion

Session 7: Religion/ Faith/Belief Systems

65. Brophy/Burke: brief welcome and comments
66. Before Intros: Administrative Details; Class Cancellations for weather (new number: 603-526-2051, ext 224. If Kearsage cancels classes, we postpone the lectures; **if they delay classes, we will stay open and hold class**. In the event of emergency, call 911, and your location is "Town Office, 375 Main Street, New London.
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71. Someone please take attendance.
72. Scientific American: Feb 2010 report on human microbiota: Human body contains 10 trillion cells, but 100 trillion bacterial cells, and between 5000 and 35000 species living in the intestines, 300-500 in the mouth and 120 on the skin.
73. Time Mag January 2010 report new chess genius, Magnus Carlsen, teenager, ranked 4th in world, and never had a chessboard at home. Learned by Computer. Garry Kasparov, former world champ says: before he is done, Carlsen will have changed our ancient game considerably.
74. Scientific American: Feb 2010: Article on Seeing Forbidden Hues.
75. [World View Profile of a Yankee](#):
76. **consciousness: dimensions**
1. **Consciousness = Brain or Mind** or both?
 2. Consciousness = **Soul**: temporal or eternal?
 3. Product of **Emergence**; consciousness happens surprisingly, result of **complexification** (de Chardin) and other brain tissue factors.
 4. **Entanglement**: is consciousness, intelligence, mathematical truths part of the basic stuff of the universe; is the universe conscious? Like the **Electric Field** described by Feynman, is there a **Conscious Field** that minds can tap into, (and communicate superluminously)?
 5. **Singularity**: Kurzweil Thesis: **unlimited exponential growth** in chip technology suggests that single computer will be "more powerful" than entire human race. Will humans and computers integrate from an evolutionary perspective? Will computers eventually become conscious?
 6. **Free Will**: experiments suggest (or claim) that a conscious mind cannot react fast enough to hit a base ball, etc. Are we simply automata?
 7. **Epiphenomenal Brain**: there is no coordinated conscious experience. We just have memories of events that have transpired.
 8. **Darwinism**: the mind is a product of evolution; nature is clever.
 9. **Blue Brain**: is an attempt to create a synthetic brain by [reverse-engineering](#) the mammalian brain down to the molecular level.
 10. **Artificial Intelligence**: Neurons are like logic gates, functions like a computer. Just need bigger, faster computers to outsmart the brain.
 11. **Quantum Brain**: with consciousness occurring when wave function collapses in the microtubules (dendrite to dendrite connections); proffered by Stuart Hammeroff (maybe Penrose and Dyson and Bohm). [Gamma Synchrony definition](#); controversial but popular belief that synchrony underlies conscious experience (results in a unity of conscious experience). [Glial Cells](#): roughly 3 glia for 2 neurons, and provides physical support for the neuron.

77. **Consciousness, God and Free Will:** Excellent discussion between Robert Wright (author, agnostic) and Daniel Dennett (author, atheist).
<http://link.brightcove.com/services/player/bcpid713544743?bctid=715977787>
78. Feynman: [The Reality of Trains](#). What keeps the Trains on the track? (5 minutes)
79. Intuition [Making a Decision](#) – Greg Burke
80. KAHNEMANN: Noble Laureate: [Well Being](#). Short humorous video on Well Being. Marriage Well Being; Happiness vs. Standard of Living.
81. Four Horsemen of Atheism: Dennett, Hitchens, Harris, Dawkins. First 5 minutes of their private debate on Atheism. [SHOW THIS IN WEEK 8]
82. Four Horsemen of Atheism: Dennett, Hitchens, Harris, Dawkins. Last 5 minutes of their private debate on what is wrong with Religion and how to save the world.
83. Comments on Entanglement: Dick Carney
84. FEYNMAN: Nobel Prize for QED: Quantum Electro Dynamics. Feynman results accurate to 1 in 10 billion. The accuracy of the diameter of the human hair, when measuring the distance from New York to London. The most successful of all theories. **WHAT IS A VACUUM?**
85. Interview/Debate of Daniel Dennett, Philosopher, Harvard; Author and Atheist. By Robert Wright, Author, proponent of [Intelligent Design](#).
86. [Part 1](#): Atheism, Intelligent Design, Bright, Supers, opening remarks
87. [Part 2](#): Optional
88. Part 3: Optional
89. Part 4: Optional
90. Part 5: Optional
91. Part 6: Optional
92. Part 7: Optional
93. Part 8: Optional
94. Stuart Hammeroff: [Lecture on Consciousness](#), Brain Structures, Entanglement
95. Stuart Hammeroff: [Lecture of Consciousness and Computers](#)
96. Karen Armstrong: [Talk on the Golden Rule](#): Belief and Credo had different meanings before the 17th century. Words were more related to Commitment [to follow the Golden Rule} vis a vis an assertion of Truth of Dogma. (7.5 minutes)
97. Karen Armstrong: [Balance of Talk on Compassion](#). Show in last session – Optional (15 minutes). How religions have been hi-jacked.
98. Kurzweil: **Exponential growth** and other events leading to the [Singularity](#), with a few decades when a computer power will exceed intelligence of human race.
99. Kurzweil: The [Singularity University](#) with Google and NASA
100. Kurzweil: [Future of Medicine](#) and Mapping of the Brain. **Computer in blood cells will enable runner to run the mile with one breath.** nnnn

101. Kurzweil: [6 Epochs to the Singularity](#): Optional

Left over from session 6:

102. Emergence: [Video David Chalmers](#), Australian National University; Consciousness part of fundamental stuff.

103. [History of Logic](#)

104. [What is Wrong with Cosmology?](#)

105. [Is the Universe Conscious?](#)

106. Discussion on Consciousness?

a. Definitions

b. How it is studied

c. Illusions

d. Can machines think and be conscious? Is thinking computational?

e. Kurzweil's Singularity, de Chardin Omega Point, Spinoza, Stuart Hammeroff's quantum consciousness?

f. Discussion

Session 8: Futures

107. Brophy/Burke: brief welcome and comments

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113. Someone please take attendance.

114.

115. Please hand in Evaluation Forms to Van Crawford, Thank you so much

116. Who would like to continue discussion on this overall subject on a periodic basis. Let's discuss after this class. We need ground rules: when, where, how often. How to select

topics. How much time devoted to general discussion of old and new issues related to reality.

117. Read the World View of Socrates.
118. Brief Video, [Richard Dawkins](#) stumped on creation of information on Genome. (2 minutes)
119. Brief Video, [Neils Tyson](#), Rose Planetarium, NYC commenting on the sharp teeth of Richard Dawkins. (5 minutes)
120. [OReilly Factor](#) vs Dawkins. Hawkings blames Hitler (the Catholic) and HRCC for mass murders. Dawkins cutdown by OReilly. (optional – too long)
121. Dawkins: [Religion: the Root of all Evil](#): Pejorative. (optional – long)
122. Intuition [Making a Decision](#) – Greg Burke
123. Can we trust our Judgment: [Decision Making, Honesty](#)
124. [Koffta Illusion](#):
125. Kurzweil: **THE LAW OF ACCELERATING RETURNS:**
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 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. Within a few decades, machine intelligence will surpass human intelligence, leading to The Singularity -- technological change so rapid and profound it represents a rupture in the fabric of human history. The implications include the merger of biological and nonbiological intelligence, immortal software-based humans, and ultra-high levels of intelligence that expand outward in the universe at the speed of light.
126. Kurzweil: **Exponential growth** and other events leading to the [Singularity](#), with a few decades when a computer power will exceed intelligence of human race.
127. Kurzweil: The [Singularity University](#) with Google and NASA
128. Kurzweil: [Future of Medicine](#) and Mapping of the Brain. **Computer in blood cells will enable runner to run the mile with one breath.**
129. Kurzweil: [6 Epochs to the Singularity](#): Optional
130. Stuart Hammeroff: [Lecture on Consciousness, Brain Structures, Entanglement](#)
131. Stuart Hammeroff: [Lecture of Consciousness and Computers](#)
- 132.

Left over from session 6:

133. Emergence: [Video David Chalmers](#), Australian National University; Consciousness part of fundamental stuff.
134. [History of Logic](#)
135. [What is Wrong with Cosmology?](#)
136. [Is the Universe Conscious?](#)
137. Discussion on Consciousness?
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 - d. Can machines think and be conscious? Is thinking computational?
 - e. Kurzweil's Singularity, de Chardin Omega Point, Spinoza, Stuart Hammeroff's quantum consciousness?
 - f. Discussion
132. Futures:
- a. Theory of everything GUT, Strings, quantum gravity
 - b. Kurzweil's Singularity, nature of intelligent computers
 - c. [Consciousness: Computers? Universe?]
 - d. [Virtual Reality and marijuana culture] optional
 - e. [Will Computers compete with Humans] optional
 - f. [The Human-Computer Interface] optional
 - f. [Facebook, Twitter, Internet Politics, Internet Religion] optional
 - g. Discussion

133. **SUMMARY OF REALITY ISSUES:**

134. **Time**

- Newton: fixed and absolute; immediate gravitational action at a distance
- Newton: Chronometer (Book:*Longitude*): not ordained by God
- Einstein: time is relative, slowed by speed and gravity; time = 0 @ SOL
- Einstein: time is an illusion
- Whitten: irrelevant near the Big Bang
- Hawking: flows only forward: *Arrow of Time*
- Feynman: backward time travel OK in QM
- Laughlin: may just be an emergent property
- Yogi Berra: What time is it? Ya mean now?

135. **Space**

- Aristotle: nature abhors a vacuum; matter is infinitely divisible
- Plato: Platonic ideal forms and the Caves: shadows of reality
- Newton: vacuums; instant action at a distance
- Maxwell: Equations of electrodynamics
- Planck: discovered the quantum of radiation: quantum = $6.626/10^{34}$ Joules
- Bohr: the Copenhagen Interpretation of QM
- Einstein: photoelectric effect; Relativity; space is curved; spacetime is a dimension
- Von Neumann: Observation creates reality
- Bell: The Bell Inequality, Entanglement
- Hawking: infinite density in black holes
- Heisenberg: electron is everywhere at same moment
- Feynman: space is empty on average
- Tegmark: universe is infinite
- Euclid: assumes that parallel lines do not meet (parallel postulate)
- Gauss (& others): it is OK to deny parallel postulate

136. Matter, Energy

- Newton: absolutes
- Quantum Mechanics: probabilistic; electron exists everywhere at same time
- Einstein: $e = mc^2$ – matter and energy interchangeable
- dark matter(22%) needed to explain galactic gravitation
- dark energy (74%) now need to explain accelerating expansion of universe
- ordinary matter (4%)

137. Complexity (reduction vs emergence)

- de Chardin: complexification from preconscious to the noosphere (mind sphere)
- Darwin: evolution and complexity
- Whitten (and predecessors): search for fundamental stuff (vibrating strings)
- Laughlin: complexity is a property of Emergence; very few fundamental laws

138. Consciousness

- Eastern Philosophy: connected to a universal consciousness
- Aquinas: component of the soul
- Descartes: Cogito Ergo Sum
- Kant: we cannot know whether the world always existed or if it had a cause
- Lanza: (many, including VonNeuman): Biocentrism: Reality exists in our mind
- Hameroff: Gamma Synchrony in Dendrite to Dendrite connections
 - Quantum wave reduction in microtubules = consciousness
- Dennet: an Epiphenomenon, just a memory, no free will
- Bell, Aspect: Entanglement of Photons: implies a conscious universe
- Godel: limitations on provability
- x: Limitations on what we can know
- Kurzweil: Singularity in 2045: Computer exceeds intelligence of humankind
- Kurzweil: the spiritual computer: *The Age of the Spiritual Machine*
- Kurzweil: the Law of Accelerating Returns
- Kahnemann: Intuition vs Reasoning; counterintuitive notions
- Lackoff: We have to reverse 2500 years of Western thinking on mind

139. Cosmology

- Aristarchus of Samos: Heliocentric
- Aristotle, Ptolemy: Earth Centered Universe
- Mathematical Epicycles justify planets
- Copernicus: Heliocentric – theory
- Bruno: Solar System just one of many in universe
- Galileo: moons around Jupiter
- Newton: Clockwork Theory: Wind up and run

- Static Universe: Einstein and Zwicky (proposed “tired light”)
- Hubble: discovers red shift
- Steady State Theory: Hoyle
- Lemaitre, Friedmann: expanding universe
- Big Bang: coined incorrectly by Hoyle, its most vocal antagonist
- Wheeler: no phenomenon is a phenomenon until it is an observed phenomenon
- Everett: Parallel Universes
- Four major problems with the Standard Cosmological Model
- Guth: Faster than Speed of Light Inflation of Universe [$10^{(10^{12})}$]
- Perlmutter: Universe is accelerating in 1998
- Null Science: “tired light,” Steady State universe

140. Life:

- Biblical creation or Evolution (Darwinism or Intelligent Design)
- Human-chimp common ancestor: 5-7 mya
- Chimp gait 4x more inefficient than human gait
- Homo Erectus, first human ancestor, maybe started migrations
- Homo Afarensis, 4 mya, Selan skull, deep cleavage in lunate sulcus disappearing
- Homo Brain: little development: flat line for 4 million years
- Dramatic climate change in short period (200,000 years)
- Homo Habilis, tool maker appears, 2mya
- Homo Heidelbergensis (common to Sapiens and Neanderthalensis) migrates 700 kya
- Homo Neanderthalensis invents, discovers pitch glue
- Homo Sapiens: migration to Europe from Pinnacle Point near Cape Town about 60 kya
- Homo Sapiens: population bottleneck 600 to 10,000 surviving members
- Cro-Magnon: 40 kya, clothing, engraving, sculpture, instruments
- Symbolic writing (maybe early alphabet) now discovered in many caves >20kya
- Caves of Lascaux: 17kya
- Packs, Tribes, Nations, Globalism
- Virtual Realities: e.g. Experiencing being a celebrity
- singularity: immortality?

141. God:

- ante Descartes: Science/religion somewhat interchangeable
- Matter/energy came forth out of absolute nothing (no creator)
- Matter/energy always existed and came forth (no creator)
- Universe is conscious, with embedded platonic values, and came forth (intelligent design)
- Eastern: Universe was created by a great spirit
- Bible: Universe was created by a divine creator, making man in his image and likeness
- Four Horsemen: Hitchens, Dennett, Harris, Dawkins

Case Studies of Class Member Outlooks: please consider submitting an optional anonymous profile about your world view?

Fergus's early reality was shaped at his mother's knee with wonderful Irish stories, accompanied by the nun's theologies, and his studies of Thomistic philosophy as an aspiring contemplative monk. His reality was continually re-shaped and broadened as an adult working as a scientist and mathematician. His best thinking now is agnostic, although he secretly hopes that the promises of his youthful religious training are fulfilled. Fergus now believes that much, if not all, of his current observations and understanding of reality is simply a reflection of how his brain works; e.g. the color of a car is in his head, and not in or on the car. Fergus has been greatly influenced by: (1) de Chardin's "The Phenomenon of Man," and his theories of "complexification" and the "noosphere;" and, (2) "Bells Theorem" and the subsequent scientific studies and proofs pointing to a "non-local" universe; and, (3) Guth's "inflation theory" suggesting a "many worlds universe;" and finally by, (4) Kurzweil's "Singularity" that describes the changes that will occur when computers compete with humans around 2025. Fergus believes that intelligence or consciousness or de Chardin's "pre-consciousness" is part of the "basic stuff" of the universe. These beliefs are frequently reinforced by reading accounts, or microscopic viewing on "very dumb" tiny one-cell e coli swimming and tumbling in a liquid and abruptly changing direction to swim toward "sugar" dropped into the liquid. Fergus also believes that our universe is infinitely infinite. As a consequence he buys into "Tegmark's conjecture": in an infinite universe, the arrangements of patterns of particles are forced to repeat, requiring therefore that there be multiple copies of all things, including Fergus in our universe. Fergus believes that our universe is one of many in a "many world's universe." He recalls Dave Susskind's recent remarks at a World Science Conference: "Beyond Einstein," that the complexities of "String Theory" seem to be pointing to a string theory that is analogous to DNA which supports "many forms of life." The polished version of string theory may eventually support "many forms of universe." Fergus has deep memories, or memories of memories of his in utero term, as well as a previous life as a Celtic warrior. Fergus has no idea whether these memories are real or fabricated but they sure seem real. Aside from his religious training, Fergus has no idea what will really happen to his soul after death. He does believe his soul extends some distance beyond his body which complicates his thinking about whether the soul dies with the body. Fergus believes that our ability "to know" is limited because our brains are limited, having evolved to help us survive in the trees and the savanna of Africa, but not necessarily to understand computer intelligence nor the non-intuitive weird world of "quantum mechanics." But evolution is ongoing. The QM experiments showing a duality of "waves and particles" are so counter-intuitive that they may simply reflect that our brain reacts to reality in two or more ways. This might be analogous to the illusion of the "rotating dancer" who can be seen rotating to the left and then suddenly to the right, as our brain struggles and balks when interpreting a three dimensional object projected onto a two dimensional surface. Fergus is optimistic about the future of our society and the wonderful new world awaiting our grandchildren.

Hippocrates has been drawn to thinking about numbers since early childhood wondering what infinity meant. He tried to count to infinity but could not. Religion was a real experience. His world was explained by the Judeo/Christian world view which incorporated a unity of the supernatural and the "real." There was no distinction. Supernatural forces interacted directly with the natural world. Ultimately, a scientific education forced Hippocrates to separate the material world from the spiritual as the laws of nature did not allow non-material explanations. This dualism seemed to be a satisfactory cognitive solution until he had a better understanding of how our minds may be working. Scientific explanations were provided by Newton, Einstein and Quantum Theory, etc. They were useful. These explanations got us to the moon, eradicated smallpox, enabled the computer, and told us about quarks. God became a mathematician. The uncertainty of the origin of the universe; the nature of consciousness; and the nature of time, space, matter, and how they interacted led Hippocrates to question whether mathematics was really so effective in describing the universe after all. The use of Irrational numbers like pi or e, the uncertainty principle, and the incompleteness theorem of Gödel then led him to question his dualistic world view and to question exactly how he knows things in the first place. Emergence and complex systems seemed beyond math. What initially seemed to be understood mechanistic explanations became much more complex and dimly understood metaphors. These metaphors seem however to be determined by how our brains are constrained to perceive and interact with the world. They have evolved according to Darwinian principles that permit adaptation to the world of our own experienced sensory scale. His conceiving or experiencing of reality ultimately was creating his reality. The "conception" is the result of how reality works but is it the same as reality. Hippocrates has been living in Plato's cave and only experiencing "shadows" of reality. He is trapped in an infinite regress of caves within caves. The neural state corresponding to this experience is "me." The age old puzzles of whether time and space are continuous or discrete; whether there is anything outside the universe; how time flows and why in only one direction; whether the universe had a beginning or will have an end; what will happen to "us" after we die; whether we have free will; whether light and matter are particles or a wave, whether anything can move faster than light; how entanglement works; whether we can ever predict the future from the past (determinism); and whether God exists are all related to a fundamental feeling (instinct) we have that wants us to make sense of the world which is derived from the world itself. The world is self-referential and that is us. The answers will always bring new questions since they are approximations that converge on the infinitude that puzzled him as a child. He believes these questions arise from an ontological instinct that drives the evolution of intellectual progress and ultimately spirituality. The answers will be random constructions that are selected because they wind up "working." The wonder is in any sense of "working." Hippocrates will have to think some more about this. He is going to ask his son if he understands what he is saying. Can you?

Augustine has been drawn to thinking about God since early childhood in parochial schools wondering what eternity meant. The concepts of Omniscience and Omnipresence were cogent discussion concepts among his close friends at an early age and at all hours. Heaven, Hell, Purgatory and Limbo were real places and grievous sin left an indelible mark. Major issues surrounded the meaning, mystery and need for the Trinity, and whether God was in the Monstrance, the Eucharist, and more generally inside or outside the Universe. If God were omniscient, then it follows that outcomes must be pre-determined. The immortality of the soul and free will are therefore impinged by the double O's; but the catechism said otherwise. This led to innumerable queries to higher authority, and searches for answers in Augustine and Thomas Aquinas, and the scriptures. Theology and eschatology were exciting and logical and far more challenging than space and time travel in super-luminal vehicles. Countless imaginative discussion hours were spent traveling faster than the speed of light to capture waves to peer into the past. The great Irish legate, Saint Malachy O Morgain, among other seers, however, stoked the hot fires of Augustine's imagination, (<http://www.dayofgod.net/Malachy/malachy.htm>). Religion was mysterious but provided a real and comforting experience, including ecstatic and cathartic experiences. His world views were explained by the Baltimore Catechism and the "approved texts" in the Testaments which incorporated a unity of the supernatural and the corporeal world. There was little need for distinction between these worlds. These teachings were reinforced by the cultural Celtic Continuum linking Natural and Supernatural forces where communication and interaction between these forces was not only possible but direct. Spirits were real and prescient. Augustine was awarded the Religion Medal upon graduating from grammar school. He joined a religious community at a young age but whilst on a summer vacation finally became interested in girls. He then transferred to a Roman Catholic engineering school where he obtained advanced degrees in Electrical Engineering with distinction. Augustine completed his Law Degree at a Roman Catholic University and practiced Law as a patent attorney, married and raised a family of nine children. He is well aware of the limitations of mathematics as posited by Bertrand Russell, never mind Gödel. He accepts the findings of science in general, and specifically the Origins of Species, finding them not inconsistent with the biblical allegorical testimony. He does not understand de Chardin. Augustine is well informed about quantum mechanics and Einstein's theories but is unmoved by their dilemmas. His religious beliefs provide far greater intellectual coherence. Although he is skeptical and concerned about the fragility among church hierarchy, he maintains an unimpeachable Faith in the Golden Rule and teachings of Jesus and the Holy Roman Catholic Church. Augustine is an advocate of passive nonviolence and passive government. He believes that science will ultimately accept the limitations of mind and move towards satisfying its quests for the ultimate answers in the realm of metaphysics and the supernatural.

Houdini grew up in Brooklyn, NY. His grandparents were Polish and Russian immigrants. His parents were well educated; father was a doctor and mother was a principal. He was precocious at an early age. He obtained advanced degrees in Art and EE from prestigious Ivy League schools. He served as director of marketing for a Fortune 50 company, and eventually retired as the Chief of Planning for a prestigious Fortune 10 corporation. His family was religious and he studied Hebrew and the Scriptures and was encouraged to become a Rabbi, a course he did not follow because he wanted to break away from tradition. His distant family was affected by the Holocaust. He was interested in astrology and the occult at an early age. He became a proficient magician at age 8, and during the course of his early studies gave four live performances to his entire school. As an aspiring magician he developed a deep understanding of psychology, mentalism and deception. He does not suffer fools and is skeptical of politicians, promoters. Houdini has great respect for all religions save one which he believes is divisive. He believes organized religion serves an important function and that most people need an affiliation with a religious organization. He believes the Golden Rule is essential. He maintains a cautious and conservative world view. He is a serious student of the facts. His interests include art, model railroads, poetry, and magic collectibles & books, and astronomy & astrology. He is an exceptional poet having published two volumes of poetry. He has maintained an active daily record of the positions of heavenly bodies for 40 years which he has correlated with investment cycles, and has financially prospered from such knowledge. Houdini lectures on art and architecture, and his studies of early ecclesiastic architecture and art continues to discover evidence of anti-Semitism. Houdini considers himself an agnostic as opposed to atheist; and he observes the cultural events of his religious and cultural beliefs. He believes in Darwinism and is supportive of scientific progress in all directions, including telekinesis and telecommunications and ghosts. He is quick to spot fraud in these areas which he believes to be prevalent. He does not believe in heaven and hell in the traditional sense. He believes in Free Will and also believes the soul can live on after death at least for a while, and perhaps find a home in a new body. He believes that cosmology has become too complicated and that a reconciliation of religion and scientific thinking and beliefs is in the offing.

Socrates: Having been asked to write my worldview, I am reminded of the story of the established author who, having decided to write his next novel, sat down with a blank piece of paper and an opening sentence in mind. An hour later the paper was still blank.

Sitting there, the author could not bring himself to write down that first sentence because he realized that, if he did, there would have been an infinite number of books that he could have written had he just chosen a different opening. The vision of those books lined up on shelves reaching to the horizon shut down his creative mind.

For the same reason, I conclude that I can't write my worldview, I can only write *about* my worldview.

What shapes my worldview? – After considerable introspection I have concluded that three dimensions of my psyche shape my worldview. I am a skeptic, an agnostic and I am religious. Sound like I'm a conflicted person? Perhaps, but I find it a healthy and productive conflict.

Skeptic – Before I accept a concept and incorporate it into my worldview, I look for evidence, proof or a sound logical argument. To me, spirituality is the antithesis of skepticism. I feel that the laws of Nature, among which I include the laws of chance, govern reality. Where others may see meaning or a message I see coincidence and I marvel in it. If there is a creator God, chance and coincidence were among His greatest creations.

Agnostic – I'm not just agnostic in the narrow sense of belief about God, but in the broader sense of willingness to remain open-minded. I think of my agnosticism as a spectrum of beliefs running from weak at one limit to strong at the other, say from 0 to 10. For any given element of reality I can place my feeling on that scale—for today, that is. Who knows what new vision tomorrow may bring?

Religious – I am a member of a parish, I attend worship regularly and I work within the church community to support its operation and programs; but my religion is personal, not conforming to any particular dogma. Its founded in three elements: gratitude, awe and love. Gratitude for all I am and all I have. Awe for the laws of Nature and their products. Love for my fellow man.

In worship I find the opportunity to express gratitude. For me the act of worship is also an opportunity for humility. Prayer, for me, is an expression of gratitude but, in the setting of my personal religion, I don't feel the need to be grateful *to* anything or anyone in particular. I'm simply grateful for the way things are.

Yankee: I was born in Salem, Mass. in 1929. My father descended from an English family which came in 1630. They were artisans, farmers, developers, town officials, doctors, bankers, businessmen, and mariners. His grandfather was a surveyor of Boston after taking care of the paperwork for his regiment for three years in the Civil war. Dad graduated from Dartmouth, joined his father's retail clothing business, became financial officer for the town of Swampscott, Mass., and a loan officer for a bank. He was a staunch Republican, an anti-FDR fiscal conservative when there was no associated social conservative wing to the Party. However, he mistrusted blacks, latinos, Jews, Catholics, politicians, and big government. He believed in responsible capitalism, not sloganistic spin. I don't think he decided what he believed about the nature of our creator. In his late years he traveled a lot, died at 88.

My mother had Scottish forebears who came to New Brunswick in the 19th century, perhaps as loyalists from the US. Some were cabinetmakers and ship's carpenters. Her father emigrated to Barre, Vt. He was a granite quarry developer who died young; his quarry became Rock of Ages later. She graduated from Middlebury, taught high school English until I was born, never worked again, and suffered from depression.

I was salutatorian of my Swampscott class of 1947, AB from Dartmouth, 2 years at Dartmouth Medical School, 2 years Harvard for my MD. I completed a residency in Internal Medicine at Dartmouth.

At the Congregational Church in Swampscott, I could not make sense out of prayer; I could not imagine a creator God who had any interest in me, or who performed miracles. Yet church seemed a valuable experience though I wasn't sure why. I was a nature counselor at summer camp, liked swimming, sailing, skiing and hiking. At ten, my parents arranged for my brother and me to live on the Vermont dairy farm of a relative, where I learned about animal procreation, milking, collecting eggs, and about spiders, mice and frogs. Roosters are formidable adversaries, we found. Besides going to church camps at Winnepesaukee and Sebago, I worked some summers as a carpenter's helper and hospital orderly.

In college I attended church less often. After marriage and children and settling as a primary care internist in New London in 1960, I attended the Baptist Church as an ecumenical social center for family and children. I still attend but am no longer a theist, concluding that my heavily scientifically oriented education excludes dependence upon exorcists and miracle workers. In fact, I have finally become comfortable with saying to others that I see no way for the source of our creation to be able to contravene physical laws which apply to the evolution of the universe we live in. In short, there is no way for a creator to exist in our universe without evidence of exhibiting a describable reality. Evolution is simply a description of our continuously changing universe. Ultimately it will run out of the energy needed to allow the interchange of energy and matter, along with space/time. Our expanding information resources now show us that there are limits to the possibilities of how beings come to be and how they change. Contrary to what I first learned, evolution is how the contents of our universe interact, which depends on chance factors rather than a grand design. As an individual living being, I have to make my own design for myself as possible within these physical laws, since no one or being has the option of doing to me or for me what I must do for myself. This is the nature of life: consciousness and free will for animal matter; preprogrammed reactions to their environment for plants. If our apparent free will and choice turns out to be emergent deterministic materialism, there will be no reason for our genes to program free will and consciousness into our life. I cannot accept that premise. I believe in individual freedom of will and the capability of exercising choice only fettered by the demands of what our physical bodies require to be able to house a brain with such capabilities. Natural selection occurs in both kingdoms, but only animals have need of a consciousness (without which they could not make the instant decisions needed to eat or be eaten). I find that imagining and believing in an afterlife holds no attraction for my mind. Neither do I fear an apocalypse. Chaos may be ultimate, but long after animal life on this planet has become untenable. Life exists in two phases: genotype and phenotype. Genotype is the fundamental constitution of an organism in terms of its hereditary factors (its DNA). Phenotype is the manifest characteristics of an organism collectively, including anatomical and psychological traits that result from both its heredity and its environment. A fertilized egg houses individual DNA. Development does not permit individual life until birth, when it is a newborn and no longer a fetus. Only then is it a phenotype; even at that it requires much more maturation to reach the stage of fully independent life. I must protect and cultivate the one life I have (my phenotype), since for me there is no evidence of rebirth or separable soul which might travel invisibly and be re-housed in another animal form. I realize that religious sects put a lot of stock in such events, which to me are totally in the realm of

individual imagination, with no other reality. Our DNA is our seed for the future; it has no consciousness as a genotype. The phenotype has no effective consciousness until it is born and shepherded through what it must learn to take care of itself and its reproduction. Our specific ecosystem, with its inherent variability, must be protected as long as possible for our species to still be a component. Human nature is a part of nature, not independent, so even an independent being has limits on how it may realize its potential.

In short, I create my own meaning for my existence. There is no external single meaning to life, and nothing is predetermined except the requirement that life and all that is in the universe be limited by what natural laws permit for variable outcomes within evolution.

I believe that a steady state in our universe is not reconcilable with the newer evidence for a universe that evolves in accord with physical laws, some of which are not fully understood. In short, our planet will be engulfed by our sun as it expands while burning out its fuel. Unless humans can get to other planets, there will be no humans when the earth is consumed about 3 billion years from now. I do not believe that information about our ecosystem is ever planted in our brains; it is acquired by our senses (aided by improving technology) and modified from continuously changing inputs and jettisoning of information our conscious mind decides is no longer useful for retrieval. Cartesian dualism is impossible. [Return](#)

QUESTIONS FOR MYSELF:

BROPHY-CONSCIOUSNESS: I feel like my consciousness is inside my skull, near the front lobe; but it must extend to my nervous system and beyond my body. But where is it? Is it the physical network of neurons and synapses; [or is it deeper in the microtubials]; or is it a fuzzy electrical and chemical charge that is sensed or “seen” or “felt” by some other “intelligence cells; or is it in some special region in the brain structure that is monitoring all brain activity; or is it in some supernatural spiritual entity residing in or near me; or is it link to some mysterious aether in the universe that causes awareness and compulsion?

Do I have two brains in a sense? I drive from point A to point B during the course of an hour and do not remember driving because I am deep in thought. Other times I am thinking (OR NOT THINKING) of nothing (ANYTHING), per Herbert Benson, MD, of the “Relaxation Response.”

The “evolution data” seems to support that size (and complexity) of the skull cavity ridges are associated with higher human function: tool use; tool making; ornamentation; burial rites. This would seem to support an evolutionary increase in “awareness” perhaps in response to more prolonged challenging environmental situations that produce “population bottlenecks.”

To what extent does my awareness differ from a dog or an elephant or a dolphin or an octopus or a chimp or a crow, all of whom are reported as being very intelligent mammals? Does their intelligence map to the complexity of their neuronal circuitry? Then again, a dog's smell sense is one to two million times greater than humans. Birds navigate using the magnetic fields; bats use radar, and ant colonies seem to operate efficiently with some kind of collective intelligence.

Furthermore, some idiot savants can find new large prime numbers; others can capture a mental image of a complex scene like the City of Rome, in a matter of seconds, and can reproduce the image with photographic precision; others play world class chess; other have total recall of music and events; still others have perfect pitch and be driven to distraction when one of the 16 (?) violins in the orchestra is slightly out of tune.

Why do some people have IQs twice that of others? Is it in the genes, brain structure, or nurture, or some combination? It has been reported that we are getting smarter using standardized tests. Is our brain still evolving; are we gaining or losing function. One of our great limitations of our nervous system is our eyes. We see only a very narrow spectrum of the bandwidth. These and other sensory limitations shape our reality. If we could observe the stars and the heavens the way a camera “sees” them: in a brilliant array of the color spectrum.

When we work on an Oak Table, we can greatly appreciate the wood grain and colors and the hardness of the surface. We are oblivious to the fact that the surface is about 99.999999999999999999999999% empty space.

BROPHY-PARANORMAL: a general term that describes unusual experiences that lack a [scientific](#) explanation, or phenomena alleged to be outside of science's current ability to explain or measure. Notably, paranormal phenomena also lack [scientific evidence](#), as detectable but not well explained phenomena such as [dark matter](#) or [dark energy](#) are not commonly called paranormal.

My two sisters would frequently refer (affectionately) to my mother as the “The Witch.” Many of these psychic situations, that I was aware of are spooky and unexplainable. I will not elaborate. Notwithstanding, I remain skeptical about the paranormal. Although I must admit that in preparation for the AIL Class on Reality/Unreality, I have become less skeptical as a result of the extensive readings I have done on the subject of Reality/Unreality.

Percentage of Americans polled

	belief	not sure	belief	not sure
	Farha-Steward		Gallup	
psychic/spiritual healing	56	26	54	19
ESP	28	39	50	20
haunted houses	40	25	42	16
demonic possession	40	28	41	16
ghosts/spirits of the dead	39	27	38	17
telepathy	24	34	36	26
extraterrestrials visited Earth in the past	17	34	33	27
clairvoyance and prophecy	24	33	32	23
communication with the dead	16	29	28	26
astrology	17	26	28	18
witches	26	19	26	15
reincarnation	14	28	25	20
channeling	10	29	15	21

Other surveys by different organizations at different times have found very similar results. A 2001 [Gallup Poll](#) found that the general public embraced the following: 54% of people believed in [psychic/spiritual healing](#), 42% believed in [haunted houses](#), 41% believed in [satanic possession](#), 36% in [telepathy](#), 25% in [reincarnation](#), and 15% in [channeling](#).^[19] A survey by Jeffrey S. Levin, associate professor at Eastern Virginia Medical School, Norfolk found that over 2/3 of the U.S. population reported having at least one mystical experience.^{[18][20]}

A 1996 [Gallup poll](#) estimated that 71% of the people in the [United States](#) believed that the government was covering up information about [UFOs](#). A 2002 Roper poll conducted for the [Sci Fi channel](#) reported that 56% thought [UFOs](#) were real craft and 48% that [aliens](#) had visited the [Earth](#).^[18]

A 2001 [National Science Foundation](#) survey found that 9 percent of people polled thought [astrology](#) was very [scientific](#), and 31 percent thought it was somewhat [scientific](#). About 32% of Americans surveyed stated that some numbers were lucky, while 46% of [Europeans](#) agreed with that claim. About 60% of all people polled believed in some form of [Extra-sensory perception](#) and 30% thought that "some of the unidentified flying objects that have been reported are really space vehicles from other civilizations."

Explanations for the Paranormal:

1. Important to remember that Dark Matter and Dark Energy are in the realm of Paranormal; but are considered politically correct, because they are in the realm of “approved physics.”
2. Misperception (Brain substitution)
3. Unreliability of Eye Witnesses
4. Memory and Confabulation
5. Xenonormal (foreign normal)
6. Hallucination
7. Coincidence
8. Chinese Whispers
9. Supersensitive People
10. Extrasensory Perception
11. Conscious Universe
12. Quantum Entanglement
13. Cultural Predispositions
14. Ambiguous Sensory Stimulus
15. Hormone Cortisol and memory

[RETURN TO HOME](#)

BROPHY: CHARACTERISTICS OF INTELLIGENCE

Memories
Quickness
Speed
Sensory Inputs: e.g. smell; magnetic fields; echos
Problem Solving
Reasoning
Creativity
Function: music, art, athleticism,
Free Choice

BROPHY: QM TEACHING COMPANY

One day in 1900, German physicist Max Planck told his son that he had made a breakthrough as important as Isaac Newton's discovery of the workings of the universe. Planck had reached the surprising conclusion that light behaves as if it is packaged in discrete amounts, or quanta, a seemingly simple observation that would lead to a powerful new field of physics called quantum mechanics.

In the following decades, a series of great physicists built on Planck's discovery, including Albert Einstein, Niels Bohr, Louis de Broglie, Werner Heisenberg, Erwin Schrödinger, Richard Feynman, and many others, developing quantum mechanics into the most successful physical theory ever devised—the general framework that underlies our understanding of nature at its most fundamental level.

Quantum mechanics gives us a picture of the world that is so radically counterintuitive that it has changed our perspective on reality itself, raising profound questions about concepts such as cause and effect, measurement, and information. Despite its seemingly mysterious nature, quantum mechanics has a broad range of applications in fields such as chemistry, computer science, and cryptography. It also plays an important role in the development and innovation of some of today's most amazing—and important—technologies, including lasers, transistors, microscopes, semiconductors, and computer chips.

Quantum Mechanics: The Physics of the Microscopic World gives you the logical tools to grasp the paradoxes and astonishing insights of quantum mechanics in 24 half-hour lectures designed specifically for nonscientists and taught by award-winning Professor Benjamin Schumacher of Kenyon College.

No comparable presentation of this subject is so deep, so challenging, and yet accessible. **Quantum Mechanics** is generously illustrated with diagrams, demonstrations, and experiments and is taught by a professor who is both a riveting lecturer and a pioneer in the field, for Professor Schumacher is an innovator in the exciting new discipline of quantum information.

Think Like a Physicist

Working on the principle that any discovery made by the human mind can be explained in its essentials to the curious learner, Professor Schumacher teaches you how to reason like a physicist in working out the features of the quantum world. After taking this course, the following apparently inexplicable phenomena will make sense to you as logical outcomes of quantum processes:

- That quantum particles travel through space in the form of waves that spread out and are in many places at the same time
- That quantum mechanics takes us to a bedrock level of reality where objects are utterly simple, identical in every respect
- That two quantum particles can interact at a distance in a way that seems almost telepathic—a phenomenon that Albert Einstein called "spooky"
- That even in the complete vacuum of empty space, there is still a vast amount of energy bubbling into and out of existence

Regarding the last phenomenon, you could say that quantum mechanics not only changes our view of everything, it also changes our view of "nothing!"

Quantum Puzzles

Quantum mechanics has even entered popular language with expressions such as "quantum leap," which is often used inaccurately to mean a radical transformation. In quantum mechanics, a quantum leap is the minimum change in the energy level of an electron, related to the discrete units of light energy discovered by Max Planck.

Another familiar expression is the "uncertainty principle," an idea formulated by Werner Heisenberg in the 1920s. Again, popular usage can be misleading, since one often hears the term used to mean the unavoidable disturbance caused by making an observation. But in quantum mechanics the concept refers to an elementary feature of the microworld—that certain properties have no well-defined values at all.

Little wonder that quantum mechanics is one of the few fields in which philosophical speculation goes hand in hand with scientific breakthroughs. Consider these quantum puzzles that have striking philosophical implications:

- **Schrödinger's cat:** Erwin Schrödinger noted that the standard Copenhagen interpretation of quantum mechanics makes it possible for a cat to be considered simultaneously dead and alive when exposed to a potentially lethal quantum situation.
- **Bell's theorem:** John Bell showed that we must either give up the idea that particles have definite properties before they are measured, or we must imagine that all the particles in the universe are connected by a web of instantaneous communication links.
- **Many-worlds interpretation:** In a scenario adopted by many science fiction authors, Hugh Everett III argued that every possible outcome of every quantum event takes place in a limitless branching series of parallel universes—of which we see only one.

Clear, Enlightening, and Thorough

Quantum Mechanics begins by exploring the origin of quantum mechanics and its golden age of discoveries in the early 20th century before taking you deeply into the key concepts and methods of the discipline. Then Professor Schumacher rounds out the course with a discussion of selected topics, including the potentially revolutionary applications of quantum cryptography and quantum computing. Throughout, he adheres to the following very helpful ground rules, tailored to give those without any previous preparation in math and physics a clear, enlightening, and thorough introduction to quantum mechanics:

- He presents the real theory of quantum mechanics, not a superficial popularization.
- He simplifies the subject to highlight fundamental principles.
- He uses thought experiments, or hypothetical examples, as a tool for probing quantum phenomena.
- He teaches you rudimentary symbols and rules that allow you to calculate the outcome of various quantum experiments.

One thought experiment that Professor Schumacher returns to involves a Mach-Zehnder interferometer, a simple arrangement of mirrors and detectors that illustrates basic properties and paradoxes of quantum mechanics. By considering the different paths that a photon can take through the interferometer, you discover such key principles as constructive and destructive

interference, Max Born's probabilistic explanation of quantum phenomena, and Niels Bohr's concept of complementarity that led to the Copenhagen interpretation—the view of quantum mechanics since the 1920s.

Lucid, witty, and intensely interesting, Dr. Schumacher's lectures are illustrated with scores of insightful graphics. You are also introduced to a celebrated visual aid used by physicists themselves: the Feynman diagram, made famous by Nobel Prize–winner Richard Feynman as a cartoon-like shorthand for keeping track of quantum particles as they ceaselessly interact, change their identities, and even move backward through time!

Viewing Notes:

1 inch aluminum cube contains 100 million atoms on an edge, or 10^{24} atoms in cube

light bulb emits 10^{20} photons every second

single cell paramecium contain 10^{12} atoms

Freeman Dyson and Roger Penrose believe mind and intelligence are the fabric of the universe

QM = 3 interpretations

1) Copenhagen: probabilities, no deeper view

2) hidden variables: hidden layer in universe governing behavior

3) many worlds: photons take every course

Universe: things or stuff (infinitely divisible) or both

Democritus – atoms and space; Aristotle, nature abhors a vacuum, everything connected

how many; Newton, corpuscles, intensity

how much; Huygens: continuous waves like sound

velocity = length x frequency

Thomas Young: 1801 – double slit experiment; Length of Light Wave = millionth of meter

Biocentrism

Biocentrism and **biocentric** (from Greek: βίος, *bio*, "life"; and κέντρον, *kentron*, "center") are terms implying a centrality of [life](#), [nature](#), or [biology](#). According to biocentrism, life creates the [universe](#) rather than the other way around. In this view, current theories of the physical world do not work, and can never be made to work, until they fully account for life and [consciousness](#).

The biocentric theory proposed by American scientist [Robert Lanza](#) builds on [quantum physics](#).^{[1][2]} His theory places [biology](#) before the other sciences in an attempt to solve one of nature's biggest puzzles: the *theory of everything* that other disciplines have been pursuing for the last century.^{[3][4][5]} To be considered a [scientific theory](#), biocentrism must meet the requirements of prediction and testability.^[6] Lanza argues that biocentrism is falsifiable, and that future experiments, such as scaled-up [quantum superposition](#), will either support or contradict the theory.^[7]

Theory

The central claim of biocentrism is that what we call space and time are forms of animal sense perception, rather than external physical objects.^[8] Lanza draws similar conclusions to those reached by philosopher [Immanuel Kant](#) in the late 1700's: that space is not objective or "real", but a product of the mind.^{[9][10]}

Lanza argues that biocentrism offers insight into several major puzzles of science, including Heisenberg's [uncertainty principle](#) and the [double-slit experiment](#), and into the forces, constants, and laws that shape the [universe](#) as we perceive it.^[12]

According to an article in [Discover magazine](#),^[11] an adaption of Lanza's book, "biocentrism offers a more promising way to bring together all of physics, as scientists have been trying to do since [Einstein](#)'s unsuccessful [unified field theories](#) of eight decades ago."

Lanza's theory of biocentrism has seven principles:^[12]

1. What we perceive as [reality](#) is a process that involves our [consciousness](#). An "external" [reality](#), if it existed, would by definition have to exist in space. But this is meaningless, because space and time are not absolute realities but rather tools of the human and animal mind.
2. Our external and internal perceptions are inextricably intertwined. They are different sides of the same coin and cannot be divorced from one another.
3. The behavior of [subatomic particles](#), indeed all particles and objects, is inextricably linked to the presence of an observer. Without the presence of a conscious observer, they at best exist in an undetermined state of [probability](#) waves.
4. Without [consciousness](#), "matter" dwells in an undetermined state of [probability](#). Any [universe](#) that could have preceded [consciousness](#) only existed in a [probability](#) state.

5. The structure of the [universe](#) is explainable only through biocentrism. The [universe](#) is fine-tuned for life, which makes perfect sense as life creates the [universe](#), not the other way around. The "[universe](#)" is simply the complete spatio-temporal logic of the self.
6. Time does not have a real existence outside of animal-sense perception. It is the process by which we perceive changes in the [universe](#).
7. Space, like time, is not an object or a thing. Space is another form of our animal understanding and does not have an independent [reality](#). We carry space and time around with us like [turtles](#) with shells. Thus, there is no absolute self-existing [matrix](#) in which physical events occur independent of life.

Reception

Lanza's article and book on "biocentrism" have received a mixed reception.

David Thompson, an astrophysicist at [NASA's Goddard Space Flight Center](#), said that Lanza's "work is a wake-up call."^[13] [Nobel laureate \(in Physiology or Medicine\) E. Donnall Thomas](#) said, "Any short statement does not do justice to such a scholarly work. The work is a scholarly consideration of science and philosophy that brings biology into the central role in unifying the whole."^[14] [Arizona State University](#) physicist [Lawrence Krauss](#) stated, "It may represent interesting philosophy, but it doesn't look, at first glance, as if it will change anything about science."^[15] Wake Forest University scientist [Anthony Atala](#) stated, "This new theory is certain to revolutionize our concepts of the laws of nature for centuries to come."^[16] In [USA Today Online](#), [astrophysicist](#) and [science writer David Lindley](#) asserted that Lanza's concept was a "vague, inarticulate metaphor" and stated that "I certainly don't see how thinking his way would lead you into any new sort of scientific or philosophical insight. That's all very nice, I would say to Lanza, but now what? I [also] take issue with his views about physics."^[17] Daniel Dennett, a [Tufts University](#) philosopher, said he did not think the concept meets the standard of a philosophical theory. "It looks like an opposite of a theory, because he doesn't explain how it [consciousness] happens at all. He's stopping where the fun begins."^[18] Richard Conn Henry, Professor of Physics and Astronomy at [Johns Hopkins University](#), pointed out that Lanza's theory is consistent with [quantum mechanics](#): "What Lanza says in this book is not new. Then why does Robert have to say it at all? It is because we, the physicists, do NOT say it—or if we do say it, we only whisper it, and in private—furiously blushing as we mouth the words. True, yes; politically correct, hell no!"^[19] Indian physician and writer^{[20][21]} [Deepak Chopra](#) stated that "Lanza's insights into the nature of consciousness [are] original and exciting" and that "his theory of biocentrism is consistent with the most ancient wisdom traditions of the world which says that consciousness conceives, governs, and becomes a physical world. It is the ground of our Being in which both subjective and objective reality come into existence."^[22]

SPEED OF LIGHT

Everything in the universe always travels exactly at Light Speed.

Time dilation: Special relativity declares a law for all motion: *The combined speed of any object's motion through space and its motion through time is always precisely equal to the speed of light.*

That's right, everything. You, me, the computer screen you're looking at, your grandma's French toast, Santa Clause... everything.

Everything is traveling through Space-time: space (the three dimensions we experience and the nine others that m-theory predicts) and time.

Adding the total movement through both space and time always equals light speed. Always. Always. Always.

Since you must travel constantly at exactly the speed of light, when you increase your speed through space, you decrease your speed through time.

Your head (and the rest of you) is traveling through space-time at the speed of light. But, when you're at rest (not accelerating) all of your head's movement is through time, none of it is traveling (accelerating) through space. Every time your head moves (accelerates) through space; in a car, in a plane, in a spaceship... even nodding up and down, some of it's movement in time is lost since it is now moving through space. Cool huh.

What about light?

Since light waves use all of their motion to travel through space *at Light Speed*, they have absolutely no motion through Time. Every photon that has ever been produced exists in an ageless state. (To us, the light seems to move through time but to the photon, time is standing still. This is one of the seemingly odd realizations of Einstein's Theory of Relativity.)

The universe ages, light does not.

Reading: [The Fabric of the Cosmos: Brian Greene](#)

EMERGENCE:

In some theories of particle physics, even such basic structures as mass, space, and time are viewed as emergent phenomena, arising from more fundamental concepts such as the Higgs boson or strings. In some interpretations of quantum mechanics, the perception of a deterministic reality, in which all objects have a definite position, momentum, and so forth, is actually an emergent phenomenon, with the true state of matter being described instead by a wavefunction which need not have a single position or momentum. Most of the laws of physics themselves as we experience them today appear to have emerged during the course of time making emergence

the most fundamental principle in the universe and raising the question of what might be the most fundamental law of physics from which all others emerged. [Chemistry](#) can in turn be viewed as an emergent property of the laws of physics. [Biology](#) (including biological [evolution](#)) can be viewed as an emergent property of the laws of chemistry. Finally, [psychology](#) could at least theoretically be understood as an emergent property of neurobiological laws.

culture is an emergent property of behavior
behavior is an emergent property of spirituality
spirituality is an emergent property of mind
mind is an emergent property of consciousness
consciousness is an emergent property of biological evolution
biological evolution is an emergent property of biology
biology is an emergent property of life forms
life forms are an emergent property of intelligence
intelligence is an emergent property of community
community is an emergent property of complexity
complexity is an emergent property of chemistry
chemistry is an emergent property of physics
physics is an emergent property of space, time, mass
space, mass, time is an emergent property of a wave function
wave function is an emergent property of a vibrating strings

Is Mathematics invented or discovered. Some say both.

Most beautiful math structure appears in lab for first time. Mathematicians discovered a complex 248-dimensional (not necessarily spatial but degrees of freedom) [symmetry called E8](#) in the late 1800s. In the 1970s, the symmetrical form turned up in calculations related to [string theory](#), a candidate for the "theory of everything" that might explain all the forces in the universe. But string theory still awaits experimental proof. Now, physicists have detected the signature of E8 in a very different realm – experiments on super-chilled crystals

new sites of interest:



Wolff, Einstein, EPR Experiment WSM Explains Famous Einstein Podolsky Rosen EPR Experiment.URL



Hulu - Saturday Night Live Parallel Universe.URL



Official Our Undiscovered Universe Site Null Physics Terence Witt Physics Scientist Author.URL

COMPLEXITY:

1. OF INTEREST BECAUSE: (1) UNPREDICTABLE, PRODUCING LARGE EVENTS, AND CAN WITHSTAND TRAUMA; (2) CAN PRODUCE BOTTOMS UP EMERGENT PHENOMENON, WITH SELF ORGANIZATION; (3) PRODUCE AMAZING NOVELTY.
2. NOT IN EQUILIBRIUM, NOR CHAOTIC, NOR THE SAME THING AS COMPLICATED WHICH IS NOT ADAPTIVE.
3. HAVE FOLLOWING CHARACTERISTICS: (1) DIVERSITY, CONNECTION, INTERDEPENDENCE, ADAPTATION.
4. METAPHOR: (1) SIMPLE AKA MOUNT FUJI; (2) RUGGED LIKE THE APPALACHIAN MOUNTAINS; (3) DANCING LANDSCAPES ARE MORE DIFFICULT BECAUSE WE ARE DEPENDENT ON THE ADAPTIVENESS OF OTHERS.
5. FUJI HAS A SINGLE PEAK. WHERE EVERYTHING IS DOWN. APPALACHIA HAS MULTIPLE PEAKS AND MAY BE DIFFICULT TO FIND THE HIGHEST PEAK. DANCING HAS PEAKS THAT ARE ADAPTIVE
6. COMPLEXITY IS USUALLY AT THE “IN BETWEEN” NOT THE EXTREMES
7. WOLFRAM’S CLASSIFICATION
 - A. STABLE, PERSISTS PERTURBATIONS, BALL IN BOWL
 - B. PERIODIC ORBITS, LIKE A STOP LIGHT
 - C. CHAOTIC: SENSITIVE TO INITIAL CONDITIONS
 - D. COMPLEX, RICH IN INFORMATION CONTENT, HARD TO DESCRIBE
8. HIGH DIVERSITY CAN DESTROY ECOSYSTEMS
IF INTERDEPENDENCY IS HIGH, TEENAGE DRESS LEADS TO CHAOS
NASH EQUILIBRIUM: HIGH INTERDEPENDENCE, SELF OPTIMIZATION
9. COMPLEX SYSTEMS ARE MODERATE INTERDEPENDENCE AND CONNECTEDNESS, AND SOME DIVERSITY AND ADAPTATION.

feynmann files

<http://www.youtube.com/watch?v=Cj4y0EUIU-Y>

<http://www.youtube.com/watch?v=jrk3GbJU0k0&NR=1>

<http://www.youtube.com/watch?v=nmzHQljJ4bc&NR=1>

<http://www.youtube.com/watch?v=6OrsaL97Epg&feature=related>

http://www.youtube.com/watch?v=AU8PId_6xec&feature=related

<http://www.youtube.com/watch?v=lytxafTXg6c&feature=related>