

Origins

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On Power

Big History on
Youtube

Big History in
Japanese

IBHA
Conference

New Book on
Big History



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On Power

George Lucas, Jerry Garcia, and Barack Obama's Big Black Helicopters

Richard B. Simon

*Department of Literature and Languages
Dominican University of California*

At Dominican University of California, where we have instated Big History as the core of our General Education program, we faculty engage in a Summer Institute, a weeklong, intensive faculty development seminar in which we work collectively to hone our program and our abilities to teach this challenging multidisciplinary curriculum. Imagine thirty PhDs (and the occasional MFA) seated in the round in a wood-paneled room in the basement of a Victorian-era mansion on campus, not only discussing how Big History works in our curriculum and how best to teach it, but arguing – amicably – over what Big History *means* – intellectually, ethically, morally, and even spiritually. For a week. It is an intense and profound experience. It is heavy intellectual lifting.

2011 was our second Summer Institute – and the first after we spent a year teaching our host of Big History courses to freshmen. We had a lot to talk about. To decompress my over-full mind between sessions, I was doing a bit of light reading: *War and Peace*. One night, I came across a passage that made me chuckle. In it, Nikolái Rostov, one of the novel's protagonists, is in the field, having recently joined the joint Russian and Austrian war effort against Napoleon's advancing army. The Russian emperor Alexander has arrived with the Austrian emperor to review the troops. The troops are all lined up in smart rows, brimming with potential destructive energy. When Rostov sees, for the first time, his "sovereign," in the flesh, he is deeply moved.

When the sovereign had approached to within twenty paces, and Nikolai could make out clearly, in all its details, the handsome, young, and happy face of the emperor, he experienced a feeling of tenderness and rapture such as he had never experienced before. Every feature, every movement of the sovereign seemed lovely to him.

Having stopped facing the Pavlogradsky regiment, the sovereign said something in French to the Austrian emperor and smiled.

Seeing that smile, Rostov involuntarily began to smile himself and felt a still stronger surge of love for his sovereign. He wanted to show his love for the sovereign

in some way. He knew that this was impossible and wanted to cry. The sovereign summoned the regimental commander and said a few words to him.

"My God! what [sic] would happen to me if the sovereign addressed me!" thought Rostov. "I'd die of happiness."

The sovereign also addressed the officers.

"I thank you all, gentlemen" (every word Rostov heard was like a sound from heaven), "with all my heart."

How happy Rostov would be if he could die now for his sovereign!¹

I found Rostov's point of view in this passage so strange, so foreign. The adulation of a political leader – a monarch, an emperor – seemed so antithetical to my proudly anti-authoritarian, anti-monarch, anti-imperialist American sensibility. I felt, smugly, that it had given me some insight into the Russian character, and even the European character – and, by contrast, the American character.

It was on perhaps the next day that I was bringing my daughter to swim in the YMCA pool in the Presidio of San Francisco. As we rounded the two-lane road that skirts the hill at the southern piling of the Golden Gate Bridge, the Presidio airfield – Crissy Field – came into view far down below. Sitting in the middle of its vast green, and seeming to take up much of the field, were two enormous black spaceships. Startled, I slowed the car. Then, floating in from the north, from above San Francisco Bay, came two more flying craft: the first was long and green and white – Marine One, the helicopter that bears the President of the United States. The second was yet another spaceship – a giant black attack helicopter.

My heart leapt with adrenaline. "It's Obama! It's Obama!" I shouted. I remembered hearing on the radio that the President was in town, raising funds

1 Tolstoy, Leo. War and Peace. Trans. Richard Pevear and Larissa Volokhonsky. New York: Vintage Classics. 2007. Print. (246)

and plying tech initiatives in Silicon Valley – and here he was, choppering in to San Francisco for two more fundraisers.

Two policemen held the high ground roadside. I rolled down my window.

“Is that Obama?” I said, excitedly.

“Yes, it’s Obama,” the officer said, a note of jaundice in his voice – as in, of course it’s Obama, you idiot.

I pulled the car onto the shoulder and popped my daughter out of her car seat. We crossed over and watched excitedly as the President of the United States landed, and a few tiny, distant figures made their way, like ants, toward a waiting motorcade. I had had no contact with the military or military hardware in the post-9/11 era. I was flabbergasted at the sight of these enormous heavy helicopters, which were so obviously bristling with destructive firepower, and resembled nothing so much as assault craft from the recent *Battlestar Galactica* television series. And what I thought then was: *we own that*.

We got back into the car, and as I pulled back onto the road, I slapped my forehead. *Rostov!* What I had just experienced was *exactly* what Tolstoy had described. And I was embarrassed.

But it was strange. I had seen Obama before, from much closer – speaking in Oakland on St. Patrick’s Day, 2007, soon after he had announced his candidacy for the Democratic nomination – and had no such emotional response. What was different now?

I realized, in that moment, that what was so compelling about Barack Obama’s helicopters was not Barack Obama himself, but the power that we, the American people, had vested in him.

We had, as citizens, as voters, purposefully funneled through this one human being nearly all the energy flows of our country: our national consumption of fossil fuels. Our nation’s electrical grid. The potential destructive energy of the U.S.

Military (which is also the largest single consumer of energy in the world). Our nuclear arsenal, measured in the thousands of megatonnes. The flows of money through the entire US economy. And that – the attractive force of all that power – was what had turned an otherwise staid anti-propagandist giddy.

It was at this moment (to borrow phrasing from George Orwell) that I perceived the real nature of political power.

Power is the ability to marshal flows of energy.

On earth, nearly all energy comes from our star. The energy that humans and most other animals consume comes from plants which have captured the star’s light and turned it into sugars through photosynthesis. The fossil fuels that we burn are the boiled down corpses of such plants and animals that lived hundreds of millions of years ago. Solar photovoltaic cells turn the star’s light into electricity. Even wind turbines rely on currents caused by thermal gradients in fluids (air and water) heated by the star or cooled in its absence. The only exceptions are geothermal energy, which is latent heat left over from the collisions that formed the planet, at high pressure (and likely somewhat radioactive) and nuclear energy, which is the result of splitting very large atoms of Uranium forged in the violent deaths of other stars.

Still, for the most part, power is the ability to marshal, to direct, flows of energy from our star, the sun. The more energy a human can direct, the more powerful we fellow humans perceive that human to be. And that’s probably also the case in other species, and certainly in other mammals that have social hierarchies, wherein lead animals in families can allocate resources, whether food or reproductive access.

It was Henry Kissinger, the Nixon-era American Secretary of State, who said that power is the greatest aphrodisiac – a magical substance that renders the wielder, in Darwinian terms, reproductively fit. That may be because humans can perceive the wielder of power as a node through

which energy flows, and at which energy therefore accumulates. And that such node-iness manifests as (and may also be a result of) that other mysterious attractive force, charisma.

And proximity to an energy flow node can itself yield evolutionary advantage – such as the ability to harvest energy (as money, food, or perhaps information) for oneself, or one’s offspring.

If we were to seek a *measure* of political power, it would be a measure of the amount of energy that an individual has at her or his command. And power bears a close relationship to charisma.

Just before Rostov’s adulation of the Czar Alexander, Tolstoy describes, through Rostov’s eyes, the two Emperors’ effect on the amassed troops:

Before the approach of the sovereign, each regiment, in its speechlessness and immobility, seemed a lifeless body; but as soon as the sovereign drew level with it, the regiment came alive and thundered, joining the roar of the entire line which the sovereign had already passed. To the terrible, deafening sound of these voices, amidst the masses of troops, motionless, as if petrified in their rectangles, the hundreds of horsemen of the suite moved casually, asymmetrically, and, above all, freely, and in front of them two men – the emperors. Upon them was concentrated the restrainedly passionate, undivided attention of this entire mass of men.²

It’s not that Czar Alexander is young and handsome and smartly-dressed that makes Rostov love him – it is that as he moves down the line of thousands of staid and grim warriors, hundreds of horsemen at his back, reality bends to his very presence, as if to an electromagnet.

Characters With Star Power

Writers of imaginative fiction have long understood the relationship between energy flows and power – and we see it at work in the most resonant examples of Industrial Age fiction, which often portray power as focused beams of physical energy.

Take *Star Wars*. As many millions of

² *Ibid*.

theatergoers know, the universe in which the popular films take place is populated by Jedi Knights who are particularly sensitive to The Force. This, as far as we knew in 1977³, was a magical property, best left unexplained. It was spiritual.

Thus, fans of the original *Star Wars* trilogy scoffed when George Lucas attempted to explain, in *Episode I: The Phantom Menace* (1999), the science behind force sensitivity. In the film, young Anakin Skywalker, a boy slave, is found by two errant Jedi Knights on the desert planet Tatooine. The Jedi sense that the boy is particularly force-sensitive, and take him into their care. The older Jedi, Master Qui-Gon Jinn, explains to the boy – in a bit of exposition – how it works:

Anakin Skywalker: Master, Sir – I heard Yoda talking about midi-chlorians. I’ve been wondering: What are midi-chlorians?

Qui-Gon Jinn: Midi-chlorians are a microscopic life form that resides within all living cells.

Anakin Skywalker: They live inside me?

Qui-Gon Jinn: Inside your cells, yes. And we are symbionts with them.

Anakin Skywalker: Symbionts?

Qui-Gon Jinn: Life forms living together for mutual advantage. Without midi-chlorians, life could not exist and we would have no knowledge of the Force. They continually speak to us, telling us the will of the Force. When you learn to quiet your mind, you’ll hear them speaking to you.⁴

The word *midi-chlorian* itself is a fusion of *mitochondria*, the “power house” organelle within an animal cell, which delivers energy, in usable form, as adenosine tri-phosphate, or ATP⁵, with *chloroplast*, the organelle within a plant cell that performs the same function.

As it turns out, when his blood is tested, young Anakin Skywalker has an unusually high

³ Lucas, George, dir. *Star Wars Episode IV: A New Hope*. Twentieth Century Fox, 1977. Film.

⁴ Lucas, George, dir. *Star Wars Episode I: The Phantom Menace*. Twentieth Century Fox, 1999. Film.

⁵ May, Paul. “Molecule of the Month: Adenosine Triphosphate.” Bristol University School of Chemistry. November 1997. Web. 26 December 2012.

midi-chlorian count. He may be, Qui Gon Jinn suspects, *the chosen one* – a being so powerful that he can bring “balance” to The Force. In layperson’s terms, that means that he will grow up to become the powerful villain Darth Vader, who, in his penultimate act, kills his master, the Emperor (the Emperor himself channels energy flows directly, as “force lightning” that shoots from his fingertips). This does bring balance to The Force, by ending imperialism and totalitarianism in the galaxy far, far away in which the tale unfolds (see *Star Wars Episode VI: Return of the Jedi*, 1983)⁶. Power, indeed.

It’s all because Anakin Skywalker’s cells, containing an unusually large number of powerhouse organelles per volume, are able to process more solar energy than those of an ordinary Force-adept. And here we must note that Anakin Skywalker’s home planet, Tatooine, is a desert world because it is in a binary star system: it orbits, and receives the radiated energy from, *two* suns.

Darth Vader is not the only solar-powered character in industrial-age fiction. Superman, created by two young American Jews (likely, at least in part, in response to the rising Nazi threat), draws his superhuman strength, his ability to fire heat rays from his eyeballs, and his ability to fly, from the earth’s star.

Superman is born Kal-El on another planet far, far away – Krypton. Ahead of a planetary apocalypse, his parents send him, Moses-like, down the cosmic river in a high-tech basket – and he lands in the American breadbasket, in Kansas, during the Great Depression. Krypton, famously, orbited a “red sun” – and it is the Earth’s yellow sun that gives Kal-El his power.

If we were to think about it in a Big History context, we might conclude that the Kryptonian Kal-El’s cells evolved to process the amount of energy thrown off by Krypton’s star. Earth’s star must therefore be emitting more energy than Krypton’s

⁶ Lucas, George, dir. *Star Wars Episode VI: Return of the Jedi*. Twentieth Century Fox, 1983. Film.

star. This would seem to indicate that Krypton’s star was a low-energy-emitting red dwarf. And Kryptonian humanoids must have evolved with some form of photosynthesis. Really, as Superman does not appear to need to consume food, and draws his power from the sun, he *must* be a photosynthesizer.

Most importantly, Kal-El’s cells are able to process the higher energy output from Earth’s star. In Spierian terms, the Goldilocks conditions that allow Superman to exist as a form of complexity must range, at least, from the lower energy flows from Krypton’s star to the higher energy flows from earth’s star⁷. And it is Kal-El’s biological ability to marshal that energy that gives him his power.

The Japanese monster movie villain-slash-hero Gojira – a.k.a. Godzilla – is another energy-wielding character. A response to the devastating nuclear bombing of Hiroshima and Nagasaki that ended World War II (and Japan’s own imperial ambitions), Godzilla is a giant prehistoric reptile, spawned or perhaps reawakened by the nuclear explosions, who marshals flows of atomic energy: his eyes shoot focused laser beams, and his breath is radioactive fire. In earlier incarnations, he is a metaphor for the atomic age. What makes Godzilla, too, such a fearful and awesome (and compelling to humans) monster is his ability to direct energy flows.

The Fit Man Rocks

One evening, many years ago, I was watching a videocassette of a Grateful Dead concert from 1991, with a friend. The video quality was terrible. It was a bootleg cassette, shot furtively. The picture was black and white – mostly black – and fuzzed with static, and the sound wasn’t much better. That said, during one of the first few songs of the band’s set, the camera focused in on Jerry Garcia, the Dead’s iconic guitarist, who was soloing. You could see Garcia’s face clearly (and knew that the enormous crowd could, too; the band at the time was

⁷ Spier, Fred. *Big History and the Future of Humanity*. West Sussex, U.K.: Wiley-Blackwell. 2011. Print. Spier explains that the energy flows that hold a form of complexity together must be neither too high nor too low.

employing massive videoscreens on either side of the stage). At one point during a solo, he played an interesting lick – and at the same time, raised one eyebrow, a classic Garcia facial expression – and the crowd went wild. “Look at that,” my friend said. “That guy has so much charisma that he can raise his eyebrow, and twenty thousand people go nuts.”

Of course, what Garcia did in his career as an electric guitar player in a powerhouse rock and roll band was to channel energy flows – in this case using his nine and a third fingers, six metal strings, a corresponding set of electromagnets, and a massive amplification system to convert large amounts of electrical energy into pressure waves that could travel through air and induce the eardrums of human beings to vibrate, thus exciting electrochemical activity in those human beings’ brains.

Garcia was an exceptionally charismatic figure. He was not particularly handsome – but he had three wives and four children by two of them, and many more girlfriends. He was particularly reproductively fit. But why?

Some simple (meaning done by an English teacher, not a physicist) calculations can give us a loose idea of the amounts of energy Garcia was able to marshal at his peak, around 1988, the summer tour following the band’s only big mainstream radio hit, “Touch of Grey,” in 1987. At this time, the band was playing both arenas and, in the summer, football stadiums – some of which, such as New Jersey’s Giants Stadium, held 80,000 people.

If you wanted to calculate Garcia’s power density (Φ_m) – per Chaisson⁸, a measure of Garcia’s *energy flow*, or the amount of energy he was directing that year with a guitar solo – you might come up with a formula that looks something like this:

$$\Phi_m \text{ JG} = \frac{\text{ENERGY FLOW OF GUITAR SOLO}}{\frac{\text{BRAIN MASS}}{\text{TIME}}} \times \frac{\# \text{ LISTENERS}}{\text{in watts/kg (per Spier)}}$$

In 1988, the Grateful Dead played 80 concerts. If you take a (conservative) roughly estimated average of 25,000 audience members per show (considering both 80,000 seat football stadiums and more shows at smaller arenas that might hold 15,000), the Dead played to 2 million brains that year. If you consider that a typical Dead show of that era ran roughly 3 hours (two 90 minute sets with a 30-45 minute break in between); that the Dead’s sound system was pumping 133,000 watts at the time (McNally 1); that the average adult human brain weighs 1.35 KG; and that Garcia’s share of the sound system’s output was 1/6 (because Garcia was one of six band members), you get some back-of-the-envelope calculations that look like this:

- 80 shows/year (1988) * average 25,000 brains per show = 2 million brains per year
- 2 million brains * 3.0 hours = 6 million brain-hours per year
Grateful Dead sound system pumped 133,000 Watts at that time.⁹
- 133,000 watts / 1.35 KG. – on average 100,000 watts per KG of brain perceiving music (also might consider entheogen-heightened neurotransmission in X % of brains)
- 133,000 watts/6 = 22,166 watts for Garcia.

$$\frac{22,166 \text{ W}}{1.35 \text{ KG}} = \frac{16,419 \text{ W/KG} \times 2 \text{ million aud. Members}}{240 \text{ hours}}$$

$$= \frac{32,839,506,200}{240} = 136,831,276 \text{ W/KG/HR}$$

Garcia’s soloing power density is 32,839,506,200/240 = 136,831,276 W/KG/HR, or, in 1988, Garcia was marshalling 13,683.127 x 10⁻⁴ Watts of energy per kilogram of audience member brain per hour.

That’s comparable to the power density Chaisson estimates for animal bodies, 20,000 x 10⁻⁴

⁸ Chaisson, Eric J. *Cosmic Evolution: The Rise of Complexity in Nature*. Cambridge, Mass.: Harvard University Press. 2001. Print.

⁹ McNally, Dennis. *A Long Strange Trip: The Inside History of the Grateful Dead*. New York: Broadway Books. 2002. Print. (1)

W/KG¹⁰.

Interestingly enough, the gestalt of a Grateful Dead concert (not to mention the group-mind of the band alone) has frequently been compared to that of a singular, living, breathing organism. It is an apt comparison.

If you again consider that two million brains are perceiving Garcia's guitar playing at these concerts (not to mention millions more listening to it on recordings around the world at any given moment), then you have some serious flows of energy, in the form of musical information, vibrations from finger-manipulated steel strings that excite electromagnets in a guitar's pickups. When amplified, this electromagnetic signal vibrates the coiled electromagnet in each of the public address system's loudspeaker diaphragms, causing the speaker cones to pulse. This pulsation transmits as sound waves through fluid (air) as pressure waves; is perceived as sound by the eardrum; and is then converted by the organs of the inner ear back into electrical impulses. These travel to and excite the brain, stimulating the growth of new synaptic connections.

Some of those brains may well have been energy-lubricated so that the energy flows, goosed by entheogenically-altered neurotransmission rates, are higher than one might expect from simply listening to a guitarist solo. In other words, the flow of music into a brain at a Grateful Dead concert would have a higher power density, in that a larger percentage of the energy transmitted would actually be *used* by listeners' brains – the energy absorbed and put to use – than at, say, a Beach Boys concert of comparable size.

What's relevant for this discussion of power is that Jerry Garcia marshaled some major energy flows in his lifetime, for thirty years – and as a result, wealth accumulated around him, as did reproductive opportunities. His charisma made him an iconic figure in the larger culture – thus allowing him to

10 Spier 32, Chaisson 139. Note that Spier presents Chaisson's calculations in W/KG, while Chaisson measures power density in ergs

gather even more energy (for example, Garcia made a small fortune from royalties on sales of Ben & Jerry's Cherry Garcia ice cream – an ice cream flavor dedicated to him just for being him¹¹).

Those 2 million tickets alone, at \$20 a piece, would have generated \$40 million, just in 1988. And when Garcia died in 1995, he left a fortune estimated at \$10 million¹². He had three wives, and four daughters (three with his first and second wives, one with a girlfriend). His genes have multiplied in the pool by four, and crossed with genes from three different mothers, increasing their chances of continuing replication. No wonder a popular bumper sticker a few years later declared him “the fit man” – as in “THE FIT MAN ROCKS!” Garcia was an energy flow node – and thus was reproductively quite fit, in the Darwinian sense.

Those energy flows both manifested in, and may have in some part resulted from, a power-charisma that Garcia was loathe to wield. He mostly refused to opine on politics and rarely spoke from the stage at all. He purposefully threw off the mantle of spokesperson. He did not want to be a leader. He knew that people would follow him. He didn't want that responsibility. (Johnny Cash, another charismatic and iconic musician, has spoken of this, too. During his famous concert at San Quentin prison – just across the Bay from Crissy Field – in 1969, Cash has said, the energy in the room was so high, if he had called “break!” the prisoners would have rioted.)

It's a Metaphor/ It's NOT a Metaphor: Occupy Wall Street and the Concentration of Power

As I pondered all this, I was teaching our first semester Big History class, the course in which we teach the entire story, from the Big Bang to today and on into the future, to all our students in their first

11 McNally 423.

12 Ingram, Eric. “Jerry Garcia Estate Worth \$9.9 Million / Probate records show guitarist's broad tastes.” The San Francisco Chronicle. 29 March 1997. Web. 28 December 2012.

semester. That fall saw the rise of the Occupy Wall Street movement, in which students and unemployed young people – among others – took over Zucotti Park in Lower Manhattan’s financial district. The occupation was a protest against rising income inequality, sparked by the aftermath of the bank-led global financial crisis.

In class, we had been discussing the formation of stars and galaxies in the early universe from molecular clouds – masses of loose hydrogen and helium. As David Christian, Cynthia Brown, and Craig Benjamin explain in their textbook *Big History: Between Nothing and Everything*¹³, the clouds were not homogeneous. There were areas within the clouds that had more matter per volume, and areas that had less. The areas within those clouds that had more matter, because matter is related to gravitational pull, had more gravity – and so those areas of more densely-packed matter drew to themselves even more matter – and more energy. Thus, regions within the early universe that had, by chance, more density, attracted more matter and thus more energy to themselves, becoming even more dense, gravitational, and electromagnetic, and attracting even more matter to themselves – and so on, until what may have been only slightly more dense eddies of matter and energy gathered to themselves all the matter and energy in their neighborhoods. They reached critical masses, at which point they lit up, the fires of the universe, as galaxies and stars.¹⁴

One morning as I was driving to campus, I heard a report about the Occupy movement – and it all clicked: the accumulation of matter and energy in areas that began with more matter and energy in the first place was a perfect metaphor for the concentration of wealth – and therefore of political power.

I discussed this with my students. In the same way that a tiny differential within the molecular

13 Christian, David, Cynthia Brown, Craig Benjamin. *Big History: Between Nothing and Everything* (Preliminary Edition). Boston: McGraw Hill. 2010.

14 Ibid 16-17.

cloud leads the region with slightly more matter and energy to draw to itself more and more matter and energy, so flows wealth in human society. A human born into a family with more wealth than the next human’s family has an advantage over the less wealthy human – and is more likely to remain wealthy. This was the problem that Occupy was addressing: the hardening of social strata over the last 30 years against upward mobility from generation to generation.

But the more I thought about it, I realized that it wasn’t a metaphor at all. What is wealth but an accumulation of money, which itself represents energy? Money, ultimately, is a stand-in for food, humans’ prime source of energy. Sugars and carbohydrates. The ability to do work. So, the concentration of wealth is a concentration of energy – and, of course, of matter.

So ...

EDDIES IN FIELDS OF MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY
ATTRACT MORE MATTER AND ENERGY

Or, as the early 1970s rock outfit Heads Hands & Feet put it,

The more you get, the more you want
It ain’t human not to take
Honey only goes to money
And the more you got, the more you make¹⁵

The accumulation of wealth and power among humans – the rich getting richer, as it were – was exactly the same thing as the accumulation of matter and energy in the early universe – matter and energy concentrating in an eddy in which matter and

15 Colton, Tony, Ray Smith, Pete Gavin, Mike O’Neill, Albert Lee, Chas Hodges. “The More You Get, The More You Want.” *Heads Hands & Feet Heads Hands & Feet*. Capitol Records. 1971.

energy are slightly more concentrated than in the surrounding area. If the concentration of wealth in fewer and fewer hands at the expense of a growing number of individuals who end up with less and less energy (the rich get richer, while the poor get poorer and the middle class disappears) is exactly the same thing as the accumulation of matter and energy in gravitational eddies, then such concentration of wealth is in the nature of the universe.

(Then, again, perhaps it *is* a metaphor, after all, demanding a Big History definition of metaphor: the poetic recognition and expression of a pattern that recurs at two levels of reality, in two types of complexity, or in two regimes; meaning resides in the comparison. It's like a wormhole. Which is, itself, exactly that.)

In terms of human societies, that means that, given a surplus of energy, the universe tends *naturally* toward feudalism and monarchy. In the agrarian age, surpluses that were the result of agricultural production led to social hierarchies. Someone had to protect and distribute surpluses. Whether through consent or coercion, individuals or small groups attained the ability to direct energy flows in the form of food. But energy and matter concentrate at such nodes – and they become monarchies, within feudal systems whose hallmarks are many serfs (slaves) and very few wealthy and charismatic nobles, be they monarchs like Czar Alexander, or priests.

If the universe tends toward feudalism, then the citizens of a democracy, in order to preserve that democracy, must actively check the concentration of wealth and power – of energy – at energy flow nodes.

This has happened at several key points in U.S. history. First and foremost, at the American Revolution, the inhabitants of the “original thirteen” settler-colonies threw off King George III’s reign and replaced monarchy with representational democracy. Abraham Lincoln abolished chattel slavery and therefore the concentration of wealth in the hands of southern plantation owners, who were feudal lords in all but name. Theodore Roosevelt checked the power

of wealthy industrialists by breaking up monopolies and enshrining labor rights for workers. Franklin Delano Roosevelt purposefully checked the growth of the wealth of those he disdained as “economic royalists”, with confiscatory income taxes that were then used to build a middle class.

And now it was happening with President Barack Obama, whose policies would check the runaway concentration of power in the oil and financial industries, in particular. Obama has consistently asserted his aim to improve the fortunes of the middle class, and restore social mobility, with some focus on what might more accurately be called *wealth inequality*, a growing chasm in Americans’ ability to gather and retain surplus energy.

According to the New York Times, the top 1% of income earners took in 23.5% of the nation’s income in 2007 – up from below 10% in the late 1970s.¹⁶ Much of this was due to Reagan-era Federal tax policies that in effect rolled back the progressive income tax that had kept the accumulation of wealth by those in the upper income brackets in check. (At the turn of the New Year 2013, Obama forced a slight re-progressivization of the tax code in the “fiscal cliff” showdown with Republicans in Congress, making permanent ten-year-old tax cuts on 99% of American wage-earners while raising taxes on the top 1%.)

A Washington Post study of who makes up that top 1% reported that corporate executives’ pay in cash and stock options led to their increasing dominance of the topmost income bracket. In the accompanying article, defenders attributed this trend toward ever-increasing executive compensation to the increasing complexity of corporations.¹⁷

It makes sense. The late industrial age has been marked by an increasing consolidation of large

¹⁶ “Share of the Nation’s Income Earned by the Top 1 Percent” (graph). *The New York Times*. October 23, 2011. Web. 29 December 2012.

¹⁷ Whoriskey, Peter. “With executive pay, rich pull away from rest of America. *The Washington Post*. 18 June 2011. Web. 19 June 2012.

corporations into larger and larger conglomerates. Those who lead such complex organizations are nodes, positioned to profit from the increasing flows of energy they control – and, as well, to use that increased wealth to lobby government for less restrictive policies, and lower tax rates, thus further increasing the flows of energy through their organizations, and allowing the increasing concentration of energy at those nodes. And so on.

This may also be why the 2012 election seemed to pit an ideology that defined “freedom” as the freedom of wealth to concentrate as it naturally would, devoid of “excessive regulation,” against an ideology that saw such concentration of power as a threat to the freedom of those with less of it, who seemed to be falling toward serfdom.

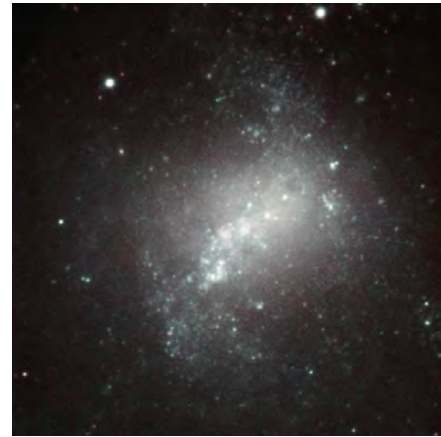
The spending of hundreds of millions of dollars by extraordinarily wealthy individuals – notably, energy industry titans, financiers, and casino magnates – in support of the anti-regulation Republican party and its candidate, enforces this picture. Those with access to the purest forms of energy – fossil fuels and money itself – posed strong opposition to Barack Obama’s re-election. And they had the ability to marshal the energy flows with which to do it.

On Obama’s side were some wealthy technology industry players. If information, in the age of digital electronics, is not energy itself, then it is at least what *organizes* energy. So, those who sit atop nodes through which information flows (executives at Twitter, Apple, Facebook, and Google) are also accumulating great wealth. (This may be why we see even manufacturers of tech devices moving into social networking and other forms of information management).

Compare this image of star formation in galaxy NGC 4214 in Canes Venatici, in which bright young star clusters are surrounded by fluorescent gas clouds¹⁸ with a datamap by artist Eric Fisher,

18 Duggan, Daniel. “NGC 4214 : Star Forming Galaxy.” (photograph). Faulkes Telescope Project. (n.d.) Web. 1 August 2012.

which tracks the location of text-based postings on Twitter (in blue) and postings of photographs using Flickr (in orange) from around London. The white dots represent places where both Twitter and Flickr activity occurred.¹⁹



The most brightly-lit areas in the galaxy image are stars gathering matter and energy to themselves, thus gathering more matter and energy to themselves, and so on. The most brightly-lit areas in the datamap are attractive locations from which Londoners (and, likely, tourists) are uploading photographs and messages – thus attracting other humans (their brains excited by incoming data, their mitochondria pumping ATP to their cells) to those same locations.

That decentralized information networks

19 O’Brien, Oliver. “Tweets vs Flickr Photos – Eric Fischer’s City Maps.” Mapping London (mappinglondon.co.uk). 29 February 2012. Web. 31 July 2012.

have, in the last few years, been the carrier waves of revolution across the Arab and Muslim worlds should come as no surprise. The patterns in which information concentrates via social media in a human-constructed city are quite similar to the patterns into which energy concentrates itself in a young galaxy. In the human realm, such robust information flows are disruptive, and challenge power structures that are based on agrarian-era or industrial-era energy flow paradigms.

Young activists in Iran and Egypt, notably, organized themselves using social media technologies such as Twitter and Flickr, which disseminate text and images, respectively. It's also, then, no surprise that the threatened existing regimes have responded by attempting to shut down such information flows, disabling Internet access and cellular phone service nationwide in Iran, Egypt, Burma, China²⁰, and now Syria.²¹

It's also of interest that in postmortems of the 2012 U.S. Presidential campaign, some analysts have ascribed President Barack Obama's re-election in part to his tech-savvy campaign's adept use of social media, and to the failure of Mitt Romney's online get-out-the-vote computer program, dubbed ORCA.²² Digital information analyst Lauren Ashburn said on the PBS News Hour that the Obama campaign spent \$47 million on social networking, while the Romney campaign spent only \$4.7 million.²³

Media analyst Howard Kurtz added:

20 Rhoads, Christopher and Geoffrey A. Fowler. "Egypt Shuts Down Internet, Cellphone Services." *The Wall Street Journal*. 29 January 2011. Web. 30 December 2012.

21 Chulov, Martin. "Syria shuts off internet access across the country." *The Guardian*. 29 November 2012. Web. 30 December 2012.

22 Kranish, Michael. "ORCA, Mitt Romney's high-tech get-out-the-vote program, crashed on Election Day." *The Boston Globe*. 15 November 2012. Web. 30 December 2012.

23 Daily Download: Obama Spent 10 Times as Much on Social Media as Romney." *PBS News Hour*. 16 November 2012. Web. 30 December 2012.

"The Obama campaign believed from the start that digital was an important new area, and really had an almost an evangelical feeling about signing people up to register to give money through Facebook and Twitter.

"The Romney campaign obviously got a later start because he wasn't the incumbent, but also I think didn't quite have the fervent belief that this deserved a lot of resources."²⁴

Romney's comments asserting that 47% of the American people would not vote for him because they were hopelessly and irresponsibly dependent on Federal government largesse, filmed covertly at a reception for a small group of elite donors, spread virally through social media. This certainly energized voters' rejection of his billionaire-bankrolled candidacy – another clear example of the disruptive threat decentralized information flows pose to agrarian/industrial-era power paradigms.

And while billionaires from the energy and finance sectors backed Romney, to roll back Obama policies that challenged those paradigms (investments in clean energy, financial system reform), donors from the tech sector backed Obama, who has made Federal government investment in advancing new information and energy technologies a hallmark of his presidency.²⁵

The Occupy movement, which also exploited social media as a means of organizing energy flows, purposefully avoided centralizing power in individual leaders who could be co-opted, or singled out for attack or character assassination by opponents. But it may be, too, that the reason the Occupy movement appears to have slipped away – or at least to have not yielded a direct clear political clout comparable to that of the somewhat analogous conservative populist Tea Party movement – is that without leaders operating as energy flow nodes, energy – and therefore political power – can not accumulate.

24 Ibid.

25 Marinucci, Carla. "Bay Area money fills Obama campaign coffers." *The San Francisco Chronicle*. Saturday, November 3, 2012. Web. 30 December 2012.

On Power

Power is the ability to marshal flows of energy.

Where individuals marshal energy flows, be they politicians, fictional characters with fantastic powers, electric guitar players, or corporate executives, matter and energy accumulate. Such command of energy flows is related to charisma, and can confer reproductive fitness. Political power may also be quantifiable, if we measure the power density of energy flows commanded by powerful individuals.

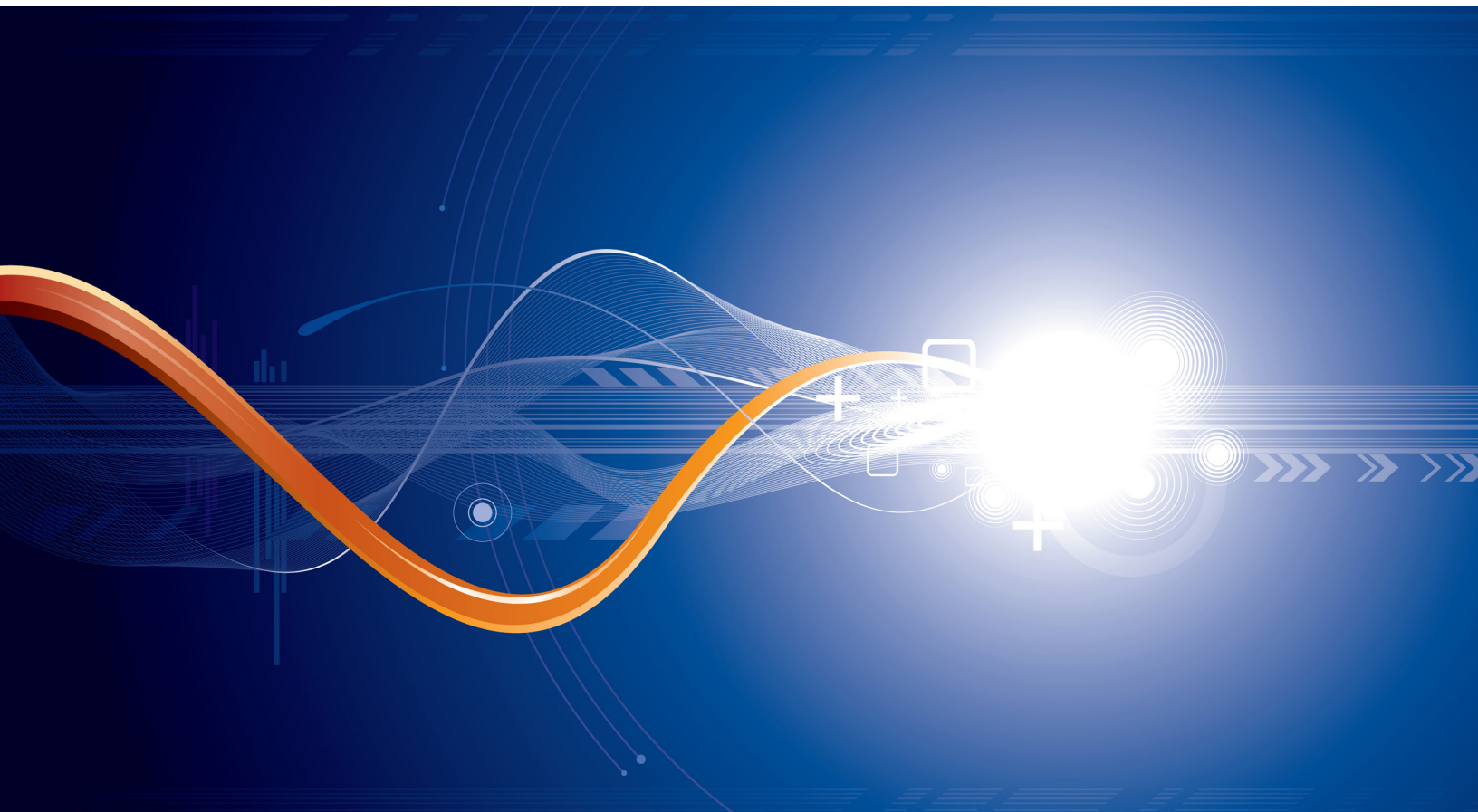
Decentralized information (the Internet) and decentralized energy production (renewable energy production technologies such as rooftop solar panels) are disruptive of Agrarian and Industrial Age power concentration paradigms. The individuals who control the energy flows in those paradigms do not want to see them supplanted. They entrench against an onrushing future.

That matter and energy accumulate and concentrate in recurrent patterns seems to indicate

that such concentration of surplus energy (and, therefore, wealth) is in the fundamental nature of the universe. In human affairs, unless such concentration is purposefully checked by regulating how matter and energy (money and power) accumulate at energy flow nodes, it leads naturally to feudalism and monarchy – and presents an existential threat to democracy.



Richard B. Simon is Adjunct Assistant Professor of English at Dominican University of California, an Instructor at City College of San Francisco, and Contributing Editor at Relix magazine. An earlier version of this article this paper was presented at the 2012 IBHA conference and also appeared in Dominican's own Big History journal Thresholds. He is lead editor with Mojgan Behmand and Thomas Burke on the Dominican University of California Big History faculty's forthcoming text on teaching Big History.



Big History on Youtube

David Baker
University of Amsterdam

In August, a 10-episode Big History series will be released on the Youtube channel Crashcourse. Hosted by the ‘vlogbrothers’, John and Hank Green, the channel has produced an enormous library of 10-15 minute crash course videos on a multitude of topics, from World History to Chemistry to English Lit. Since 2012, Crashcourse has amassed a following of 1.83 million subscribers (as of writing in early July) and a whopping 112 million views. John Green is a talented novelist and has recently seen one of his books turned into a highly successful movie, *The Fault in Our Stars*, and he usually hosts the more humanities and social science based topics on the channel. Hank Green is a trained scientist in his own right and runs a number of highly informative science channels that are a staple for any big historian looking to keep pace with the most recent developments, breakthroughs, and curious facts. Hank naturally hosts the science based videos on Crashcourse.

But! Due to the deeply-rooted transdisciplinary nature of Big History, we have the rare honour of having our series hosted by both Green brothers, despite the fact they live in different cities and operate out of different studios across the country.

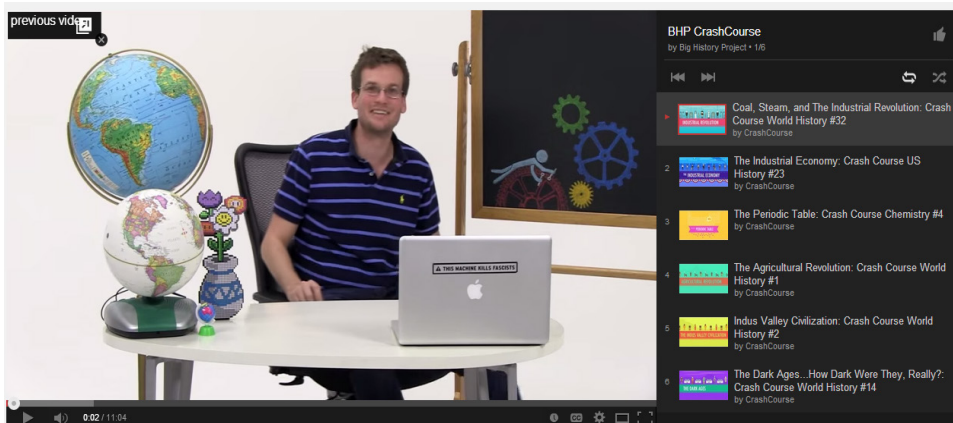
Back in 2013, John and I briefly discussed the possibility of doing a Big History series. Idealistically speaking, we were both firmly on board – running gleeful laps from stem to stern and high-fiving when we passed each other amidships. I don’t think I need to wax profound to the IBHA members reading this article on the immense appeal of Big History in order to explain why. Then perhaps more practically, John asked, ‘you don’t happen to have a few thousand dollars lying around do you?’ I confessed I did not. I don’t exactly do this job for the 401k or a villa in Capri. Thankfully, miracles are often an email or two away. Andy Cook of Bill Gates Catalyst 3 (bgC3), the venerable benefactors behind the Big History Project, had also developed a liking for Crashcourse and very generously offered to fund the series and expressed the wish that it also be incorporated into the BHP’s curriculum. And so began a slew of script-writing, condensing, revising, uncontrollable weeping, and more script-writing. It is difficult not only to fit the grand narrative of 13.8 billion years into a few 15 minute episodes, but also to pepper the script with jokes. My own particular difficulty came with keeping the jokes PG-rated. After six years teaching university students, and then having to write with high school students (or at least their teachers) also in mind, one’s humour repertoire contracts in the most sudden and shocking of ways...

In the writing process, I am extremely grateful for the input of Hank Green, who could be an excellent big historian in his own right, Bob Regan and Rachel Phillips, who made sure the thing jived with the curriculum needs of the BHP, and Esther Quaedackers, my colleague at the University of Amsterdam, who was kind enough to donate her time to pore over the episode outline and drafts of the scripts. Above all I’d like to thank Stan Muller, Crashcourse’s producer, for a constant stream of emails over several months, tirelessly tweaking to make sure things would work on camera.

Anyway, at the time of writing we have prepped most of the videos, including graphics and animations with the same pacing and format that has become the Crashcourse style. The first episode should land on Youtube sometime in August. The potential for hundreds of thousands, and, if it does as well as some of the Crashcourse videos, millions, of Youtubers to experience Big History will be very good news for our genre gaining even more traction and public recognition as an established discipline. Big History should not only be a thing of university and high school classrooms. It should be a thing of our common culture and a defining aspect of the 21st century popular consciousness. By placing on Youtube the cosmic epic of what Douglas Adams called ‘life, the Universe, and everything’, we hopefully will reach people who otherwise might not yet have heard of Big History. And this can only be a good thing.

So [hop onto Youtube](#), [click](#) the subscribe button, and WATCH THIS SPACE.

David Baker did his PhD in Big History under David Christian at Macquarie University, and now teaches Big History at the University of Amsterdam alongside Fred Spier and Esther Quaedackers.



The first introductory book to Big History in Japanese

IGCP ed., *An Introduction to Big History*/
Journal of the Institute for Global & Cosmic Peace, No. 8,
Yokohama: IGCP, 2014, 193p.

Nobuo Palette Tsujimura
Institute for Global & Cosmic Peace

On April 16, 2014, NHK (Japan Broadcasting Corporation) broadcast David Christian's TED talk, "The history of our world in 18 minutes" on an educational TV program, "Super Presentation" (*1). Most Japanese people were exposed to Big History for the first time. Previous to this, some Japanese scientists such as Norio Kaifu, Takafumi Matsui and Takeshi Naganuma had reconsidered human beings from a Big History-like perspective, and the Institute for Global & Cosmic Peace (IGCP) had also introduced Big History to a subsection of Japanese people.

However, many Japanese people probably got to know such a whole historical approach thanks to Christopher Lloyd's book, *What on Earth Happened?* The Japanese edition of this, *Hyaku-sanjū-nana-oku nen no Monogatari (A Story of 13.7 Billion Years)* was published in September 2012 and later sold over 100 thousand copies (*2). Since April 2013, TV TOKYO has run a TV program, "Hyaku-sanjū-nana-oku nen no Monogatari." Two kinds of *The What on Earth Happened? Wallbook* (poster size timeline) were also translated into Japanese in 2013 (*3). Lloyd has delivered lectures at several junior and senior high schools, universities and a symposium in Japan during recent years. On September 26, 2013, he made a special lecture titled "Big history, visualisation and the brain" at Keio University (*4). His books are geared towards the general public rather than academia. The growing interest in the big history perspective suggests that Big History Project and Chronozoom Project are in demand among Japanese people. In response to this demand, We at IGCP published the first Japanese introductory book for Big History, *Biggu Hisutorī Nyūmon (An Introduction to Big History)* this year (*5).

I would like to explain the origins and meanings

of our book in another context, as well. Leading author and historian, Osamu Nakanishi, had been constructing his own historical study for peace. In 1986, against Reagan's "Star Wars" Initiative, he founded the International Institute for Global & Cosmic Peace (IIGCP). Fifteen years later, the attacks on September 11, 2001, occurred, and he reorganized his institute as the Institute for Global & Cosmic Peace (IGCP) in December 2001. Ten years later, 3/11 occurred: Japan suffered great earthquakes, tsunamis and nuclear incidents in 2011. Nakanishi published *Russian Revolution, Chinese Revolution and 9/11* in the aftermath of these events, in spite of his falling health. It struck me.

Right after this, I made contact with Gina Giandomenico on Twitter. She kindly introduced me to Barry Rodrigue, the international coordinator of IBHA, and several other big historians. In April 2013, Barry Rodrigue visited Tokyo and met with several IGCP members; Nakanishi (the President), Kazuko Ohta (his secretary), Kunio Okada (the Vice-President) and me. Rodrigue promised to help us to establish communication with Russian big historians (*6). Thanks to him in June of that year, Nakanishi, Ohta, Okada and Kaoru Sakurai, who was also a member of IGCP, were able to visit Moscow and meet with Akop Nazaretyan and other Russian scholars. As a result of these meetings, Nakanishi first suggested featuring "Russia and Big History" in the next edition of our annual journal. Later, he felt it would be more appropriate to publish the first introductory book of Big History in Japanese. As he became 82 years old at the end of 2013, he felt this would be his last book, so he decided to publish the introductory book before passing away. Eventually, it was published both as a book (*An Introduction to Big History*) and a journal

We at IGCP published the first Japanese introductory book for Big History, *Biggu Hisutorī Nyūmon (An Introduction to Big History)* this year.

(*Journal for the Institute for Global & Cosmic Peace*, No. 8) on January 11, 2014. This publication date was chosen to honor that we created a new study of the universe to overcome the events of 9/11 and 3/11 (violence and disasters).

Here are the contents of our book:

Introduction—Osamu Nakanishi (7–10)

Part I

What is Big History?—Osamu Nakanishi (14–94)

1. What is Big History?
2. The beginning of the Universe
3. The birth of the Sun, the Earth and life
4. The evolution and diffusion of human beings
5. Historical perspectives of McNeill, Christian, Spier and Nazaretyan
6. Historical perspective of Osamu Nakanishi
7. How will the world be in 2050?
8. The futures of the Universe, the Sun, the Earth

Part II

Nazaretyan and Recent Moscow—Kaoru Sakurai (96–113)

Foreword

1. A visit to Oriental Institute, Russian Academy of Sciences
 2. A. P. Nazaretyan
 3. Nazaretyan's academic career
 4. A summary of Nazaretyan's *Nonlinear Futures*
 5. Valuations on Nazaretyan's *Nonlinear Futures*
- Afterword: My impressions of Moscow

Universal Origins of Humanity: On Nazaretyan's "Mega-Evolution and Big History"

—Nobuo Tsujimura (114–151)

1. A historical trail of the article
 2. Confrontation with thoughts that divide humans: The core of the article
 3. Akop Nazaretyan and David Christian
 4. What does universal evolution mean?
 5. Information: A key to interpret the article
 6. The present stage of universal history
- General review
References

From the Philosophy of Risk to Cosmological Global Peace Theory

—Hirofumi Katayama (152–181)

Introduction: The development of technology and modern risks

1. Existential risk theory of Bostrom
 2. The trans-humanist nature of existential risk theory
 3. Risk society theory of Beck
 4. Reflexive modernization's limits due to remaining within modernity
- Conclusion: The need to construct a new cosmological perspective on humans
References

Conclusion—Osamu Nakanishi (182–187)

References of Osamu Nakanishi (188–190)

Afterword—Osamu Nakanishi (193)

Osamu Nakanishi's writings: Part I plus

Introduction, Conclusion and Afterword are the heart of our book. Nakanishi finished the doctoral course at Department of International Relations, Graduate School of Sociology, University of Tokyo, and is now in charge of the following posts: 1a) the President at the NPO, IGCP, 1b) the Rector at Universal University, IGCP, 2a) the President at Salon in Memory of Setsuko Nakanishi Co. Ltd. (Salon Setsuko), 2b) the Rector at University Universe, Salon Setsuko, 3) an advisory professor at Shanghai Normal University, 4) a visiting professor at Wuhan University, 5) a special researcher at the Center of Japanese Studies, Peking University in Beijing. Universal University is one of divisions of IGCP for spreading Universal History (*7). University Universe is that of Salon Setsuko, which was founded with his late wife's name in October 2012 when he temporarily withdrew from the presidency of IGCP.

Nakanishi prefers the term "Universal History" rather than "Big History." Because such narratives have existed for the last 3000 years, since the Old Testament, he feels a historian should not ignore the fact that humans have tried before Big History to construct historical accounts encompassing everything. Old Universal History is based on myth, and the new one is based on science. He puts it as "development of Universal History from the mythic to the scientific" after Engels' *Socialism: Utopian and Scientific*. So he defines Big History as "one of the versions of Universal History from the twentieth to twenty-first centuries."

In Nakanishi's view, a role of historians is to place exactly all events into the universal context. Overlooking 13.7 billion years of the universe,

he considers that we can learn seven lessons from universal history. First, what definitively rules birth, continuation and passing of human life is nature, such as the earth, the sun and the cosmos. Humans must be in awe of nature. Second, humans can't be born and live without the earth, the sun, air, water and foods. Since nature creates all these things, we must know this and thank to nature. Third, humans and human societies could survive and develop in severe nature thanks to science and technology. But, the appearance of nuclear weapons reveals that there are two kinds of science and technology: one we should develop and the other we shouldn't. Fourth, humans spread from Africa to parts of the world searching for foods and a better place to live. Such diffusion represents the first stage of globalization. Unification of humans after 1492 represents the second stage of globalization. Fifth, the launch of Sputnik in 1957 advanced global integration, and humans began to enter into space. Cosmonization (unification of the whole universe) has already started. Sixth, human history is full of revolutions and wars. They are violent ways to cut the Gordian Knot. Seventh, a war is a terror by states, and a terror is a war by individuals. Our times demand that we solve problems by peaceful means.

Nakanishi says that since a human lives for a hundred years at best, we don't need to worry about a next hundred million years and beyond. All we need is to think about how to live a hundred year life with an eye on the next thousand and ten thousand years. For a closer example, how will the world in 2050 be like? An optimistic scenario is for a global commune to form. This would happen in stages. First, a Chinese Federation is formed, one that includes the PRC and Taiwan. North and South Korea form the Koryo Federation. The Chinese Federation and the Koryo Federation and Japan form the East Asian Union. The East Asian Union then joins with India and the other countries to form the Asian Union. Australia and New Zealand form the Oceanic Union. The USA, Canada, Mexico and others form the North American Union. Latin American Union also emerges. The United Nations would be reorganized into a loose organization

to contact, coordinate and negotiate among these regional unions. Finally, the entire globe would be a commune in peace. The Japan-US alliance is dissolved, and American forces and bases are removed from Japan.

A pessimistic scenario can also be imagined. International society remains an assemblage of sovereign states. The EU weakens efforts to integrate and the UK leaves it. The other regional integration also stagnates. North Korea promotes nuclear development and nuclear weapons. Conflicts between North and South Korea escalate, and a war breaks out again. The relationship between mainland China and Taiwan gets worse, which finally develops into the armed conflict. The

USA intervenes, and a Sino-American War breaks out. In Japan, the Constitution is amended and the self-defense force becomes a complete military force. Japan-US forces engage in warfare with China and Korea. India and Pakistan initiate the first nuclear war. Iran becomes a nuclear power, and then Saudi Arabia, Egypt, Iraq and Syria try to follow after

that. Conflicts between Israel and Palestine escalate, and a war breaks out again. The USA and NATO intervene, and the battlefield spreads across the Middle East and Africa. A series of these wars would generate a new international order in the first half of this century, which centers on victorious countries of the wars. Nakanishi thinks that a mixture of optimistic and pessimistic scenarios are likely to materialize.

Nakanishi concludes that we must create new thought and study that can cope with problems of human nature, social systems and nuclear threats, and Universal History and Universal Science can provide the basis for such thought and study. It is a challenge to make us genuine *Homo sapiens* (wise person). Therefore, he agrees with the "Global Enlightenment" that Rodrigue stated at an international congress, *Global Future 2045* in Moscow in February 2012 (*8).

Part II emphasizes Russian achievement because our book was originally planned to feature Russia,

Nakanishi concludes that we must create new thought and study that can cope with problems of human nature, social systems and nuclear threats, and Universal History and Universal Science can provide the basis for such thought and study.

as previously mentioned. Kaoru Sakurai's essay, "Nazaretyan and Recent Moscow" is an interlude of our book. She withdrew from the doctoral course at Department of Sociology, Graduate School of Letters, Soka University, and is a translator between Russo-Japanese languages. She wrote about the IGCP visit to Moscow last year. The IGCP members, including her, visited the Eurasian Center for Big History & System Forecasting (ECBSF), Oriental Institute, Russian Academy of Sciences on June 10, 2013. In the colloquy, it was discussed that the social status of Big History had not been established yet either in Japan or Russia. Akop Nazaretyan, the Director of ECBSF, explained that, although most astrophysicists and cosmologists had regarded culture and mind as side constituents until the mid-1990s, such paradigms have rapidly changed, and the development of mind would decide our future. IGCP and ECBSF promised future academic exchange and cooperation. Then Nazaretyan invited the IGCP party to the presentation the next day of his new book, *Nonlinear Futures*. Nakanishi commented there that it was "an encyclopedia of Universal History in the West." Sakurai values "in the West" in his comment, and argues that it has incalculable value in researching Universal History and the same theme on humans and the universe all over the world.

She also outlines *Nonlinear Futures* (*9). Nazaretyan points out that Graem Snooks, Alexander Panov and Ray Kurzweil independently came to the same conclusion that according to calculations based on various parameters, intervals between important events (emergence of life, the primitive age, development of civilizations, industrial revolution and informative revolution, etc.) have gotten narrower through universal evolution, and will be zero around the middle of the twenty-first century. *Nonlinear Futures* focuses on what those nonlinear graphs mean. Although Nazaretyan values the shock therapy provided by the Club of Rome's *Limits to Growth* (1972), he criticizes its biocentrism that humans are no more than an element of

biosphere because it might come to the conclusion that humans are cancer cells of the earth. In his view, ecological problems are errors when human mind develops. Human mind is the most significant parameter that decides the limits to growth. He wishes that evolutionary perspective of Universal History would make human potential infinite.

I (Nobuo Tsujimura) finished a doctoral course at Department of Sociology, Graduate School of Letters, Soka University. I am an artist and a scholar beginning a new activity, "the Big Attractive," which is not confined to academic framework of Big History. I call all activities to place humans in the universe, communicate with the cosmos, and have cosmic sense as "the Big Attractive" (*10). My article, "Universal Origins of Humanity" critically reviews Akop Nazaretyan's representative article, "Mega-Evolution and Big History," which is the record of struggles of those who tried to understand universal history without God (*11). He criticizes that Western Big History neglects significance of information or informational parameters. So, I asked him, "What does information mean in your usage?" He answered that information included the whole developmental process from material reaction, living organism's perception to human knowledge and ethics. While Charles Darwin searched biological evolution for origins of humanity, Nazaretyan searches inorganic and even universal evolution for them, especially of reason and mind. If we cannot find them within evolution of nature itself, it could make room for divine intervention.

He rejects any religious and quasi-religious ideologies because he believes they all discriminate and divide humans between friends or foes.

Nazaretyan agrees that complexity and rarity go together in universal evolution and says that evolution is tapering like a cone from dark matter to humans. Then he argues that humans' non-material

influence exceeds geological and climatic changes. Japanese people know that it is not true through disasters after 3/11. In contrast, a behavioral ecologist, Mariko Hasegawa, points out that since

Today what is emerging or coming back is a perspective that can see human-like attributes in nature and nature-like ones in humans. Nature is not just the composition of matter and energy. It has brought up new capacities like proto-mind and mind: sense, perception, intelligence and ethics.

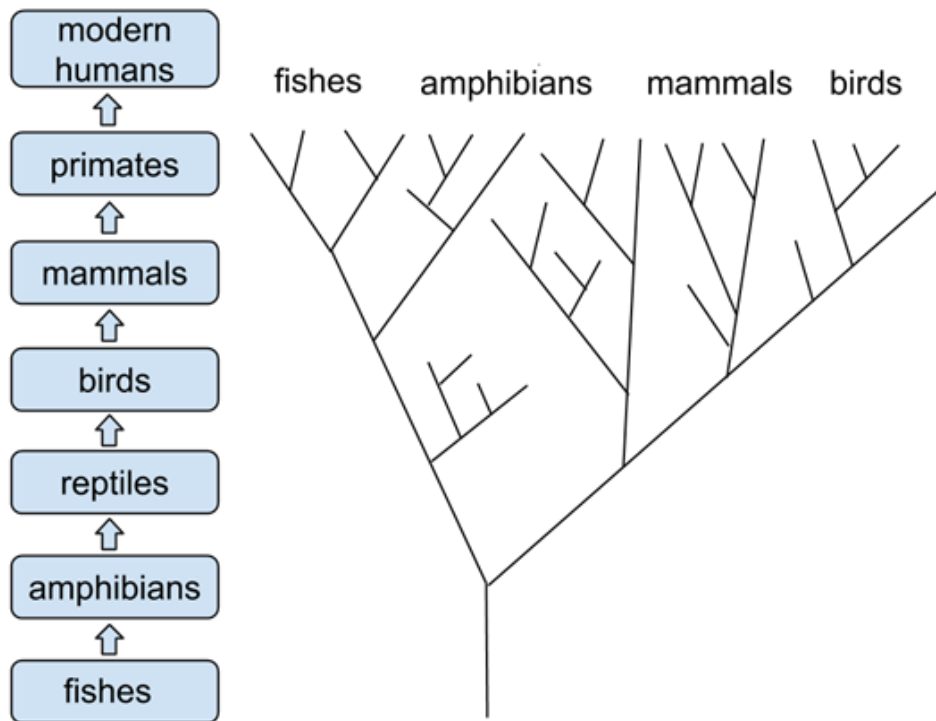


Figure 1 Two viewpoints on evolution
I remade and translated Hasegawa's figure.

new capacities like proto-mind and mind: sense, perception, intelligence and ethics. Mind doesn't go beyond nature, but it is part of nature. Thus, human mind is not our ability but one of abilities of nature. A philosopher, Ataru Sasaki, says that since average life of a species is estimated to be four million years, we've lived only one twentieth of it. Seen from eighty-year-old people, we are no more than four years old. So, we can say that we and our civilization are infants.

Hirofumi Katayama obtained a Ph.D. (economics) at the Graduate School of Economics, Hitotsubashi University and is a professor at College of Arts and Sciences, J. F. Oberlin University. He makes a specialty of environmental economics, comparative

evolution is the process of branching to adapt to different environments, all living things are the tops of their own branches (see the right side of Figure 1) (*12). Although her viewpoint is limited to life on earth, we can apply it to everything in the universe (see Figure 2).

We, modern humans first understood nature by personification. Various myths understood the super power of nature as something great that took on human forms. Then we understood humans as nature by modern science. Nature seemed to consist of just matter and energy. Today what is emerging or coming back is a perspective that can see human-like attributes in nature and nature-like ones in humans. Nature is not just the composition of matter and energy. It has brought up

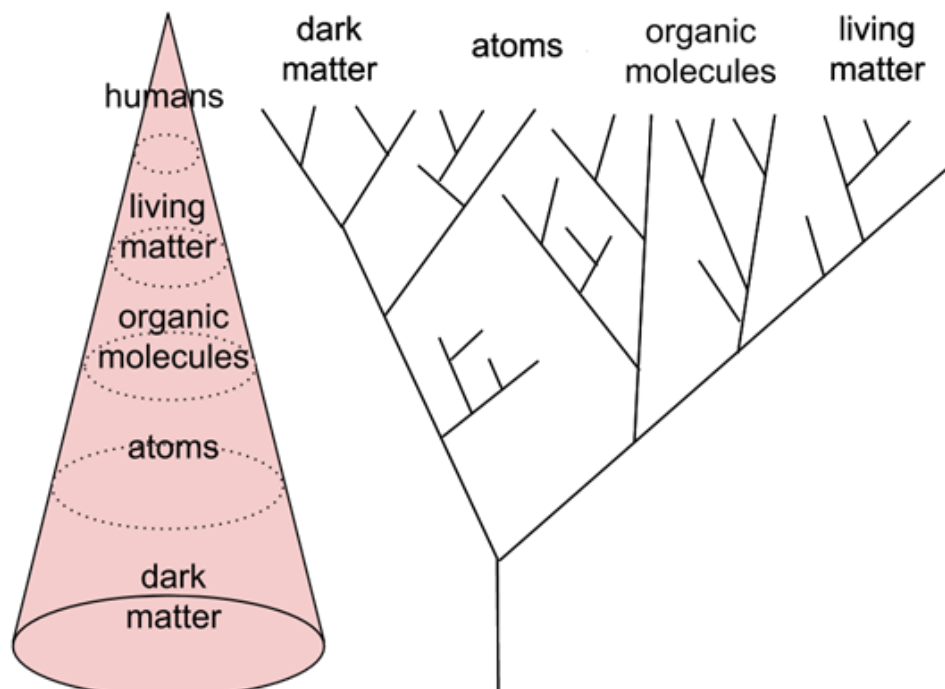


Figure 2 Two viewpoints on universal evolution
I constructed Nazaretyan's cone of evolution from his description and then converted it to Hasegawa's tree of evolution. This figure will be included in the revised edition of our book.

economic systems, and commons. His main works are *Free Market and Commons: An Introduction to Environmental Finance* (2008) and *Politics of Climate Change over the Arctic: A Tentative on Anti-Property Commons* (2014) (*13). His article, “From the Philosophy of Risk to Cosmological Global Peace Theory” implicitly asks what view of humanity should Big History be based on in order to overcome the modern risks threatening global peace. Nuclear energy began to threaten human survival in the latter half of twentieth century. Humans decided to control it under the sovereign state system. The attack of 9/11 revealed the political risk that terrorists were out of control of negotiation processes among nations. And 3/11 revealed the technological risk that natural disasters, human errors and unexpected runaway of technology were also out of control. Hence 9/11 and 3/11 symbolize the twenty-first century as “a century of risk.”

Then Katayama compares two representative thoughts on modern risks: trans-humanist theory and reflexive modernization theory. A trans-humanist philosopher, Nick Bostrom, explains the limits to growth with the analogy of a space rocket. It is sustainable when it is on the launch pad and flies in space. But it is unsustainable once it flies into the air. Then reduction of energy consumption is useless because sooner or later its fuel will run out. The best solution is to keep propulsion strong enough to get out of the Earth’s gravity. Thus only technological development will save us. Resource problems will be drastically solved by space colonization. Moreover, trans-humanists regard the most essential nature of humanity is not body but mind, especially information. Bostrom therefore argues that humans will evolve to immortal post-humans by uploading their intelligence and self-consciousness to silicon brains and then live as informational patterns within them. The transition from humans to post-humans will be left to personal choice. As a result, species and abilities of humans will differentiate in the future. In an optimistic view of trans-humanism, we shall overcome modern risks threatening our existence by reaching the new stage of post-humans and space colonization. It is a strategy to obtain temporarily unsustainable conditions and then sustainable trajectory.

In contrast, a sociologist studying reflexive modernization, Ulrich Beck, is more pessimistic about technological development because it is

advanced in sub-political domains of business and science, which are not controlled through parliamentary democracy. Such situations allow increase of risks, and therefore scientific rationality can convert to social irrationality. So what is most needed is direct democracy that individuals take part in discussions in sub-politics. Such globally cooperative and public control of technology will save us. Politics and Sub-politics will complement each other.

Seen from Katayama, both Bostrom and Beck refer their solutions to personal choice (not to parliament). Although Bostrom’s solution can’t be easily accepted from ecological viewpoints, Beck is at more of a disadvantage than trans-humanists in sub-politics. Adding my supplementary interpretation to Katayama’s argument, trans-humanists rethink and reinvent humanity on the cosmological scale, which will create new opportunities for economic benefits, technological innovation, new natural resources and improvement of body (medical treatment, anti-aging, cosmetic surgery, body transformation and reconstruction, genetic engineering, becoming a cyborg and even immortal). So they will gain support and solidarity of those who will want such things. On the other hand, Beck failed to cherish his early idea, “solidarity of living things” encompassing modern dualism between human and nature. Because he remains within the modern conception of humanity, he just appeals to us to be cosmopolitans against common risks on the basis of the Kantian Enlightenment tradition. So it seems to be difficult to provide a strong incentive for globally unified solidarity. Katayama concludes that to find a new solution, neither that of Bostrom nor Beck, we need another cosmological perspective on humanity. Then an idea of world communality, including cosmology, will emerge from it, and finally we will construct cosmological global peace theory based on such idea.

Lastly, I also designed the cover and belly-band of our book. My drawing, “Taiyō” (The Sun) on the cover means that what lights us most is not reason but the sun. It implies protest against arrogance that humans are brightest in the universe and that we can enlighten others. Enlightenment needs those who are blind and should be lighted as its prerequisite condition. Once modern Westerners called their previous age as “the Dark Age,” Africa as “the Dark

Continent” and Asia as a region of “stagnation.” They enforced violent colonization and deprivation over what they regarded as non-modern, non-Western and non-human. And now we call unknown parts of the universe as “dark matter” and “dark energy.” What is genuinely dark is not them but our reason and intelligence! (*14) Although modern Westerners’ light of reason took the place of God’s light of reason, it will make no sense that big historians’ one will take the place of Westerner’s one in Western way. If Big Historians regard themselves as the light side and others as the dark side, it will do nothing but make a new division between Big Historians and non-Big Historians (*15). We can light each other because we are all children of stars. Our bodies consist of elements made within pressure cookers of stars. However, we failed to use part of star energy in Hiroshima, Nagasaki, Three Mile Island, Chernobyl and Fukushima. After the Fukushima Daiichi nuclear disaster, Lloyd rethought his previous conclusion in the original edition of *What on Earth Happened?* that nuclear energy would save the world, and he later recanted in the Japanese edition (*16). We must know what shines most. We are still infants, yet infants have amazing abilities to learn.

Notes

(*1) See <http://www.nhk.or.jp/superpresentation/backnumber/140416.html>. A TV program, “Supre Presentation” introduces selected TED talks to Japanese audiences.

(*2) Christopher Lloyd, *What on Earth Happened?: The Complete Story of the Planet, Life, and People from the Big Bang to the Present Day*, Bloomsbury Publishing, 2008. Japanese edition: Kurisutofā Roido, *Hyaku-sanjū-nana-oku nen no Monogatari: Uchū ga hajimatte kara kon-nichi made no zen-rekishi (A Story of 13.7 Billion Years: The whole history from the beginning of the universe until today)*, translated by Kyoko Nonaka, Tokyo: Bungeishunjū, 2012.

(*3) Christopher Lloyd, *The What on Earth Happened? Wallbook: From the Big Bang to the Present Day*, What on Earth Publishing, 2010. Japanese edition: Kurisutofā Roido, *Bijuaru Dai-*

nempyō Hyaku-sanjū-nana-oku nen no Monogatari (A Visualized Big Timeline of the Story of 13.7 Billion Years), translated by Kyoko Nonaka, Tokyo: Bungeishunjū, 2013. Idem, *The What on Earth Happened? Wallbook of Natural History*, Natural History Museum, 2011. Japanese edition: Idem, *Seibutsu Yonjū-go-oku nen no Monogatari Bijuaru Dai-nempyō (A Story of Four the Half Billion Years of Living Organisms: A Visualized Big Timeline)*, translated by Ayako Murata, Tokyo: Asahi Shimbun Shuppan (Asahi Shimbun Publications), 2013.

(*4) <http://www.ic.keio.ac.jp/news/002671.html>

(*5) Chikyū Uchū Heiwa Kenkyūjo (IGCP) ed., *Biggu Hisutorī Nyūmon/ Chikyū Uchū Heiwa Kenkyūjo Shohō, Dai hachi gō (An Introduction to Big History / Journal of the Institute for Global & Cosmic Peace, No. 8)*, Yokohama: IGCP, 2014.

(*6) On our meeting in Tokyo, please see Barry Rodrigue, “Promoting Big History in East Asia in 2013,” *International Big History Association Members’ Newsletter (later Origins)*, III (6), June 2013. Rodrigue wrote “Osamu Nakanishi in Japan was among the first big historians in the world to begin telling this unified story” (pp. 9-10). Nakanishi wrote that Rodrigue was a highly multi-talented and activist scholar as well as an educator in our new book (p. 23).

(*7) About IGCP, Nakanishi and me, please see Nobuo Palette Tsujimura, “Universal (Cosmic and Global) History from Japan,” *IBHA Members’ Newsletter*, I (5), November 2011.

(*8) Barry Rodrigue, “Manifesto for a New Millennium: A Working Agenda for the Anthropocene,” February 20, 2012 at *Global Future 2045* in Moscow. <http://2012.gf2045.com/read/112/>

(*9) On Akop Nazaretyan’s *Nonlinear Futures*, see also *IBHA Members’ Newsletter*, III (3), pp. 7-8.

(*10) My online gallery: <http://palettehole.wix.com/ntoco>

(*11) Akop Nazaretyan, “Mega-Evolution and Big History” Barry H. Rodrigue, Leonid E. Grinin and Andrey V. Korotayev eds., *From Big Bang to Global Civilization: A Big History Anthology*, unpublished.

(*12) Mariko Hasegawa, *Shinka towa nandarōka* (*What is Evolution?*), Tokyo: Iwanami shoten, 1999, p. 62 (in Japanese).

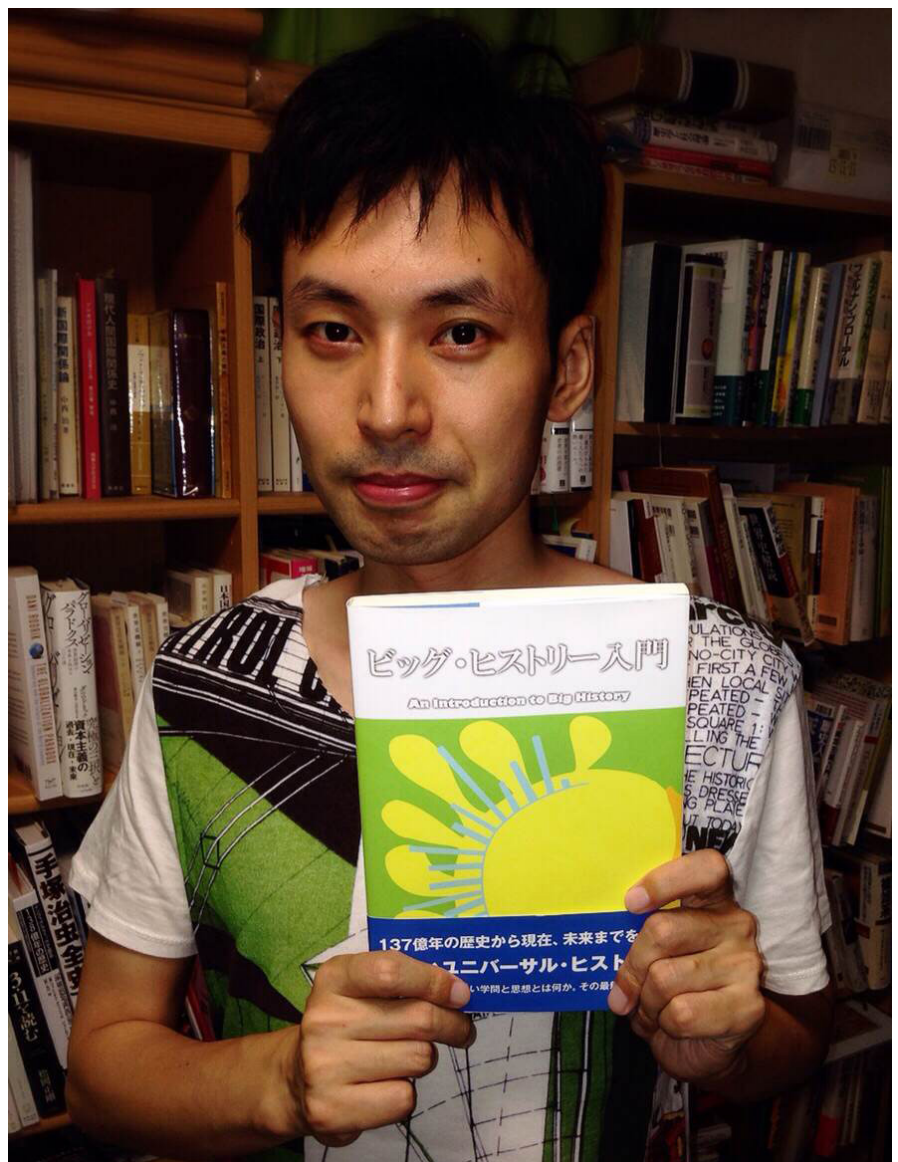
(*13) Hirofumi Katayama, *Jiyū-shijō to Komonzu: Kankyō-Zaiseiron Josetsu* (*Free Market and Commons: An Introduction to Environmental Finance*), Tokyo: Jichōsha, 2008. *Idem*, *Hokkyoku o meguru Kikōhendō no Seijigaku: Han-Shoyūteki Komonzuron no Kokoromi* (*Politics of Climate Change over the Arctic: A Tentative on Anti-Property Commons*), Tokyo: Bunshindō, 2014. (Both in Japanese)

(*14) On September 9, 2012, I delivered a lecture titled “Biggu Hisutorī towa nanika” (What is Big History?) at Universal University, IGCP. I said, “David Christian says that we, humans are in a sense eyes and ears of the universe. If so, eyes and ears of humanity seem to be those of babies. Because we cannot conceive over 90% of the universe: dark matter and energy.” On Christian’s argument on meanings of our life, watch his final lecture of Teach 12 (David Christian, *Big History: The Big Bang, Life on Earth, and the Rise of Humanity*, 8 DVDs, The Great Courses, The Teaching Company, 2008).

(*15) I wrote this thinking both of the past Enlightenment and the Global Enlightenment proposed by first David Hooke and then Barry Rodrigue. It is a little anachronistic of a term to me, although I know they don’t use it in such a sense as I criticize here. On the past Enlightenment, see Roy Porter, *The Enlightenment*, 2nd edition, New York: Palgrave, 2001. Late Porter wrote “As it moves into the twenty-first century, Western civilization still subscribes to – or, rather, some would say, remains imprisoned within – this secular version of the limitless human drive towards economic growth, scientific innovation, and progress, which the Enlightenment envisaged. [...] it might be better to say that what the *philosophes* essentially did was to replace a *Christian* myth with a *scientific* myth – one more appropriate for an age of technology

and industrialization.” (p. 19) On the Global Enlightenment, see note 7 and Daniel J. Stasko and Barry H. Rodrigue, “Changing the Future with the Past: Global Enlightenment through Big History,” *Journal of Globalization Studies*, 1 (2), November 2010. <http://www.sociostudies.org/journal/articles/140650/>

(*16) “‘Fukushima Daiichi gempatsu jiko’ wa rekishi o dō kaetaka: Ei besutoserā ‘Hyaku-sanjū-nana-oku nen no Monogatari’ Nihongoban” (How did “Fukushima Daiichi nuclear accidents” change history?: The Japanese edition of a British bestseller, *What on Earth Happened?*), livedoor NEWS, September 25, 2012 (in Japanese). <http://news.livedoor.com/article/detail/6984367/> See also Roido (Lloyd), *Hyaku-sanjū-nana-oku nen no Monogatari*, pp. 474-475.



INTERNATIONAL BIG HISTORY ASSOCIATION CONFERENCE

AUGUST 6 - 10, 2014

DOMINICAN UNIVERSITY OF CALIFORNIA
SAN RAFAEL (SAN FRANCISCO BAY AREA), CALIFORNIA

TEACHING AND RESEARCHING BIG HISTORY: BIG PICTURE, BIG QUESTIONS

The theme for the 2014 conference is “Teaching and Researching Big History: Big Picture, Big Questions.” The conference seeks to continue the dialog begun at the first IBHA conference in 2012. In addition IBHA seeks to create a forum for the articulation, discussion, and distillation of questions central to Big History. Among the topics that are to be addressed at the conference through a series of panels, roundtables, and discussions are:

- Big History and energy
- Big History in education
- Big History pedagogy
- Big History scholarship
- Big History research agenda
- Evolution of complexity
- Identification and analysis of thresholds
- Continuity and Contingency in our Universe
- Big History: interdisciplinary, multidisciplinary, or trans-disciplinary?
- Big History and the future
- Big History and meaning
- Big History outcomes and assessment
- Politics and Big History
- Little Big Histories



The IBHA Conference will convene on the campus of Dominican University of California in San Rafael, which is located twelve miles north of the Golden Gate Bridge. Attendees will have the option of selecting from one of several hotels in San Rafael and the surrounding area or staying in on-campus accommodation.

San Rafael is a wonderful destination in Marin County surround by woods and beaches. For all things San Rafael go to <http://www.sanrafael.com>. For a complete guide to San Francisco and its many attractions, visit <http://www.sanfrancisco.com/>. And if you have more time to explore the larger Bay Area, see <http://www.visitcalifornia.com/Explore/Bay-Area/>.

Please find more details on the conference at www.ibhanet.org. We hope you can join us for this fantastic second IBHA conference!

Program Committee: Cynthia Brown, Lowell Gustafson, Fred Spier, Harlan Stelmach, Joseph Voros

Transportation to/from San Rafael

Flying into SFO

We suggest taking the Marin Airporter from SFO to Marin and disembarking at the Central San Rafael Transit Center. Approximate travel time is 1.5 hours. Buses pick up passengers at SFO every 30 minutes, on the hour and half-hour, beginning at 5:00 AM. The last bus of the night departs from SFO at midnight. Fare is currently \$20. http://www.marinairporter.com/schedules_sfo_to_marin.html

From the Transit Center in San Rafael, there are taxis available to take you to your hotel. If you are staying at the Four Points by Sheraton in San Rafael, it is approximately 3.3 miles from the Transit Center to the hotel.

Flying into OAK

We suggest taking the Sonoma County Airport Express to Marin and disembarking at the Central San Rafael Transit Center. Fare is currently \$26. Please refer to the Airport Express website for travel times and pick-up times. <http://airportexpressinc.com/schedules.php>

From the Transit Center in San Rafael, there are taxis available to take you to your hotel. If you are staying at the Four Points by Sheraton in San Rafael, it is approximately 3.3 miles from the Transit Center to the hotel.

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Reservations may be cancelled without penalty up to 24 hours prior to arrival.



*Guzman Hall
Dominican University of California*

Conference Registration

To register for the 2014 IBHA conference, please [click here](#), or click on "Conferences" at <http://www.ibhanet.org/>. The first registration window should pop up. Please let us know at ibhanet@gmail.com if this form gives you any trouble.

LOH181

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Grand Valley State University
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Allendale MI 49401-9403
USA

Daily bus transportation, specified meals and evening events are all included with registration.

Name _____

Address _____

City, State _____

Zip _____

Institutional Affiliation _____

Email _____

Guest Name _____

Total Registration Fee Included _____

Please make your check payable to the
International Big History Association

- ☐ Member - \$355.00 (USD)
IBHA Member Late Registration Rate (after July 19)
- ☐ Non-Member - \$455.00 (USD) (after July 19)
IBHA Non-Member Late Registration Rate
- ☐ Student Member - \$210.00 (USD) (after July 19)
IBHA Student Member Late Registration
- ☐ Guest Registration - \$150.00 (includes evening events only)



International
Big History
Association

Geological Tour of Land's End and Sutro Baths, San Francisco
\$50 p.p. Limited capacity: 20
Wednesday, August 6th, 1:00-5:00pm

1 pm pick-up at Four Points Sheraton
5 pm dropoff at Four Points Sheraton
* On-campus pick-up available

Enjoy a beautiful hike at Land's End at the northwestern corner of San Francisco, where stunning views will astonish you at every turn. Hillside of cypress and wildflowers, views of shipwrecks and the ruins of Sutro Baths provide the setting for a tour with a Big History perspective. Geologist Dr. Christopher Lewis will be your guide through Ocean Beach, the Sutro Baths, and Land's End as you learn how our California coastline came to be. Links to [Land's End](#), [Land's End map](#), [Sutro Baths](#).

Contact [Donna Tew](#) in the IBHA office to reserve your place on these tours!



Wine Country Tour

\$120 p.p. Limited capacity: 56
Sunday, August 10th
9:30 am pick-up / 3:30 pm dropoff at Four Points Sheraton

This tour includes visits to two distinct attractions in our local wine country. The first site is the beautiful Jacuzzi Family Vineyards where IBHA guests are invited to tour the winery, enjoy a tasting, and partake of a delicious and specially prepared lunch. The second site is Cornerstone Gardens, an ever-changing series of walk-through gardens, where IBHA guests are invited to tour new and innovative garden designs from the world's finest landscape architects and designers. For more information, visit the websites at <http://www.jacuzziwines.com/> and <http://www.cornerstonesonoma.com/explore/about-cornerstone/>

The IBHA is proud to announce that Jennifer Joy, a New York City writer/performer/comedian who draws her themes from Big History, will be performing excerpts from her hit show, *The Physics of Love*, in a special lunchtime performance at the upcoming IBHA conference.

She has performed to rave reviews in New York City and all over the country. She is currently touring *The Physics of Love*, a romantic comedy based on Big History, to colleges, universities and theatres across the country.

In this multi-character one-woman show, “Lisa” is a science teacher who revels in her nerdiness, seeing everything in her life through the lens of science’s Universe Story – from the chaos of her 7th grade class to her bumpy search for love. She is surrounded with quirky characters, including students, many bad dates and finally, The Right One. But will she be able to give love a chance? Filled with humor and intelligence, this show will delight and inspire you!

Critical Raves for “The Physics of Love” “...(a) powerhouse performer, Jennifer Joy Pawlitschek has written and performs a multimedia piece involving quantum physics... Not only is Ms. Pawlitschek strikingly beautiful in her tall bearing, she’s highly articulate and bright, and puts on a captivating show.”

- Mark Mardon, Bay Area Reporter

“Jennifer Joy combines humor, science and humanity in an excellent show about one life in a vast universe.”

- Lamont (Monty) Hempel, PhD.,
Hedco Professor and Director,
Center for Environmental Studies, University of Redlands

“There was amazing distinction between each character, with the voices and the body gestures. The science aspect played beautifully into the love story and I loved that it was not boom! Happily ever after. It was, ‘let’s try this again’. Jennifer is amazing!”

- Jack McKenna, SUNY Potsdam

“The Physics of Love” is a hit! It’s magic!

Don’t miss this special performance! Friday, August 8th at 12:30 pm
Creekside Room in Caleruga





Special Plenary Session
Guzman Lecture Hall
Saturday, 3:30-4:30 pm
**ChronoZoom: New Features
and Future Research Tools**

Roy Zimmermann
Chair
Microsoft Research

Walter Alvarez
University of California,
Berkeley

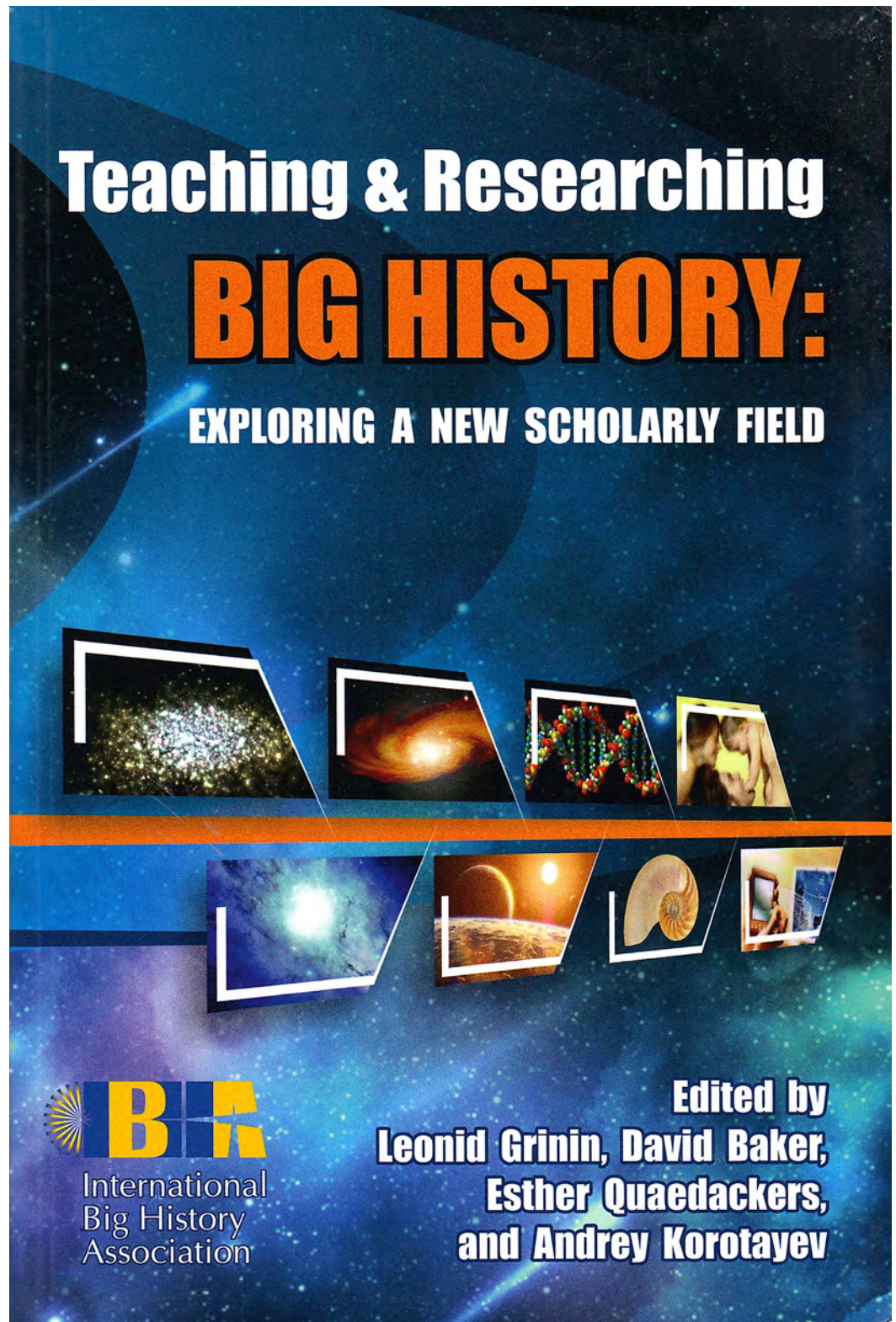
Roland Saekow
University of California,
Berkeley

David Shimabukuro
Sacramento State
University

Teaching & Researching Big History: Exploring a New Scholarly Field

Edited by Leonid Grinin, David Baker, Esther Quaedackers, and Andrey Korotayev

According to the working definition of the International Big History Association, 'Big History seeks to understand the integrated history of the Cosmos, Earth, Life and Humanity, using the best available empirical evidence and scholarly methods.' In recent years Big History has been developing very fast indeed. Big History courses are taught in the schools and universities of several dozen countries. Hundreds of researchers are involved in studying and teaching Big History. The unique approach of Big History, the interdisciplinary genre of history that deals with the grand narrative of 13.8 billion years, has opened up a vast amount of research agendas. Big History brings together constantly updated information from the scientific disciplines and merges it with the contemplative realms of philosophy and the humanities. It also provides a connection between the past, present, and future. Big History is a colossal and extremely heterogeneous field of research encompassing all the forms of existence and all timescales.



In recent years Big History has been developing very fast. Big History courses are taught in the schools and universities of several dozen countries. Big History deals with the grand narrative of 13.8 billion years and brings together constantly updated information from the scientific disciplines and merges it with the contemplative realms of philosophy and the humanities. It also provides a connection between the past, present, and future. Big History is a colossal and extremely heterogeneous field of research encompassing all the forms of existence and all timescales. In this volume the Big History is presented and discussed in three different ways. In its first part, Big History is explored in terms of methodology, theories of knowledge, as well as showcasing the personal approach of scholars to Big History. The second section comprises such articles that could clarify Big History's main trends and laws. The third part of this book explores the nature of teaching Big History as well as profiling a number of educational methods.

This volume will be useful both for those who study interdisciplinary macroproblems and for specialists working in focused directions, as well as for those who are interested in evolutionary issues of Astrophysics, Geology, Biology, History, Anthropology, Linguistics and other areas of study.

Unsurprisingly, Big History may be presented in very different aspects and facets. In this volume the Big History is presented and discussed in three different ways. In its first part, Big History is explored in terms of methodology, theories of knowledge, as well as showcasing the personal approach of scholars to Big History. The second section comprises such articles that could clarify Big History's main trends and laws. The third part of this book explores the nature of teaching Big History as well as profiling a number of educational methods.

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Teaching & Researching Big History: Exploring a New Scholarly Field /

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Introduction

Big History's Big Potential

*Leonid E. Grinin, David Baker,
Esther Quaedackers, and Andrey V. Korotayev*

Big History has been developing very fast indeed. We are currently observing a 'Cambrian explosion' in terms of its popularity and diffusion. Big History courses are taught in the schools and universities of several dozen countries, including China, Korea, the Netherlands, the USA, India, Russia, Japan, Australia, Great Britain, Germany, and many more. The International Big History Association (IBHA) is gaining momentum in its projects and membership. Conferences are beginning to be held regularly (this edited volume has been prepared on the basis of the proceedings of the International Big History Association Inaugural Conference [see below for details]). Hundreds of researchers are involved in studying and teaching Big History.

What is Big History? And why is it becoming so popular? According to the working definition of the IBHA, 'Big History seeks to understand the integrated history of the Cosmos, Earth, Life and Humanity, using the best available empirical evidence and scholarly methods'.

The need to see this process of development holistically, in its origins and growing complexity, is fundamental to what drives not only science but also the human imagination. This shared vision of the grand narrative is one of the most effective ways to conceptualize and integrate our growing knowledge of the Universe, society, and human thought. Moreover, without using 'mega-paradigms' like Big History, scientists working in different fields may run the risk of losing sight of how each other's tireless work connects and contributes to their own.

Scientific specialization and the immense amounts of information contained in the various 'silos' of academia can hinder our capacity for inclusiveness, but, paradoxically, it also amplifies the need for it. Many scientists would like a more integrated vision that sees beyond their meticulous and complicated fields of specialization. One can see the growth of such interest in the framework of individual disciplines, as well as in interdisciplinary research. Yet, while interdisciplinarity is not

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expositions

INTERDISCIPLINARY STUDIES IN THE HUMANITIES

Academic Roundtable

Vol 8, No 1 (2014)

Introduction to the Roundtable: Big History

An Introduction to Big History

Lowell Gustafson

Big History

Bruce Mazlish

Slimmer, Brighter, and Nearly Perfect: The New Big History Textbook Is Here

Mojgan Behmand

We Are Stardust ... Concentrated by Earth!

Walter Alvarez

Big History's Risk and Challenge

Eric J. Chaisson

<http://expositions.journals.villanova.edu/issue/view/130>

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**International
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**International Big History
Association
Brooks College of
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Grand Valley State University
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Allendale MI 49401-9403**

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