

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

by Richard B. Simon

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.¹ 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.

¹ This paper has been updated from one delivered at the inaugural International Big History Association Conference, August 4, 2012, at Grand Valley State University in Grand Rapids, Michigan.

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!²

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

² Tolstoy, Leo. *War and Peace*. Trans. Richard Pevear and Larissa Volokhonsky. New York: Vintage Classics. 2007, 246. Print.

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 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 megatons. 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 restrained, passionate, undivided attention of this entire mass of men.³

It's not that the 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 theatergoers know, the universe in which the popular films take place is populated by Jedi Knights who are particularly sensitive

³ Ibid.

to The Force. This, as far as we knew in 1977⁴, 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

⁴ *Star Wars Episode IV: A New Hope*. Dir. George Lucas. Perf. Mark Hamill, Harrison Ford, Carrie Fisher. Twentieth Century Fox, 1977. Film.

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.⁵

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 triphosphate, or ATP⁶, 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 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

⁵ *Star Wars Episode I: The Phantom Menace*. Dir. George Lucas. Ewan McGregor, Liam Neeson, Natalie Portman. Twentieth Century Fox, 1999. Film.

⁶ May, Paul. “Molecule of the Month: Adenosine Triphosphate.” Bristol University School of Chemistry. November 1997. Web. 26 December 2012.

galaxy far, far away in which the tale unfolds (see *Star Wars Episode VI: Return of the Jedi*, 1983).⁷ 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.

⁷ *Star Wars Episode VI: Return of the Jedi*. Dir. George Lucas. Perf. Mark Hamill, Harrison Ford, Carrie Fisher. Twentieth Century Fox, 1983. Film.

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 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 star.⁸ 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

⁸ 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.

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 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 remarked. 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 Chaisson⁹, 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:

⁹ Chaisson, Eric J. *Cosmic Evolution: The Rise of Complexity in Nature*. Cambridge, Mass.: Harvard University Press. 2001. Print.

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

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 time¹⁰; 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.¹¹

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.

¹⁰ McNally, Dennis. *A Long Strange Trip: The Inside History of the Grateful Dead*. New York: Broadway Books. 2002, 1. Print.

$$\frac{22,166 \text{ W}}{1.35 \text{ KG}} = \frac{16,419 \text{ W/KG} * 2 \text{ million aud. Members}}{240 \text{ hours}} = \frac{32,839,506,200}{240} = 117,278,571 \text{ W/KG/HR}$$

Garcia's soloing power density is $32,839,506,200/240 = 136,831,276 \text{ W/KG/HR}$, or, in 1988, Garcia was marshalling $13,683.127 \times 10^{-4}$ watts of energy per kilogram of audience member brain per hour.

That's comparable to the power density Chaisson estimates for animal bodies, $20,000 \times 10^{-4} \text{ w/kg}$.¹²

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 electromagnets in the public address system's loudspeaker

¹² Spier 32, Chaisson 139. Note that Spier presents Chaisson's calculations in w/kg, while Chaisson measures power density in ergs

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 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 him¹³).

¹³ McNally 423.

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 million.¹⁴ 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 loath 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.)

¹⁴ 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.

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 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*¹⁵, 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

¹⁵ Christian, David, Cynthia Brown, Craig Benjamin. *Big History: Between Nothing and Everything (Preliminary Edition)*. Boston: McGraw Hill. 2010. Print.

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.¹⁶

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 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 has an advantage over the less wealthy human—and is more likely to remain wealthy. This was the problem that

¹⁶ Ibid 16-17.

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
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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 make

Keep that turnstyle turnin' around the gate¹⁷

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 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

¹⁷ Colton, Tony, Ray Smith, Pete Gavin, Mike O'Neill, Albert Lee, and Chas Hodges. "The More You Get, The More You Want." *Heads Hands & Feet*. Capitol Records. Vinyl LP. 1971.

that were the result of agricultural production led to social hierarchies.¹⁸ 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

¹⁸ Christian, David. *Maps of Time*. Berkeley: University of California Press, 2005, 259-282. Print.

“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.¹⁹ 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%.)

¹⁹ “Share of the Nation’s Income Earned by the Top 1 Percent” (graph). *The New York Times*. October 23, 2011. Web. 29 December 2012.

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.²⁰

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

²⁰ Whoriskey, Peter. “With Executive Pay, Rich Pull Away from Rest of America. *The Washington Post*. 18 June 2011. Web. 19 June 2012.

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 clouds ²¹ with a datamap by artist Eric Fisher, which tracks the location of text-based postings on Twitter (in blue) and postings of photographs using Flickr (in orange) from around

²¹ Image courtesy of Faulkes Telescope Project/LCOGT. Duggan, Daniel. "NGC 4214 : Star Forming Galaxy." (photograph). Faulkes Telescope Project. (n.d.) Web. 1 August 2012.

London. The white dots represent places where both Twitter and Flickr activity occurred.²²



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 have, in the last few years, been the carrier waves of revolution across the Arab and Muslim worlds should come as no

²² O'Brien, Oliver. "Tweets vs Flickr Photos – Eric Fischer's City Maps." Mapping London (mappinglondon.co.uk). 29 February 2012. Web. 31 July 2012.

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, China²³, and now Syria.²⁴

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

²³ Rhoads, Christopher and Geoffrey A. Fowler. "Egypt Shuts Down Internet, Cellphone Services." *The Wall Street Journal*. 29 January 2011. Web. 30 December 2012.

²⁴ Chulov, Martin. "Syria Shuts Off Internet Access across the Country." *The Guardian*. 29 November 2012. Web. 30 December 2012.

get-out-the-vote computer program, dubbed ORCA.²⁵ 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.²⁶

Media analyst Howard Kurtz added:

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.²⁷

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,

²⁵ 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.

²⁶ "Daily Download: Obama Spent 10 Times as Much on Social Media as Romney." *PBS News Hour*. 16 November 2012. Web. 30 December 2012.

²⁷ Ibid.

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.²⁸

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.

²⁸ 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, by measuring 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.

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