REVITALIZATION
OF DOWNTOWN WINNIPEG
and every other City on earth

Urban decay, complexity, multi-scale competency architecture, perturbations, scalin g, city whisperer s, and the question, "Do private impact housin g investments stimulate spontaneous regeneration in urban set-

featuring Mr. Big

by Keith Wiebe Gord on

Revitalization of Downtown Winnipeg and Every Other City on Earth:

Urban decay, complexity, multi-scale competency architecture, perturbations, scaling, city whisperers, and the question, “Are bio-electric stimulation on frog regeneration analogous to private impact housing investments on urban decay?

Emergent thoughts spoken in real time and published in the spirit of the community commons 2024 by KEITH WIEBE GORDON

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The idea that humans can revitalize anything once it has started to deteriorate is, in one sense, nonsense. Any thinking teenager paying attention in a high school physics course has enough information to deduce that the earth is in a closed system universe and thanks to the immutable Second Law of Thermodynamics, every particle story always has an unhappy ending.

Okay, I agree, almost none of us paid attention in high school, especially in a physics class. I, for one, was in the habit of skipping physics to play pool with my buddies in the inner city of Winnipeg. So, let's slow this down and start from the beginning.

The Scottish Lord Kelvin and the German Rudolf Clausius were the physicists who described the Second Law of Thermodynamics for the first time circa 1860. The First Law of Thermodynamics, developed earlier by Clausius and others, explained that the energy in the entire universe is always conserved. That means

energy can't be created or uncreated anywhere, including an inner city.

However, although there can't be more or less energy in the universe, it can move around, so to speak, and that is where the Second Law of Thermodynamics comes into play. While the overall energy in the universe can't increase or decrease, it can change. Like a Second Law caveat on the First Law, it can be said that energy is still energy even if it changes its form. In the same way that a green, blue or yellow chameleon is still the same chameleon, likewise, energy in any form is still the same energy.

"How does energy change?" you ask. "Does it change colours?" No energy doesn't come in colours. But energy can sometimes be useful, and sometimes as useless as an old sock.

The idea that energy can change its state from useful to useless is sort of like the idea of your delicious hot coffee becoming a terrible cup of room temperature coffee with no hope of it heating itself up again for you, but not exactly. While the Second Law of Thermodynamics recognizes the reality of irreversible heat transfer, it is more concerned about something becoming irreversibly disordered. However, the uselessness imagery of room temperature coffee is still helpful because it is the hot starting point that makes it attractive and thus useful to us. The cold end point target of that cup of coffee gives it motion. Coffee served to you with a starting point of room temperature is useless.

Let's go to an unlikely source to illustrate this concept. Jesus is dramatically quoted in the New Testament as saying he preferred his followers to be either behaviorally hot or cold, and if they were lukewarm, he was going to spit them out of his

mouth. His quote is a good primer on the Second Law of Thermodynamics. Jesus, never shy to mince words, is saying the behavioral energy of his followers needed to exist in a constant state of hot or cold to be of any use. Surprisingly, Jesus advocated a dialectic approach to his teachings, yes vs. no, hot vs. cold, in a constant interplay.

Energy, like the followers of Jesus, is not helpful in a tepid state. Energy must be on the move, and, thankfully, energy has a built-in tendency to leave its organized starting point to find a disorganized ending point. Thus, the Second Law of Thermodynamics describes the concept of energy in a closed universe always becoming disordered and never becoming useful again. Remember, energy cannot disappear, but it can become redundant.

Potential energy is rooted in the first microstates of atomic and subatomic particles that were the building blocks of everything in the universe. When these particles were densely configured, as they were right after the big bang, they were in an unlikely ordered state and wanted to move to something more probable, such as a randomly distributed state.

But again, you ask, "Why is an ordered configuration of microstates improbable, and their disordered configuration probable? The answer to that doozy of a question is above the paygrade of even the smartest among us, and so we will just have to accept it as the nature of things. For some universal reason beyond our understanding, the energy in the smallest members of our universe is always on a journey of potential. In this case the potential is different than the potential you see in your precious children, with all your hopes and dreams.

The energy in microstates has a potential for chaos. This idea can

be illustrated by imagining the contrast of 5,000 rats, forced to sit politely in their seats, row on row, in a concert music hall, to the behaviour of those rats when the concert is over. When the curtain closes on the boring music (well, boring to the rats), all hell will break loose in the concert hall. Those same perfectly behaved rats, in their bib and tucker, will suddenly, to paraphrase the Canadian poet Stephen Leacock, fling themselves from their chairs, and then fling themselves from their orderly rows, and go scurrying off randomly and chaotically in all directions.

So, is the universe just hell bent on creating chaos? The answer is both yes and no. And thus, we are now getting to the most fascinating part of what seemed like a thermodynamic death sentence to everything in the universe. What is especially interesting to those of us who are alive and breathing, is that the creation of life occurs neither in a highly improbable particle state of ordered energy density, nor a highly probable state of energy randomness, but in the state when energy is on the move. Yes, it is in the world in between where all the good stuff happens, the middle earth where life can spontaneously occur. Jesus was on to something.

The story of energy on its journey from being ordered to being disordered is not just a story of chaos, it is also a story about what could happen after energy buys a one-way ticket to nowhere. At the moment of the Big Bang, all the energy in the universe was in the tiniest of suitcases, compact and completely ordered, just like your suitcase before you take a long trip. No excitement in that suitcase at all, just lots of socks, underwear, t-shirts and shorts neatly folded and confined. But there is a lot of potential for something in that suitcase when you get to your

tropical destination.

After you arrive at your vacation getaway, and let's imagine it's somewhere with a nice hot beach, you open the suitcase, take out your swimsuit and snorkel and dive into the water. There is a lot to explore with the help of the items in your suitcase until it is time to go home again. But here is where you are different than the general state of energy in the universe. On the last day of your vacation, you will neatly repack your suitcase again, but the universe can't repack suitcases. The unpacked previously orderly suitcases of the universe can never be orderly again.

So, the bad news is that the universe does not know how to re-order energy once it is used up. But there is some good news. In the transition from ordered to chaotic states energy can be put to work and that is why a planet can create life.

To create life, we need action produced from energy on the move, but neither perfectly ordered energy, nor perfectly disordered energy. We need emergent energy, the potential of the small parts of a system self-organizing between the boundaries of order and chaos. Ironically, to create and preserve life, preventing endpoint killer chaos is the goal, but returning to a completely ordered starting point would also be a killer. Life needs action and action can only be found when energy is on the move, between the starting line and the finish line.

I am afraid to tell all you peaceful Zen lovers, and ordered monastics mystics, we actually want to be in a constant state of flux, one step behind boringly ordered microstates, and one step ahead of the deathly mediocre entropic forces. We all know that humans seeking personal relationships are mostly rewarded by the thrill of the chase, but the aftermath of the successful cap-

ture of a lifetime partner is never as exciting. Likewise, at the onset, creating a city produces a great sense of anticipation, but maintaining a city is always more tedious and tiring. Thus, the reality of life and love and of cities and everything else that moves, is that we never get a day off. So, get over it. Life is energy and energy is constant movement.

The one-way energy journey towards potential disorder has been dubbed *entropy* by physicists. The word entropy is rooted in the Greek word *entropia* and conveys the idea of a turning toward or transformation. Entropia, or entropy as we know it, is also conceptually connected to the Latin *evolvere,* from which the word *evolution* is derived. Both words carry the sense of a transformation, either unfolding as with evolution, or turning toward, as with entropy.

Thanks to Darwin, we tend to think of transformations in progressive growth and development terms. A physicist pondering the Second Law of Thermodynamics sees transformation differently in that energy transforms regressively in a closed system and always carries with it the potential of moving from a low state of entropy (a non-random starting point of low disorder potential) to a high state of entropy (a highly random ending state of high disorder potential).

“But wait a minute,” you say. “I object! Don’t we always have new life developing on earth, and, if so, do Darwin’s observations regarding the progressive forces of transformation embedded in the laws of nature cast shade on the regressive view of transformation as seen in the Second Law of Thermodynamics?”

Well, sorry to tell you, the answer is no. Evolution through natural selection operates on different principles than thermodynam-

ic entropy. Evolution involves genetic variation and selection pressures, not just energy states. But still, your point is well taken. Even with a focus on energy outside of evolutionary properties, the earth does seem to be able to decrease entropic forces temporarily.

Remember, in high school physics we learned entropy always increases in a closed system. The key word here is closed. The earth is in an open sun-earth-empty space thermodynamic system, and open system pockets can be found in a closed system universe. Therefore, because the earth exists in an open thermodynamic system, we can temporarily avoid being arrested by the entropy police and getting convicted for being thermodynamic lawbreakers. In a closed system, you can't escape the law. In an open system, there are many places to hide.

In a completely closed system, such as the entire universe, with a fixed amount of energy, open energy pockets can form, like our solar system, where over relatively short timescales—relative to the age of the universe—it appears that energy is becoming more useful with time. However, all good things must come to an end, and eventually the usefulness of the energy will be used up. The Second Law of Thermodynamics is not thwarted in temporary open systems.

Okay, so how exactly does an open sun-earth-space system seem to cheat entropy? Let's think of it this way. Our earth, being situated near the sun, takes advantage of the cast-off energy being unpacked deep inside the sun's core and moving on its one-way journey which takes it right past our home planet. Lucky for us! We can temporarily take advantage of the heat energy of the sun while it is on the move to a colder, or, more ac-

curately, disordered, state. Our earth knows how to turn a negative into a positive by reordering the particles and thereby increasing the potential for new forms of order. In that process Mother Earth makes something useful out of the sun's leftovers, such as us, and regurgitates it, before pooping out our used-up energy into a formless and dark universe.

The openness pocket of our local solar system in a closed universe is the proximity of earth, located somewhere between the hot sun and the hypothetical state of absolute zero. We are lukewarm compared to the sun and absolute zero, but a little less lukewarm than outer space.

Mother Earth reforms the sun's energy as it passes by into all kinds of elements that will later produce life, such as carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. Then, Mother Earth produces organic molecules such as proteins, nucleic acids, lipids, and carbohydrates. Not finished yet, finally, Mother Earth produces life forms such as vegetation, animals, and us.

We humans, being one of the sharper tacks in the planetary box, then figured out that we can do the same trick we learned from Mother Earth. For example, we learned to create a locomotive's steam engine which performs useful work as the heat in the system changes form. Heat is used to boil water which becomes high pressure steam. Then, in its desperate attempt to escape the closed system, the steam pushes the piston of the engine. The outcome is a useful moving train.

So, as a smart human, doing your best Mother Earth impersonations, give yourself a pat on the back. In the same way that Mother Earth makes useful life out of the sun's energy in motion, we use the same theory to create something useful on a smaller

level, like a steam engine. Good for us. What's the harm in that? Well, there's a catch. There is always a catch.

Human-made thermodynamic manipulation operates in relatively small closed systems. On a broader scale, the open sun-earth-outer space thermodynamic system allows billions of years to cycle through the disordered solar energy the earth receives, and then reorders to create life, and then finally discards it in an even greater disordered, random state. In this timeframe, we can't notice the overall sad state of decay transformation.

Since the onset of industrialization, in tightly controlled closed systems with finite time and space parameters, humans have indeed figured out how to harness energy on earth in the same way the earth harnesses the sun's energy. However, we also inadvertently sped up entropic processes exponentially.

To make the process even more volatile, not only did we learn how to create useful energy by manipulating the natural building blocks of life through the extraction of energy from heat transfer in a steam engine, but we also learned that Mother Earth has a treasure chest under her crusty surface where she stores the sun's energy deposited in a hidden savings account a long time ago.

This savings account is the energy of the sun stored in organic materials which have decayed and fossilized over billions of years. We all know this form of energy as fossil fuel. Once we humans learned how to find the treasure chest of fossil fuel, like the pirate Blackbeard, we lusted after the gold inside and ever since have been converting that stored energy treasure into all manner of quick pleasures and benefits.

The outcomes of our artificially closed system of energy transfer

in confined time and space parameters has further increased both the potential for growth, but also an entropic potential. We will see later why this is relevant to the current rapid growth and rapid decline of cities. Unless we super smart humans get even smarter, and unless we get smarter faster and discover new and better ways to keep one step ahead of the super charged entropic forces that we created and are never going to go away, life in cities is not going to be pretty in the years to come. This is true even though cities are amazingly resilient.

So, if we reverse engineer our present urban progress, we can see that urbanization is the outgrowth of industrialization, which is the outgrowth of new forms of closed-system energy transfer. Since the onset of the industrialization period, many people have gone from living rurally to living in urban settings. This process has occurred in less than 250 years and is still accelerating. Cities all over the earth grow quickly by taking advantage of stored solar energy and turbo charging it by human ingenuity. But the bigger we are, the harder we fall. Or, to put it another way, the faster we grow, the faster we decline. There is no avoiding this reality.

Some parts of downtown Winnipeg are in a state of decline, just like some parts of many other cities everywhere in the world. So yes, downtown Winnipeg is partly becoming disordered, but give it a break! Cities are just doing what comes naturally in an entropic universe. If a focus on urban revitalization is too narrow and pays no heed to the ubiquitous reality of entropy, attempts to intervein and shape urban revitalization will be misguided and can't end well.

Energy is at the core of rapid urban development and energy at

the scale of modern human achievement can only be borrowed temporarily, or worse yet, stolen. A disregard for the responsible use of fossil fuels is akin to energy theft. When humans become energy thieves, they become fugitives and are always on the run. We humans everywhere are guilty as charged and we are in a heap of trouble.

Admittedly, there have been obvious benefits to humans after stumbling across a treasure trove of fossil fuel energy 200 years ago. Quick and easy energy allowed humans to scale urban living rapidly and globally. Based on the illicit proceeds of energy larceny, and an arranged threesome of business, science, and government, we moved into cities, centralized our energy consumption, and improved our life expectancy and quality of living.

The bad news is that we need more and more energy to stay one step ahead of the entropic forces that increase in magnitude the more the artificially ordered state of human ingenuity creates big cities via big business, big science, and big government.

Easy fossil energy is no longer available because the easy access oil and gas has already been extracted. There is no doubt that we are going to witness the Humpty Dumpty phenomenon as urban systems fall off the wall of development, and all the kings' horses and all the kings' men are not going to be smart enough and fast enough to put Humpty together again.

So, am I just another depressing dystopian writer callously calling out urban development optimists on their folly? Well, actually, it is the opposite. In this book I will explain both why cities can deteriorate so quickly, but also why they are amazingly hard to kill. This riddle is better understood by an awareness of complexity science and recent discoveries in what is known as multi-scale

competency architecture.

The forces in the universe that can build are human civilizations are the same forces that can tear them down. They are, so to speak, morally neutral. Ordered cities or cascading cities are met with the same thermodynamic enthusiasm.

Lest we become too discouraged at this point, it is important to know that the law of entropy doesn't require disorder in a system to increase, the law just states disorder can't be reversed.

"Ah, is there a loophole?" you ask. Well, perhaps, but it is a very speculative loophole and may be more helpful to a positive imagination than anything remotely practical. However, because, as we shall discuss later in this book, the human imagination plays a significant role in the rise or fall of cities, it is worth taking a brief look at the loophole, which, admittedly, is more of a wormhole than a loophole.

An increased average of disorder in the macro states humans have measured since Kelvin and Cassius brought forward their theories are what has been observed to date and are therefore what has come to be expected by we narrow thinking humans. But we should never forget that the human mind itself is a macro state inside larger macro states which we call cities, or planet earth, or the solar system, or galaxies, or the universe.

The mind contains both constructive and destructive powers in the individual and collective conscience that humans still know so little about. It is hard to get hard data out of the soft tissues that produce a strong emergent force such as consciousness. We will discuss in future chapters the role of the imagination in the life and death of our cities.

Although these theories are speculative, recent attempts to understand what is going on inside black holes have postulated that the complex systems at play beyond an event horizon may decay at slower rates than the entropic systems beyond the same event horizon. It seems, in some circumstances, that the universe may have allowed its creative forces to possess a greater robustness than its destructive forces.

If we dare to carefully, and not directly, apply in analogous terms, some of what we know in the natural sciences to our understanding of how cities grow and decline, we might find hope that the robust nature of cities is stronger than we think. This may be true despite the ubiquity of the forces that are working to tear cities apart. If we can collectively try to understand more about the robustness of cities in the face of decline, we may be able to use that knowledge to help revitalize cities everywhere.

This book is a case study of the city of Winnipeg, Canada, which openly is asking for the revitalization of its downtown core, but the concepts discussed here are applicable to any city on the planet. Oh, and one more thing, you have one last question for this chapter. “What is up with Mr. Big on the cover of this book? Why would anyone read a book on such an important topic littered with a silly cartoon figure?” The answer lies in the name of the character, Mr. Big. Yours Truly is intentionally trying to illustrate that the big plans and big ideas and big pronouncements of humans, disconnected from the natural laws of the universe, are folly.

So, the ideas in this book need to be taken with a grain of salt. The universe is all about the power of small. Mr. Big doesn't agree, and he will rudely interrupt to represent top down, big

plan, reductionist thinking everywhere, even though his vocabulary is extremely limited and all he wants to do is party.