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Human Habitat

For thousands of years, humans built cities for people who walked. The size of buildings, spacing of destinations, and distances individuals would travel on a routine day were scaled for a society where nearly everyone traveled by foot. This was true for human settlement across all continents, spanning all latitudes.

Today, in North America, we build cities around a more modern transportation technology: the automobile. We have developed different building types, different development styles, and different ways of arranging things on the landscape, all to accommodate a living arrangement based on automobile travel.

If you query Americans about this transition, nearly all would talk about it in terms of progress. Humans of the past used to walk everywhere and so they built settlements around people who walked. Today, we drive everywhere, and so we build our cities around people who drive. Someday people will have jet

cars or teleportation technology and their cities will look completely different than ours.

The narrative we tell ourselves is one of progress. We like to think of it in this way because doing so places us on a path of improvement, one where our lives are continually getting better. There is another way to think about these changes, however, that isn't quite as comforting. It's a more plausible narrative, one worth pausing to consider.

When we ponder the layout of ancient cities, we must acknowledge that they are the byproduct of thousands of years of human tinkering. People came together in villages and tried different living arrangements. What worked, they copied and expanded. What didn't work, they discarded. That is, if those experiments hadn't already killed or disbanded them.

Humans used trial-and-error experimentation for thousands of years to refine humanity's approach to building its habitat. By the time history reaches the apex of ancient cities Americans are familiar with, places such as Athens or Rome, those experiments had been tested during times of abundance and scarcity, peace and war, disease, pestilence, stagnation, and growth. The result was a pattern of development that was adaptable, productive, and strong.

This same pattern can be seen in the pre-1900s cities of North America. While the architecture changes with geography and time, the essential layout is the same. A person living in a frontier town in the early 1900s, or Manhattan of the same period, could have bought a meal, earned a paycheck, and found a place to sleep, all within a reasonable walk. In other words, these neighborhoods would have been familiar to our ancient city-dwelling ancestors.

That same insight is no longer true. The way we now build cities in North America would be unrecognizable to an American who lived even a century ago. It would be difficult for them to comprehend a highway, a parking lot, a shopping mall, or a middle-class family in a single-family home with a three-car

garage. They would be lost in the world of big box stores, office parks, and cul-de-sacs.

Get beyond whether the changes have been positive or not; there is one important aspect of this shift that is critical to acknowledge: It was abrupt. Humans had been living one way for thousands of years, yet within just a couple of decades, Americans transformed an entire continent around a new set of ideas.

Those ideas were not the byproduct of thousands of years of trial and error experimentation. They did not evolve into being. They originated largely from the writings of a handful of European intellectuals, notions their cultures largely rejected, but Americans – with lots of room, boundless optimism, and no ancient moorings – readily adopted.

In the context of human history, the North American development pattern is the largest human experiment ever attempted. In the blink of an evolutionary eye, we have transformed everything about how we live, get around, interact with each other, make decisions, conduct commerce, fall in love, and countless other aspects of human existence.

There is no going back, but there is useful wisdom we can gain from an understanding of the past.

Complex, Adaptive Systems

There are an infinite number of variables a human habitat must take into consideration. There are things we prioritize in city planning today, such as where water drains and how garbage is disposed of, but there are many other priorities that individual humans struggle to harmonize across a society.

How do we keep our food protected from potential thieves? How do we best raise our children to be acclimated to our culture? How do we take advantage of the sun to heat our house in cold weather? Where do we honorably dispose of our dead?

Each individual priority is continually weighed against the others, a balancing act of give and take across time.

Such systems are experienced as emergent. Their order is not imposed; it just appears, as if by magic. Each interaction may be understandable on its own, but the complexity of interactions makes the entire system unpredictable. Everyone learns from experience, adapts their individual behavior, and, in doing so, continuously impacts everyone else.

We often think of evolution as a process that happens incrementally over time. That's close, but the full reality is more like how Hemingway described bankruptcy: gradually, then all at once. Traumatic events, large and small, force both adaptation and failure. The combination creates the learned wisdom that is passed on to subsequent generations.

Author and philosopher Nassim Taleb has described such systems as “anti-fragile.” Fragile systems degrade when stressed, but anti-fragile systems grow stronger (up to a point). We discover that it's not wise to put our village too far from the river or we'll spend too much time and energy hauling water. Later we discover that it's not wise to put our village too close to the river because a flood will wipe us out. Each of these lessons – and an infinite number of others – were learned for us, the price being our ancestors' suffering and even death.

The development pattern that was used in North America through the late 1800s represents thousands of years of received wisdom on how to build human habitat. In no way was it perfect, but it's important to understand that perfection is not possible in a system with so many competing priorities and objectives.

What is attainable is a degree of stability, the harmonious balancing of multiple things simultaneously over time. Our habitat was optimized to us, and we to our habitat. The two co-evolved. Grasping that fact opened to me a world of spooky wisdom.

Spooky Wisdom

I had the opportunity to spend time in Italy during my mid-20s. Walking amid the ruins of Pompeii, I noted a little shop that had served as the fast food restaurant of its day. It was located on one of the direct paths from the core of the city to the edge, although it was closer to the outskirts than the center of the action.

The building was small: just two rooms. The room furthest from the street was the living quarters, closed at the back but with an opening to the front. The front room along the street was where the food was kept warm and dispensed out of pots placed under a countertop. The countertop ran along the sidewalk for ease of service.

As an engineer who had worked on site layout and project development for a handful of fast food restaurants, my initial reaction was: how quaint. Look at how these simple people lived. What a hard and miserable life. Thank goodness we are so much more intelligent and sophisticated today. Thank goodness we have risen above this.

In subsequent years, I would grow to realize how ignorant I had been.

With just two rooms, the family member who ran the fast food operation in front could also keep an eye on small kids in back, taking a break from sales when times were slow and being more attentive when they were not. Thus, half the household's parents could both create an income stream and care for young family members simultaneously.

This freed up the other half of the household, along with any extended family that lived under the roof, to get a job elsewhere, likely outside of the city doing some form of manual labor. Matthew 20: 1–16, in the New Testament, relays the Parable of the Workers, describing how people would line up in the marketplace to be selected for manual labor. This was a common arrangement of the day, with those selected earning a day's wages.

What this family had created was income diversity. If no labor was to be had that day, hopefully the restaurant would provide some fallback income. If the restaurant had a slow day, ideally it was because there were wages to be had laboring in vineyards. If both had a successful day, it allowed some savings to accrue for those times when both sources of income dried up.

A stretch of good fortune for both income streams would cause savings to grow into a nest egg, some real wealth that could be used to improve the family's situation. Maybe they used that wealth to expand the restaurant. Or to hire help, perhaps purchasing a slave culled from the ranks of a defeated enemy, which was common practice. Again, I'm not describing a utopia; I'm describing a complex system that imperfectly harmonizes many competing priorities simultaneously over time.

What is important is that the strategies emerging in such systems are anti-fragile. They limit the risk of catastrophe while maintaining the capacity for improvement, particularly during stress events. These are the strategies that survive the test of time, and when it comes to the Pompeii fast food restaurant, I'm just getting started.

The building was located near the edge of town. The land was likely acquired for free or at a very low price. Prime real estate near the center of town would have been much more expensive, but on the edge, someone could start with relatively nothing. Yet, if the community grew and prospered, the edge would expand outward. The shop owner would then find themselves with an investment now strategically located closer to the center, a more valuable situation.

The little shop owner thus shared a common fate with other property owners in the city. It was not a zero-sum game, where one benefits only at the expense of others. I'm not suggesting they all lived in harmony, but they had a lot of selfish incentives for altruism.

This makes the common walls of the buildings more understandable. The Pompeii fast-food structure shared a wall with

its neighbor on each side. We can appreciate the lawyers and building inspectors involved with something like this today, but historically, shared walls were the norm. Common walls meant shared cost, an advantage when you were short on resources. It also meant that heat would dissipate more slowly in cold seasons, reducing fuel consumption.

With buildings sharing common walls and having their sole entrance face the street, the place was made more secure for everyone. Someone wanting to enter a home for nefarious reasons would be subject to the random watchful gaze of neighbors, both during an approach and upon exit. Even in cities where there was a paid security force, this design was a way to provide a decent amount of security at a marginal cost.

To the extent that human and animal waste in the streets allowed, the street itself was a place for people to gather, including neighborhood children. Shared parenting – I’ll watch your kid and you watch mine – took the strain off raising kids who were too old to be kept in the home, but not yet old enough to work.

The building itself was very simple, just a two-room box. It’s easy to see that if things didn’t work out with the restaurant, the building could be adapted to a new use. Or, if things worked out really well, the neighboring building could be acquired and the two merged together. If sometime in the future that arrangement no longer worked, the buildings could be easily subdivided again. The inherent flexibility meant that people didn’t need to be able to project what would happen in the future to act today; they just built structures that could be adapted to harmonize changing priorities.

The collection of buildings on either side of the fast food restaurant were built in a line. They faced a mirrored set of buildings on the opposite side of the street, also in a line. These opposite rows of buildings were spaced at ratios comfortable to human beings. They were not so close as to feel constrained, but they were not so far that they failed to create an edge.

Edges are very important for humans. In our habitats, we are drawn to edges. This is a phenomenon observed by Jane Jacobs in her book *The Death and Life of Great American Cities*, then elaborated on by Christopher Alexander in *A Pattern Language*. In public spaces, Jacobs notes that people “stay to the sides,” while Alexander states that people “naturally gravitate toward the edge.” This street in Pompeii provided that opportunity.

Biologists call this wall-hugging trait *thigmotaxis*. Think of a mouse scurrying along the edge of a wall, instinctively fearful of journeying into the center of the room. Humans have that same propensity. Darwin called evolution a “conservative process” in that it conserves winning strategies and builds on them. At some point in the very distant past, thigmotaxis was a winning strategy. The alignment of the buildings along the street in Pompeii comforted that primal urge.

In the book *Cognitive Architecture*, Ann Sussman and Justin B. Hollander explore how humans respond to the habitats they have built for themselves. They explore thigmotaxis, but they also dig into a phenomenon called *pareidolia*, the propensity for humans to find faces in objects. When people see Elvis or the Virgin Mary in a piece of burnt toast, they are experiencing pareidolia.

Faces trigger a strong emotional response in humans. Sussman and Hollander quote the Danish architect Jan Gehl in suggesting, “Man is man’s greatest joy,” that people delight in seeing other people. As written in *Cognitive Architecture*:

Our face-sensing capability is so strong and present that faces also appear to be put into building elevations or facades unintentionally. It reflects the fact some researchers believe pareidolia, the subconscious tendency to assemble faces in random objects, plays a much more significant role in design, aesthetics, and our appreciation of buildings and cityscapes than is generally realized.¹

The Pompeii restaurant has the rough proportions of a face; it is narrower than it is tall (Figure 1.1). Contrast this with the

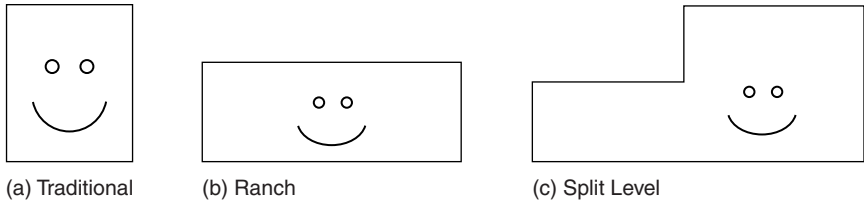


Figure 1.1 (a) Traditional home with proportions of a face. Neither the (b) ranch home nor the (c) split-level home has face-like proportions.

rough proportions of a 1950s ranch home or a 1990s split-level home. In trying to build something functional that would simultaneously add to human delight, the builders in Pompeii made the most out of meager resources.

They almost certainly also employed symmetry in the building's exterior design and symmetrical shapes in the ornamentation. This is because, as Sussman and Hollander point out, humans have a natural disposition toward symmetry. We not only process symmetrical designs more quickly than nonsymmetrical ones, but:

Researchers have also learned that looking at symmetrical objects subconsciously activates our smiling muscles more than looking at random patterns. And when we smile, we are more likely to feel calm or reassured.²

Why do humans see beauty in symmetry? Sussman and Hollander suggest it is for the same reason we have our other subconscious traits: "It is bound up and cannot be teased apart from survival."

A Pompeii street lined with shops and homes, each designed to convey humans through town in the most comforting and pleasant way that could be attained while still harmonizing many other urgent needs, provides the perfect framing for a monumental building or even a simple public gathering space.

Think of the way that a great picture frame draws out the magnificence of the picture. When buildings line up to form a wall, they serve as a frame. The picture is whatever sits at the termination point of the street; it's naturally drawn out, whatever magnificence it has magnified by the framing.

The termination point could be a place of worship, a fountain, a park, a civic building, or even the house of a wealthy family. In the case of Pompeii, the street terminated at the Forum, the center of Roman life. This arrangement served to draw out Roman values and culture into the broader community, connecting the day-to-day lives of Pompeii's citizens with the broader society in which they lived.

This design is not by accident. In his book *The Original Green*, architect Steve Mouzon describes the elements of making a place lovable, which he suggests is a key component of building cities that endure. Loveable places reflect us; we see ourselves and our common culture within them. They delight us with beauty and comfort. And they harmonize us with nature and the rhythms of life. This design worked to accomplish all three.

I could go on this way for a long time. Suffice it to say, the little building in Pompeii was more than a mere restaurant and home. It was one component of an evolving human ecosystem. That habitat helped the people of Pompeii meet their daily needs, but it also helped them raise their young, care for their elderly, save for the future, pass along their stories and culture, comfort their primal urges, and reach for higher truths by communing with the existential. In short, the city helped make them human.

We are compelled today to acknowledge that the wisdom contained in the cities our ancestors built, in the patterns and approaches they developed over thousands of years, exceeds our capacity to fully understand. There are deeper truths there than we will ever know, spooky wisdom that has co-evolved along with humanity itself, to serve our needs – known and unknown – in ways we have been far too eager to casually dismiss.

Systems That Are Merely Complicated

As an engineer, I'm trained to see cities as a collection of roads, streets, pipes, pumps, valves, and meters. My education as a planner provided some additional depth in the realm of economics, land use, and the environment, but the knowledge gained was still superficial. The practice of city planning has largely been reduced to zoning, a way of categorizing the world into homogeneous blocks, primarily for ease of regulation and transportation, the latter being the primary way we facilitate growth within our cities.

What both professions have in common is that they view cities as complicated, but not complex. There is a massive difference, and it's critical to explaining why our modern cities are so fragile.

Something that is complicated can have many moving parts, but those parts are ultimately knowable, understandable, and predictable. A mechanical watch is complicated. It has many gears and switches that interact in ways that only highly trained watchmakers understand. Even so, a watchmaker can tell you what will happen to one gear if a different gear is moved.

The watch is merely complicated because it lacks the ability to adapt. The gears in a watch can receive information in the form of stress, but they can only respond as they are designed. They can't change their approach, or adapt to a new set of stressors in novel ways. A watch is incapable of evolving.

Most importantly, systems that are complicated are fragile. They don't get stronger when subjected to stressors. They can't adapt, so they can only become weaker. With time being infinite, every complicated system will eventually fail.

When humans imagine cities as complicated machines and not complex human habitat, they fail to grasp what is really happening. They misdiagnose problems and opportunities as being a byproduct of one or two related variables, instead of one manifestation of an interrelated, complex system. Our responses – often

as disproportionately overwhelming as they are rote – stifle adaptation and, in doing so, unintentionally increase fragility.

So why are we stuck seeing our cities as merely complicated? Why can't our professionals, policymakers, and citizens at large grasp the complexity?

Our modern development pattern – a continental-scale social experiment – was established during a period of unprecedented abundance after World War II. We were not only the sole economic superpower that wasn't devastated by war; the biggest players in the world were indebted to us. We held the global reserve currency, we had the greatest amount of easily accessible oil and coal resources, and we had a generation of motivated young people culturally unified by shared hardship and common enemies.

All the systems that launched this massive experiment, from the new financing mechanisms to the highway and infrastructure programs, were developed at a unique period of time when we could dream big and accomplish anything. For a moment, our vision was not constrained by our reach.

For complex systems, an abundance of resources destroys the need for adaptation. It renders the complex merely complicated. This effect is described by Neil Johnson in his book *Simply Complexity*:

Why is competition for limited resources so important in real-world systems? The answer is simple. In real-world situations where there is no competition, it matters little what decisions people actually make. In other words, if there is an over-supply of desirable resources, then it doesn't matter very much what we decide to do since we will still have enough of everything we need, and more.

In such situations, we could each go around acting in whatever way we wanted, either cleverly or stupidly, and yet still end up with an embarrassment of riches. Hence there is no need to learn from the past, or adapt. The need for feedback then becomes pretty meaningless since we are all getting what we want all the time.

The end result is that the collection of objects in question will behave in a fairly simple way. In particular, the lack of dependence on any feedback or interactions between the objects will make the overall system non-complex.³

The underlying assumption of the American development pattern is an abundance of resources. When this was essentially true in the decades immediately after World War II, our cities functioned in ways that were complicated, but not complex. We could, as Johnson suggested, act “cleverly or stupidly, and yet still end up with an embarrassment of riches.” And we did.

Have a crime problem? Just hire more police. There’s no real incentive to design homes to face the street, to have front porches and windows that open onto the common space, to provide a base level of self-policing in a neighborhood. That would require a sacrifice of some privacy. It would force people to work cooperatively, to learn to rely on their neighbors. We have the resources, so just hire some more officers.

Have a traffic congestion problem? Just build more lanes. There is no incentive to minimize auto trips, to create neighborhoods where people can walk or bike for most of their daily needs. That would involve changing zoning codes, allowing people to start businesses in neighborhoods where they are currently prohibited, and maybe even increasing the cost of driving during peak times. We have the money, so just build more capacity.

Are sales at the big box store stagnating? Just close it and build a new one in a better location. There is no incentive to construct buildings that can serve multiple purposes or be easily adapted to another use. Achieving that resiliency would compel our economy to be less efficient and our transactions more localized, and that would change the nature of growth in our economy. So long as profit is to be made building a new store, we would be foolish to stop it from happening.

Experiencing an increase in the teen suicide rate? An epidemic of obesity? Out-of-control costs for senior medical care? No matter the problem, and no matter how bad it becomes, there is no force compelling us to evolve our habitat, to change the way we live together. Each challenge has become but a complicated problem to be worked out by someone else, through public

policy or market mechanisms. We're the wealthiest nation in the history of mankind, after all.

In our new experimental living pattern, feedback and adaptation have become meaningless. We do not perceive any need for our human habitat to harmoniously balance multiple things simultaneously. Why would we when we can just go ahead and use our resources to solve problems as we become aware of them?

This approach worked well right after World War II – perhaps too well. It allowed Americans to, for a time, address many of civilization's nagging struggles. Through our success, however, we collectively developed a low tolerance for uncomfortable feedback and a reduction in our ability to adapt to stress.

We're more comfortable behaving as if our cities are merely complicated. Increasingly, they are not.

Notes

1. Ann Sussman and Justin B. Hollander, *Cognitive Architecture: Designing For How We Respond to the Built Environment* (New York: Routledge, 2015).
2. Ibid.
3. Neil Johnson, *Simply Complexity: A Clear Guide to Complexity Theory* (London: Oneworld Publications, 2017).