

An Evolutionary History of the City

Richard Qian Li

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Introduction

The Author, Qian Li, a multifaceted professional as an architect, urban designer, real estate developer and podcast influencer, complemented by the abilities in creative coding and programming. Qian holds degrees from Tsinghua University (B.Arch.) and University of Michigan (MUD), and has an experience of 19 years in the field with prestigious firms (Obermeyer, EE&K, Vanke) internationally (USA, China, Germany).

Beyond the realm of traditional urban studies, Qian draws insights from diverse disciplines including anthropology, geomorphology, histophilosophy, economics, computer science and evolutionary biology, each offering perspectives on varied evolutionary systems.

This work is largely extracted from Qian's podcast channel :<https://www.ximalaya.com/album/3733966>, which is originally in Mandarin language and is purposely serialized to later become a book on urbanism, which is temporarily named [*An Evolutionary History of the City*]. It underscores the self-organizational, bottom up generative aspects of the city and its problem awareness is set against the backdrop of contemporary China, where the convergence of 1) discourse and ideology that favors top-level design with 2) the needs of interest groups to seize wealth and power has resulted in highly authoritative urban mega-planning and irreversible damage to the built environment due to 3) professional malpractice. Nevertheless this work creates a few arguments/analyses on the broader history of urbanity, which the author expects to be innovative or even useful in the understanding and the *modeling* of urbanism.

The content is in the process of being reorganized and refined to meet academic standards, 12 more chapters are to be added for a preliminary completion. The Author is working on re-writing/editing it in English, in order to improve its readability in English context. Various media, illustrations, charts and videos, are being created to make the work eventually visualized/animated.

01 Examples: the Three Tourist Attractions with the Same Morphism

Beginning with this chapter, I will give a series of lecture on viewing cities from an evolutionary perspective.

Biological communities and economic systems are commonly understood as evolutionary. This notion extends to areas including computer algorithms, linguistics, aesthetic trends, Earth's geomorphology, and the universe's structure, all analyzed as evolutionary systems.

However, the city - a place where everyone lives their daily lives, and an obvious evolutionary system - is often seen as a product of human design, and is thought to be something drawn out of a blueprint. So much so that the discipline of studying cities is called 'urban planning' or 'urban design' acknowledging a prevailing assumption that cities are products of deliberate planning and design.

Adhering to this viewpoint, however, can obscure a deeper comprehension of urban dynamics. And those in power keep creating hideous cities based on their arbitrariness.

And if you give up the urge to plan and instead examine the city as an evolving system, you will dramatically increase your opportunity to systematize and structure urban knowledge. The knowledge gathered from this approach often has stronger explanatory power, making it useful for diagnosing a city's problems or predicting its future trajectory. Pioneered by Charles Darwin and Friedrich Hayek, great scholars like Richard Dawkins, Stewart Brand, and Michael Batty have also contributed to this discourse.

The ancestors of whales and sharks had significant differences, yet they evolved similar physical forms due to their similar habitats and occupying similar ecological niches. This analogy extends to urban environments, where cities may evolve comparable structural features in response to similar environmental pressures. In the following paragraphs, I will provide three examples to further illustrate this concept.

Kaminarimon Gate, Tokyo

Those who have visited Sensoji Temple in Tokyo may remember a long, narrow street that stretches between the temple's main gate and the Kaminarimon Gate.

This street is ‘over 200 meters long and about 7-8 meters wide, with a column of small shops on either side, 54 on the east and 35 on the west’ (Asakusa Nakamise Shopping Street Association 2008), permanent and prestigious, but similar to the setting of temporary stalls in a flea market. You can weave through the gaps between these shops to get to the back of the stores. Behind each row of shops, there is a street that runs parallel to the central street, and along the outer street, there are shops that have a more classical appearance. All three streets have shops, parallel to each other, leading from the Kaminarimon Gate to the temple.

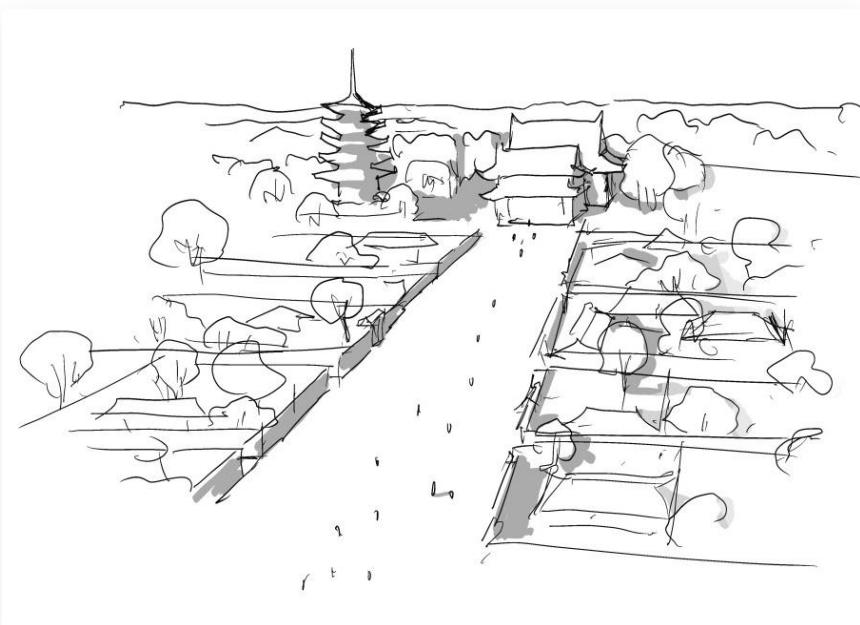


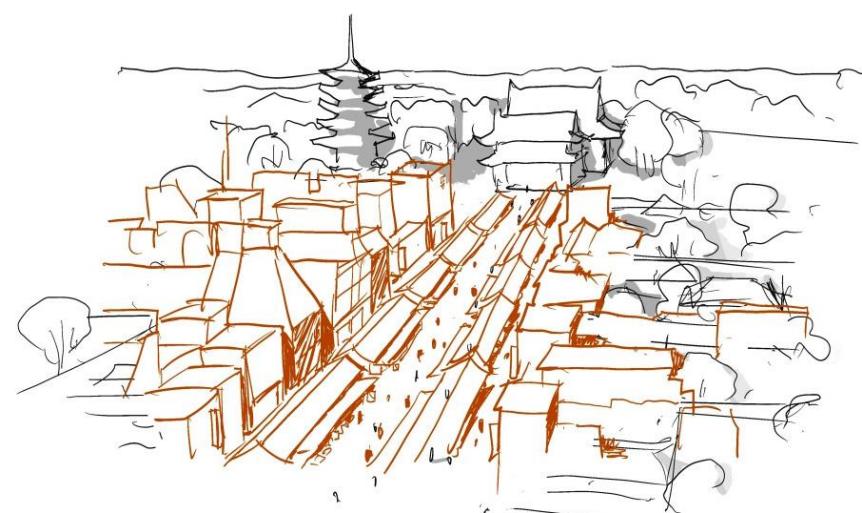
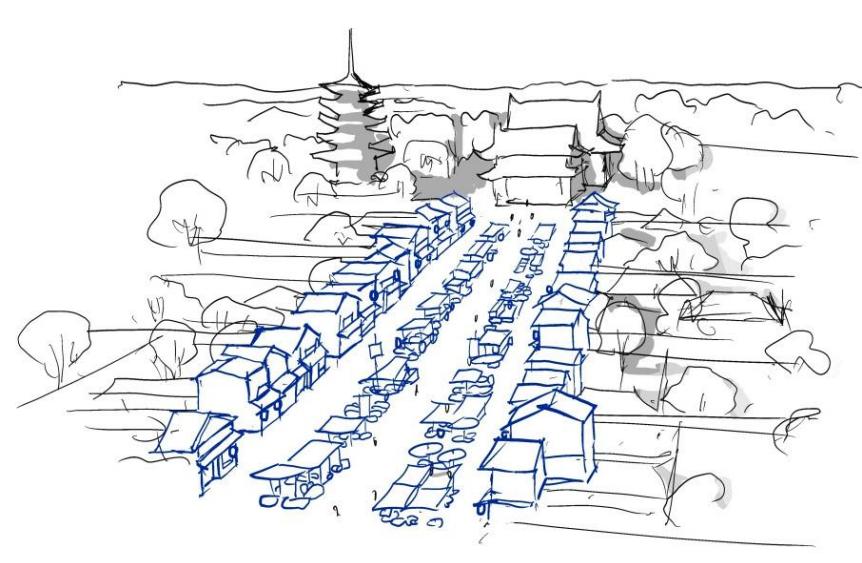
(Figure above: Kaminarimon Gate from Microsoft maps)

It is evident that this thoroughfare was originally an expansive avenue, extending over 20 meters in width, deliberately designed to lead to the temple, embodying a monumental grandeur. Architecturally speaking, it possessed a significant commemorative and monumental character. On festival days, the avenue teemed with a multitude of pilgrims and worshippers, lending it a

vibrant atmosphere, and concurrently, numerous vendors capitalized on this influx by setting up stalls for commercial gain.

Looking into the history record (23 Special Wards of Tokyo Council official record), the right of running stalls were originally granted to the group to take the duty of cleaning the temple precinct. A strategic question arises: where would these stalls be optimally positioned? Logically, they would not be located directly in the center of the avenue, as this would impede the direct path of the pilgrims towards the temple, necessitating the maintenance of a sufficiently wide passageway. Additionally, positioning stalls in front of the permanent storefronts lining the avenue would obstruct customer access, thus requiring the preservation of an unobstructed pathway for these establishments. Consequently, the stalls were predominantly situated slightly off-center, either to the left or right of the avenue's midpoint.





(Figures above: the pilgrimage passage over time. Top: original passage in early Edo Era. Middle: late Edo Era. Bottom: modern era.)

This arrangement, borne out of practical necessity, was proven over time not to disrupt the flow of the pilgrimage. Interestingly, these temporary stalls garnered remarkable commercial success, surpassing the established shops flanking the avenue. This raises the question of potential commercial harm to the permanent storefronts. However, this was not the case. The introduction of these stalls

intensified the avenue's competitive commercial environment, enhancing the shopping experience by offering greater convenience and affordability. This transformation elevated the avenue's status as a paramount destination for belief, tourism, and shopping. Despite the partial obstruction and diminished visibility caused by the stalls, and the diversion of some business, the established shops benefited significantly from the augmented pedestrian traffic, ultimately witnessing an increase in overall profits.

Furthermore, the temple, being the proprietor of the avenue, capitalized on this evolution by collecting fees from the stall vendors and eventually institutionalizing the presence of these stalls. Through these evolutionary changes, this avenue, located at the forefront of the temple, emerged as one of Tokyo's most illustrious temple fair streets.

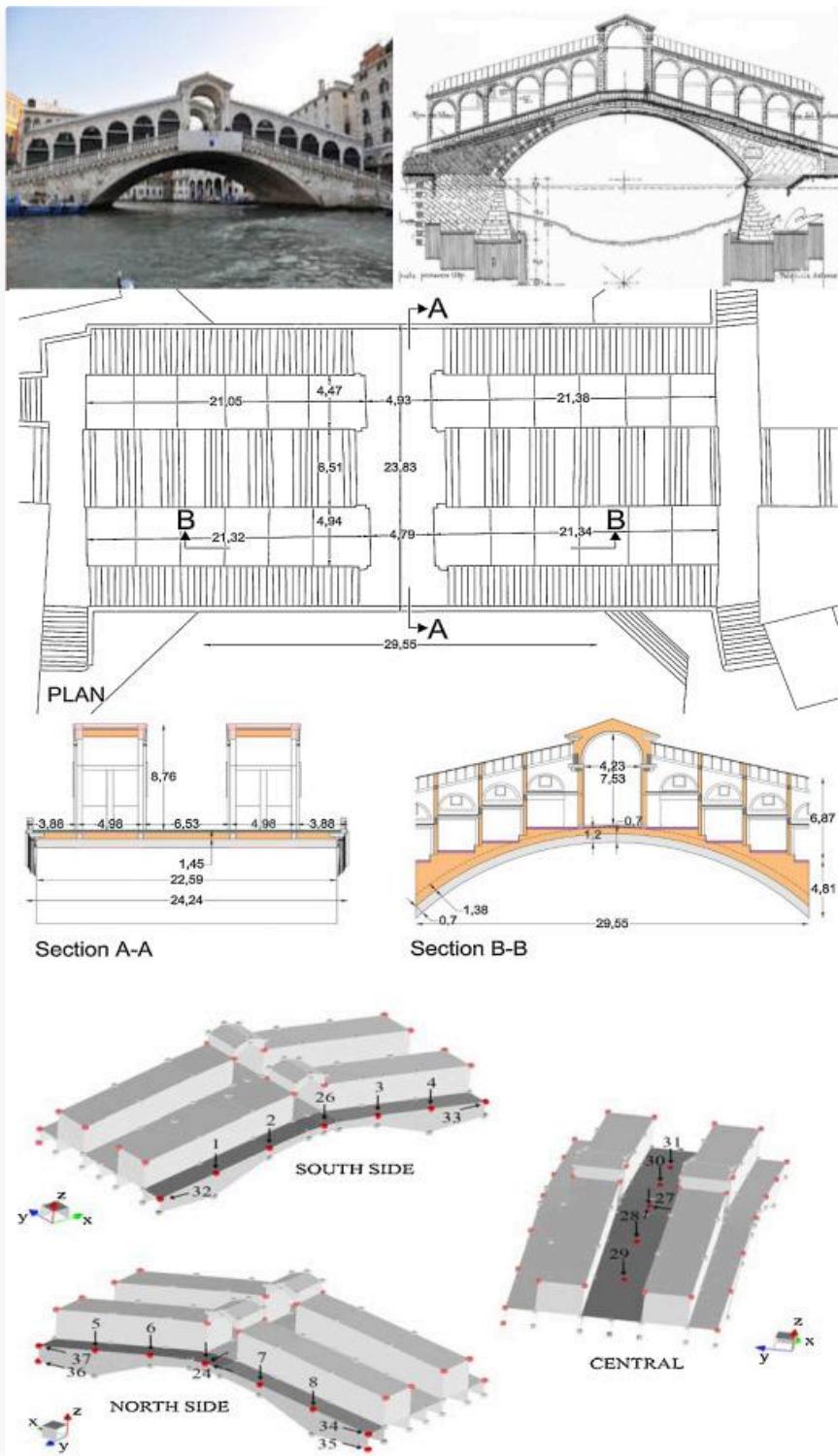
In the process of transformation, it is conceivable that contradictions, conflicts, and adjustments were prevalent. For instance, there were instances where stalls were set up exceedingly close to the center, impeding traffic flow. Additionally, certain stalls completely obstructed the entrances of established shops, adversely affecting their business operations. However, after a period of negotiation and adaptation, all parties involved on the street eventually reaped benefits. The central roadway was reduced to 8 meters in width, naturally not as conducive for movement as the original expanse of over 20 meters, but it remained sufficiently functional.

Should one singularly emphasize the transit efficacy of this street, it is indeed apparent that it has diminished. However, the majority of the street's users and stakeholders have acknowledged and accepted this transformation.

One can imagine certain individuals who never utilized these small stalls, such as authoritative figures like the Shogun. Hypothetically, if the Shogun, while passing through the Kaminarimon, had noticed these stalls and remarked on their detrimental effect on the cityscape, and if the temple authorities had acquiesced to his wishes by dismantling the stalls, the result would have been a much wider but mundane street. Such a scenario did not happen on the Shogun, contrarily, upon the municipal authorities assuming control over the temple's rights in 1885, the entire commercial street was demolished, resulting in significant losses for the vendors. Hence, it is observed that the arbitrary and forceful actions of a democratically elected government are not necessarily less arbitrary than those of a feudal ruler. Fortuitously, the commercial street, owing

to its traditional economic value, was soon restored and continues to thrive to this day.

Ponte di Rialto, Venice



(Figure above: from Salvatore Russo, 2016)

The next example is in Venice, which has a unique transportation system consisting of both water and land routes. The land system consists of many connected alleys and bridges . The most important bridge here is, without a doubt, the Rialto Bridge on the Grand Canal. Before the 19th century, it was the only bridge over the Grand Canal in Venice. The bridge connects the market and two of Venice's central districts.

The beautiful arches on the bridge might create a misconception that they meant to provide shelter for pedestrians. But actually only shops are under the roof of the colonnades. Between these shops, the pedestrian passage is contrarily open to the air. Further details are omitted here; however, these rows of shops bear resemblance to the stalls at the Kaminarimon shopping street. They divide the wide bridge deck into three parallel passages.





(Figures above: compared 12th century wooden Rialto Bridge, with shops on its deck, and modern Rialto Bridge, with shops more pronounced by its colonnade. by the author 2023)

The significant pedestrian traffic on the bridge greatly contributed to the success of its shops. These shops were also a key part of the bridge's architectural design, becoming prominent visual features. The inclusion of these shops was planned during the bridge's reconstruction in 1591, and this aspect has been maintained since then. This design choice, however, was not necessarily due to the foresight of the architects. Originally, there was a wooden bridge in this location, which initially had no shops. Maintaining a wooden bridge required funds, and while collecting tolls was a straightforward option, the Venetian authorities decided to construct shops on the bridge, using the rent from these shops for maintenance. This approach proved to be more beneficial than just collecting tolls, embedding commercial activity into the bridge's identity. This integration of shops became a lasting tradition, so much so that when the wooden bridge was replaced with a stone bridge, this commercial element was preserved. The Rialto Bridge is more than just a transportation link in Venice; it has become a self-supporting entity combining mutual benefits and functionality (Dupré, Judith 2017).

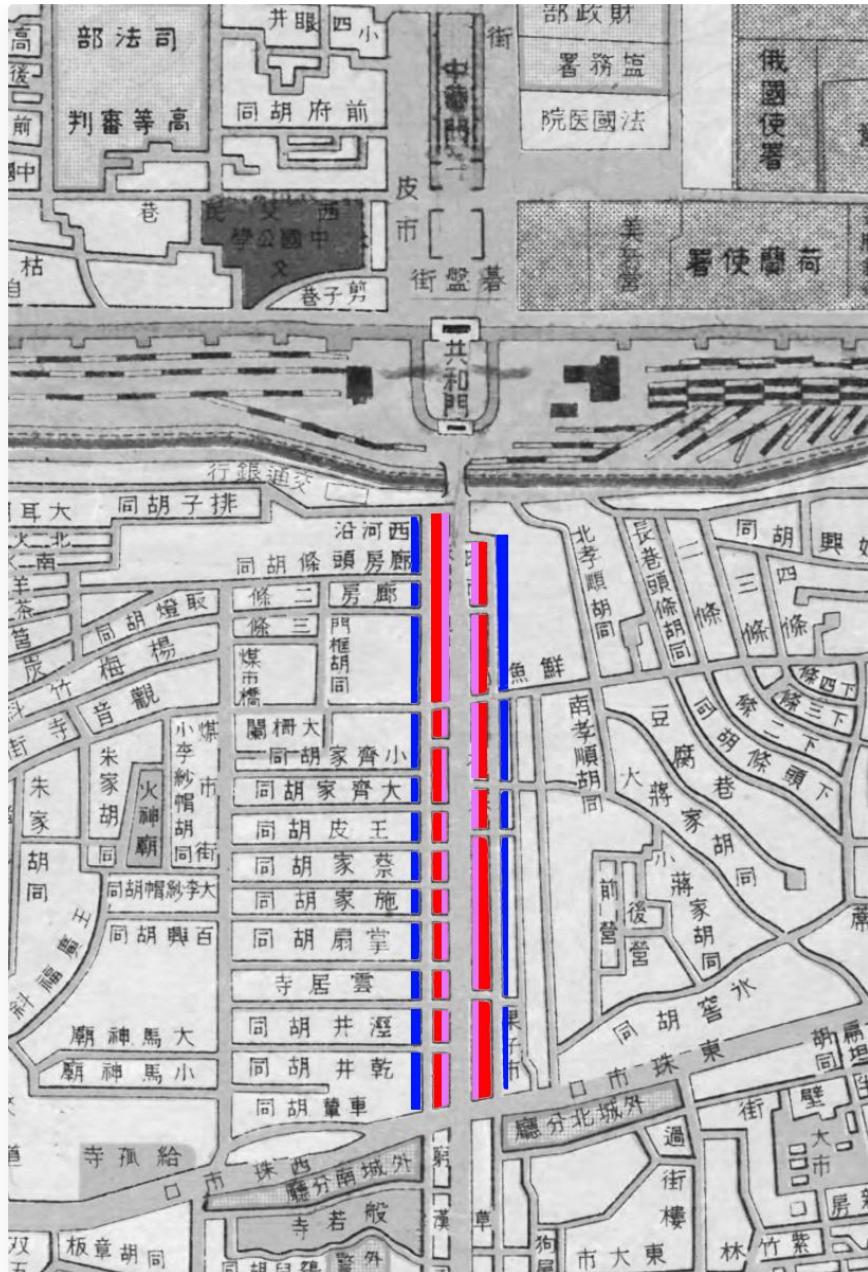
This concept of combining commercial spaces with bridge structures was not unique to Venice, rather it was a quite common practice. Other notable examples include Florence's Ponte Vecchio and London Bridge, which, before the 19th century, not only hosted a market but also had residential spaces above it (Pierce, Patricia 2001).

Chien Men Avenue, Beijing

Imperial China has often been viewed as traditionally more autocratic and less friendly towards the free market. However, there is an example that suggests that at some point in time, the traditional authorities could be more tolerant towards spontaneous activities, even more than the modern ones. This example is the Chien Men Avenue in Beijing, which is the 30-meter-wide axial street in front of the Forbidden City.

If one visits Chien Men Avenue today, they will find a small street on each east and west side, located behind the shops along the main street. The street on the west is called Jewelry Street, and the one on the east is called Fruit Alley. They are parallel to Chien Men Avenue and form a system of three parallel roads. When I visited it in 2017, I immediately realized that this could be a result of informal occupation on a once broader avenue. I later find its evidence:

The original Chien Men Avenue was a 60-meter-wide monumental avenue. As it served not only as the front door of Beijing but also as the route for the emperors to the Temple of Heaven to offer sacrifices. As early as the late Ming Dynasty, there were already many temporary shacks on Chien Men Avenue, which formed two columns of continuous shacks. 'Notes from Hongyi Pavilion,' recorded an incident that occurred at Chien Men during the late Ming Dynasty. It states, 'In front of Beijing's Front Gate, shelters were erected and occupied as shops, a practice long established.' In the seventh year of the Chongzhen Emperor's reign, the residence of a royal, Zhu Chunchen, was destroyed by fire on a festival day. Consequently, the city's officials demolished all the shelters that encroached upon the official street and obstructed the roadways, for they hindered the fire fighting. In response to this event, Imperial Attendant Jin Guangchen immediately petitioned the Emperor, stating: 'The capital's impoverished residents, who rent shelters without means, barely eke out a living through trade, their professions meager and their plight pitiable.' He argued that the wholesale demolition of these shelters was inconsiderate of the hardships of separation. He further questioned: 'If a fire spreads to a shelter, should we then destroy all shelters, just as if it spreads to an inner chamber, should we also destroy all inner chambers?' Following this memorial, the Emperor, deeming the argument reasonable, halted the demolition of the Chien Men shelters, preserving the existing structures. (Gao Yongyan, Zhu Yizun, 1687)



- Ming Dynasty Original Edge 15th Century
 - Stalls Formalized from 17th-19th Century
 - Current Formalized Frontage

(a map of 1920s Beijing, Library of Congress)

Over time, the passage between the two columns of shacks has become the main street of Chien Men Avenue. These shacks have gradually become more valuable and turned into permanent shops, housing many luxurious stores. Meanwhile,

the original edge of the street, the part behind the shacks, has become two alleys mainly housing small shops that sell daily supplies. What is more interesting is, in an old photo around 1900, the guards of honor of Emperor Guangxu and Empress Dowager Cixi were returning to the Forbidden City through the Chien Men Avenue after the Boxer Incident subsided. In the photo, there were two new columns of stalls in the already narrowed avenue. Another round of informal occupation has taken place. The left right of way was being eroded. This wave just did not get formalized. But, if we view the photos of the Avenue in time sequence, we realize it is gradually narrowed, until the modern municipality entered the history, and trolley bus was introduced.



(Figure above: P.Champion 1872)



(Figure above: Hedda Morrison in 1930s)

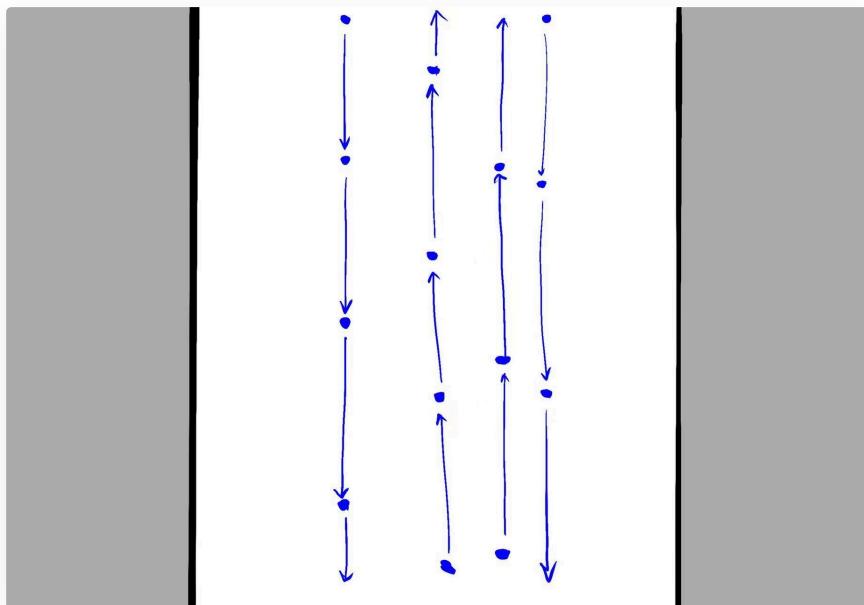
Remarks

The three examples of Tokyo's Kaminarimon, Venice's Rialto Bridge, and Beijing's Chien Men Avenue can be considered isomorphic. Each involves introducing stalls into pre-designed passageways, a form of temporary or informal occupation. Over time, these adaptations evolve into new traditions, transforming the original street layouts. This evolution results from negotiations and a balance of interests among various stakeholders, coupled with authority tolerance. These stakeholders include:

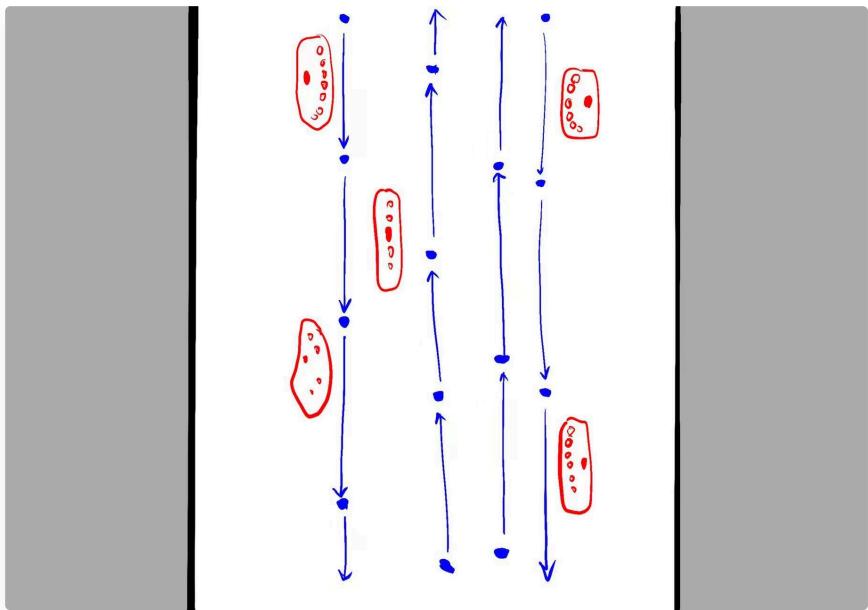
- Through Traffic: likes the spaciousness of the passage, dislikes the shacks' narrowing the passage; but in case there are services provided, he/she may join the shoppers, and benefit from it.
- Shopper: likes the convenience/affordability provided by the commercial activity; hates the disorder of poorly organized setting; hates also the elimination of the activity.
- Business owners:
 - Original street frontage owner: likes the economic gains from the traffic, likes to push the frontage closer to the traffic; hates objects, shacks blocking his frontage; but likes the traffic attracted by other businesses.

- Shack operator: likes to take advantage of the traffic, will try to be at the point of most traffic; like to formalize his claim; fears the hatred by the original owners and purposeful travelers and the relinquishment of his establishment due to public or authoritative sentiment;
- Authority:
 - Community organization: likes the collective interests of the local; hates rule breakers; hates intervention from the higher authorities;
 - Bureaucrat: likes the ‘good’ appearance, likes to be politically correct, as being fair, being cautious; hates hazards, conflicts and chaotic appearance.
 - Autocratic ruler: favors tax and prosperity; dislikes the reduction of his authority or control over the society.

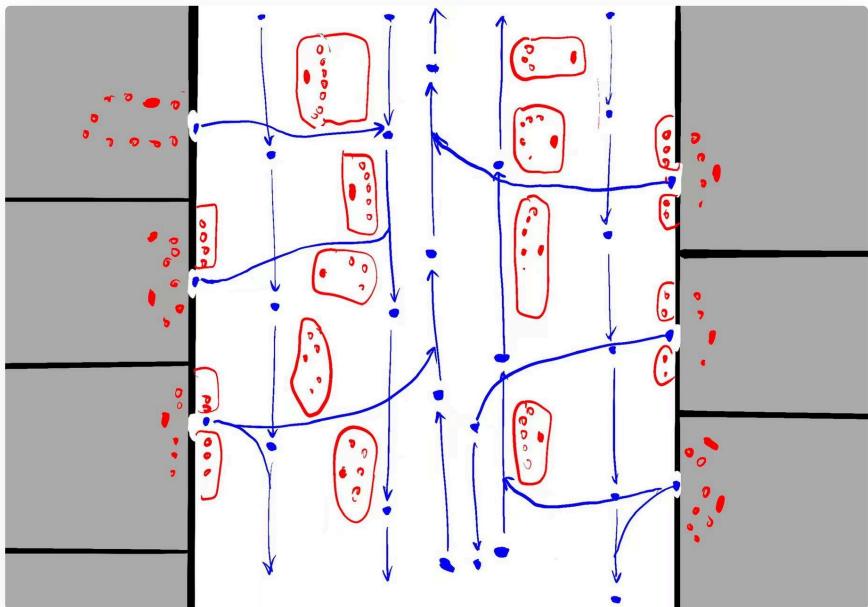
The process is a complex game among all parties, each individual would act to maximize his own interests, but is countered by other parties. It is an accumulation of the decisions made by all the individuals over time, although each of them may have different weight. Good practice arises from a balanced situation, where traditions regulate the behavior of the participants, and intentional organization might invent or reinvent the traditions.



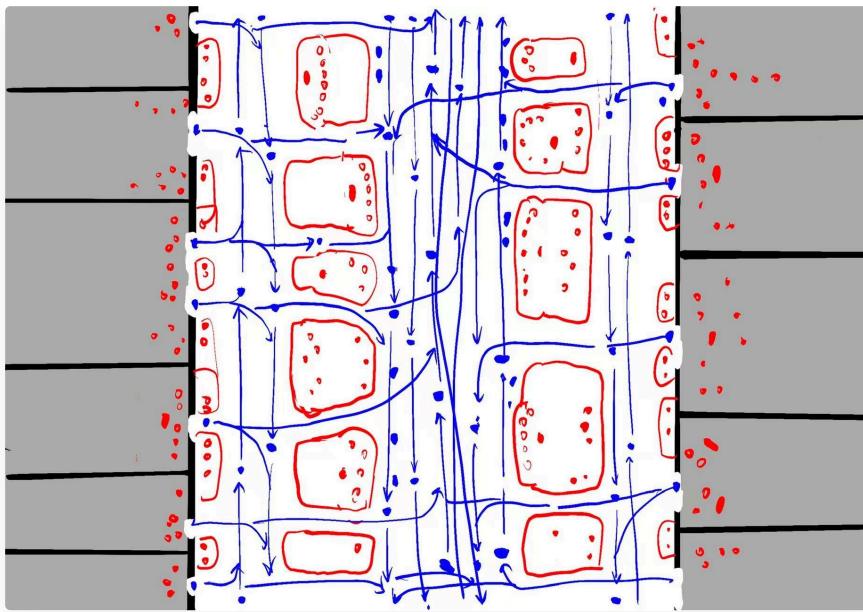
(above: original width street)



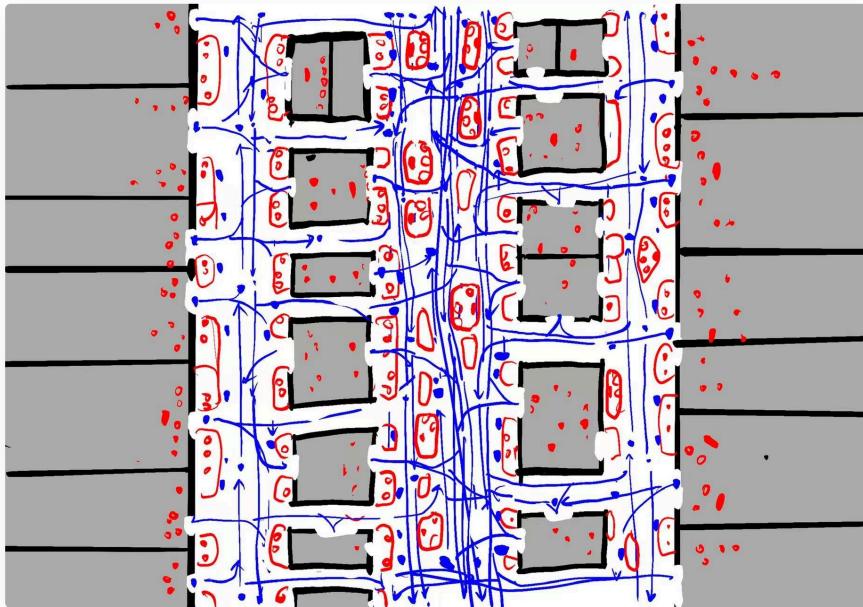
(above: stalls attracted by traffic in the width street)



(above: shops open on the once closed street walls)



(above: avenue more compactly occupied, and forming stable formation)



(above: occupations formalized and the next level of informal occupation takes place)

Moreover, the three examples have demonstrated the fact that the fundamental driving force behind these processes is human nature, desire, and behavior

patterns, and the self-evolving structure of cities is universal and transcends cultures and regions.

02 An Origin of the City, a Holy Site for Community Making

In this chapter, I will explore the origin of cities, starting with the first aspect: their role in the formation of community.

From band to clan

Community is essential because it is impossible for an individual to survive alone. A man armed with a bow and arrow or a spear could not guarantee success in hunting a wild boar. But archaeological evidence suggests that primitive humans were able to hunt mammoths. It is clear that this was not the work of a single individual.

In modern times, there are still hunter-gatherer communities living on the grasslands of East Africa. It only needs a small team of three to defeat a lion, relying on their intelligence and cooperation.

And this three-person team belongs to a community with tacit cooperation and mutual trust. This community is the basic unit for their survival. and it is through this unit that humans are able to maintain their position at the top of the food chain.

The population of small Paleolithic bands typically ranged from 20 to 100 individuals. It is related to the ecological concept of land carrying capacity, which places limits on the size of a community that can be sustained by a reachable area of land.

The low density of Paleolithic population

To provide an example, the Yellowstone National Park, located in the United States, spans approximately 9,000 square kilometers of land.

The park is home to a diverse range of wildlife, including over 30,000 elk, which translates to more than three elk per square kilometer. The park also has approximately 4,000 yaks, with an average of one yak per two square kilometers. In contrast, the park's population of brown bears and wolves is much smaller, with only 300 of each species. This means that there is only enough prey to support one predator for every 30 square kilometers. Despite these predator

populations, Humans are far more lethal than wolves, so the number of land carrying people may not necessarily be more than wolves.

It took a vast land of a few square kilometers to feed a single hunter-gathers, and a tribe's hunting and gathering range on foot typically covers only a few hundred square kilometers.

These tribes are typically composed of families with close kinship ties, which are instinctual and form natural communities. This is the natural community of people. The border of the natural community is the people you are born into and are intuitively protecting. This kind of community has existed since ancient times.

In addition to competing with wild beasts, small communities must also compete with other communities. This competition can be peaceful or violent. It evolves a lot of competitive strategies.

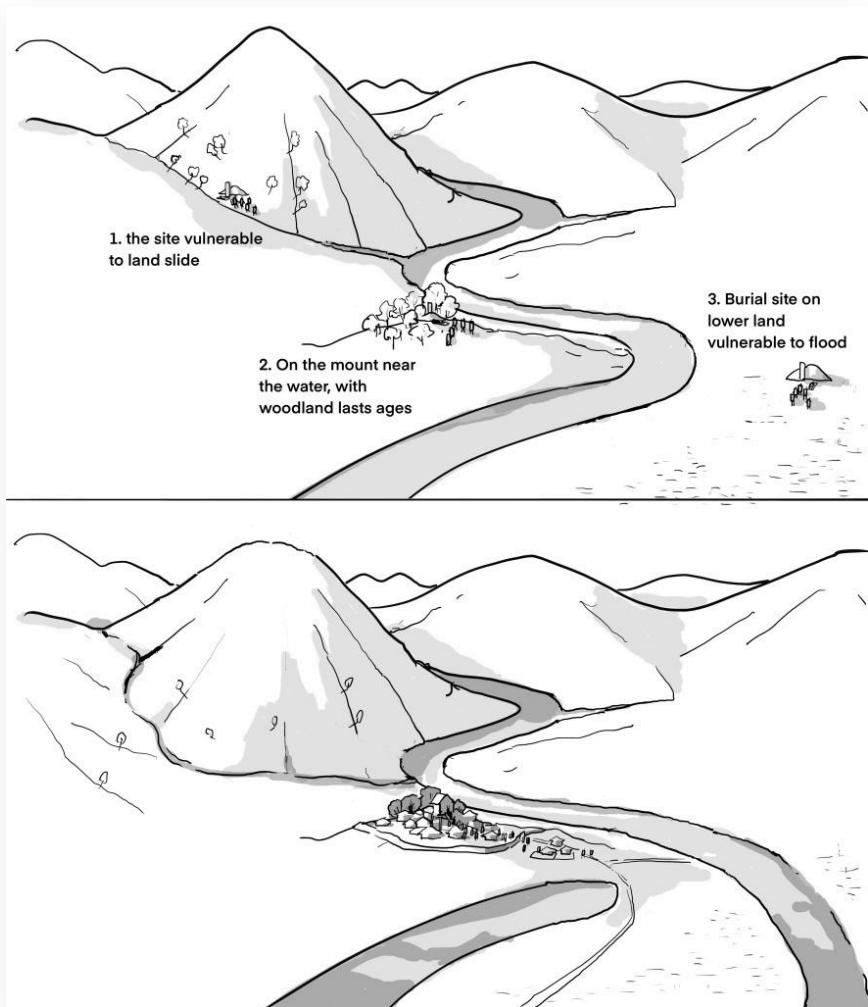
One of the most important strategies is cemetery identification. A community that respects its ancestors and maintains their tombs and tombstones is more likely to thrive. Families that identify with the same ancestors and patronize the same cemeteries can recognize and unite with one another, giving them a competitive advantage.

Even if a tribe wants to join another more powerful tribe, its leader can also invent other people's cemetery as their cemetery. If it happens that they do not have a well-known cemetery, it will be more convenient.

Conversely, if a tribe with a cemetery wants to annex another tribe, they can also share the identify their cemetery with others. This manipulation of facts can be done easily and quickly, making cemetery identification a powerful tool for uniting communities. As it only takes a generation for the propaganda department to turn any myth into fact.

Therefore, the cemetery is a tool of united front and also a tool of national invention. Any tribe with a cemetery can form a union between small communities to form a virtual larger community. The cemetery recognized by the large community is a holy place and a physical evidence of myths in the world.

A long-standing holy place must meet certain conditions, such as avoiding mudslides and landslides that could make tombstones disappear and ensuring that floods do not accumulate silt that covers the original surface marks. While not all ancient people knew how to choose such a location, the right choice can provide a powerful tool for a united front, while the wrong choice can lead to the loss of this tool. This is a process of natural selection in evolution.



You can find that sites with good sanctuary conditions may also be suitable for settlements if they have a steady supply of water and food.

divine siting, as a technique of making union, has achieved universal victory, become more mature and produced many variants. It doesn't matter whether it is a cemetery; Different types of worship, including totem worship and animal worship, can be practiced at these sites, making them flexible and changeable.

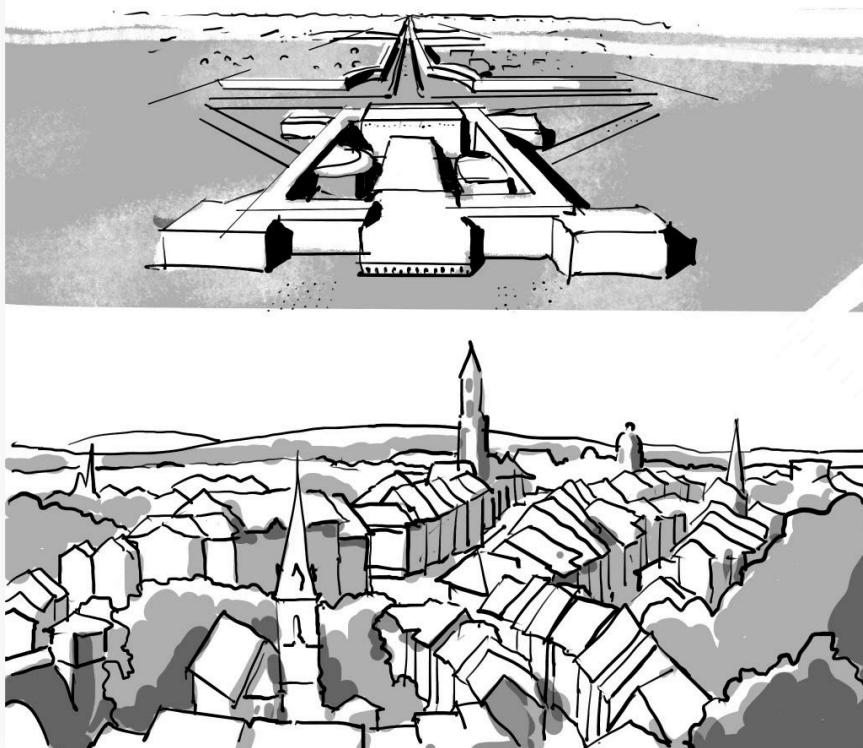
Small communities use sacred sites to identify themselves and organize into larger ones. More mature large communities evolve into nations, with the nation becoming the basic unit of competition. This has been a major theme throughout recorded human history on a large scale.

Sacred sites represent the physical manifestation of a large community. People repeatedly visit these sites, and professional religious leaders are responsible for providing organization and services to worshipers. These leaders may have been the earliest urban settlers. Interestingly, before the French Revolution, the Estates-General consisted of three estates or professions, with religious leaders ranked first, even before the nobility. In India's caste system, the highest caste is the Brahmins, who are priests, and not even the king ranks higher; the king and warriors are the second caste known as Kshatriyas. The role of religious leaders in the formation of large communities is therefore critical. They play a primary role in maintaining stability, and their work is the lowest-cost solution (compared to violence) to social issues. In modern atheist countries, religious leaders are sometimes replaced by revolutionary leaders or propaganda departments. Religious leaders and monuments form the physical and ideological foundations of sacred sites and are typically found at the heart of a city.

The exchange of goods and services among worshippers creates an efficient marketplace at the holy site. We oversee a temporary market known as a temple fair, which takes place on specific religious festival days when all citizens come to worship. These distinct structures help shape the outline of the city.

Large cities with political significance all have a monument or holy site that serves as a symbol for the larger community. The more developed the physical structure of the holy site, the more it signifies the existence of organization.

The holy sites take different forms in the different context.



(Figure: a monument overwhelms everything else (Bucharest) vs. monuments of hierarchy signify the communities (Bern).)

Tombs

The tallest and largest building in the ancient world was the Great Pyramid of Giza, Egypt, 4,600 years ago. Needless to say, it is the **tomb** of the Egyptian kings.

Temples

Thebes, the capital of ancient Egypt, has no living buildings left today, but the huge **obelisks** and stone pillars of the Karnak **Temple** and Luxor Temple are still standing after 3,500 years.

Jerusalem, one of the things people are most familiar with is probably the Wailing Wall, the Western Wall of the ancient Jewish temple. The sanctuary is gone today, replaced by the Dome of the Rock, also a religious shrine.

On the Capitoline Hill in Rome is his Temple of Jupiter, which the ancient Romans would defend to the last, the real center of their city-state community.

Similarly, on the Acropolis of Athens is his Parthenon;

Shrines to Their Leaders

On the central axis of Washington, there are the Capitol, the Washington Monument, the temples of Lincoln and Jefferson;

In the center of Beijing are the Monument to the People's Heroes and Mao Zedong's Memorial Hall;

Governmental Buildings/Open Space

In the center of Bucharest, the capital of Romania, stands the People's Palace, a monumental building built by Ceausescu, an old friend of the Chinese people. This is the latest of the monuments I mentioned above. To build this building As well as the public space around him, a total of 7 square kilometers of the old city were demolished. This building is also the heaviest single building in the world, with a weight of 4.1 million tons.

A Sign of the Strength of Organization

Monuments serve as an expression of the values, aspirations, and cultural heritage of communities. While traditional temples and monuments remain popular forms, modern communities exhibit a range of monument styles, from buildings and streets to intangible objects.

In larger cities, grand monuments reflect the community's historically strong organizational abilities. For example, within a 100-kilometer radius of northern France, over a dozen Gothic cathedrals from the 12th to the 13th centuries, such as Saint-Denis, Rouen, Chartres, and Amiens, stand as a testament to the region's financial and technical strength and fierce competition among cities.

The majesty and development of European community churches reflect their communities' strong organizational power, as well as their position as significant political and economic centers. On the other hand, communities that lack such organizational power are unlikely to produce grand monuments, and any ancient traces may be sold off, indicating a community in decline.

In essence, monuments serve as a reflection of the community's identity and values, and their styles and forms evolve with the changing needs and

aspirations of communities over time.

03 An Origin of the City, the Pattern of a Sanctuary - a Temple, a Treasury and Granary, a Bank, a Philanthropy, a Market, a Center of Study, a Decision Making Body

In the last chapter, the focus was on sacred sites, which represent the hardware necessary for the formation of a great community. These sites may take on various forms, such as burial ground, temples, churches, shrines, monuments, memorials, Confucian temples, museums, and other similar structures.

Sacred sites are the most fundamental components of a city. When attempting to identify a city, the first element to recognize is the sacred site, as the main narratives of a city often occur within its confines.

A sacred site serves as the ideological center of its great community, and it is set apart from the of daily life. The priesthood, such as the legendary Japanese queen Himiko recorded in historical texts, remains a mysterious presence, invisible even to samurai and nobles.

The typical configuration of a sacred site comprises a temple surrounded by a wall, with guarded entrances. This configuration creates a miniature fortress.

Sacred sites also serve as targets of attack by other great communities, and thus are impregnable. Many renowned sacred sites, such as the Acropolis of Athens and the Capitoline Hill in Rome, which are often used as examples, themselves are fortified citadels situated on a small hill overlooking the city. Sacred sites also serve as targets of attack by other great communities, and thus are impregnable. Many renowned sacred sites, such as the Acropolis of Athens and the Capitoline Hill in Rome, which are often used as examples, are similar to fortified citadels situated on a small hill overlooking the city. These defensible locations within the city, are often occupied by citadels of sacred sites.

While driving in central Italy, one may encounter numerous settlements atop hills, with some centered around monasteries, which are the castles themselves.

Cities that revolve around a castle centered on a temple are generally ancient republic city-states, provided they are not ruled by religious personnel. In contrast, in cities ruled by a monarchy, the central citadel usually belongs to the monarchy, but the temple is in the outer line of defense. For example, within the

context of the Japanese feudal period, the temples and shrines of Oda Nobunaga's Azuchi Castle and Kato Kiyomasa's Kumamoto Castle occupied a secondary defense position outside the central castle, reflecting their status as service institutions.

A sacred site with a sound defense capability can accommodate a variety of organizational roles, one of which is a treasury. Followers contribute money and goods, leading to the accumulation of wealth in the temple.

In general, the temple and treasury are integrated. For instance, the national treasury of the Roman Republic was located in the Jupiter temple on the Capitoline Hill. Temples in Athens, Delphi, and Ephesus also served as the city's treasuries.

These treasuries led to the emergence of temples as the origin of banking. Why did temples engage in banking?

Because they possess all the conditions required for operating a bank: a large stock, warehousing and storage capabilities, good credit and authority, and the ability to enforce borrowing and repayment within the community.

Lending has a helpful and remedial function, as well as profitability.

Therefore, it is generally believed that temples began to exercise banking functions even before the advent of gold and silver currency, lending out items such as grain and seeds.

In Athens, Delphi, Ephesus, and Rome, their temples were important banks that also inspected the quality of gold and silver and minted coins.

The role of banks, treasuries, and mints is an extension of the function of temples and sacred sites beyond religion and ideology into the economic field. According to Herodotus, ancient temples even engaged in the sex industry before various taboos arose, though we will refrain from delving into this topic.

Following the decline of classical civilizations, the second "early spring" of Western civilization emerged during the European Middle Ages. Amidst the ruins of cities and villages devastated by previous conflicts, commercial cities began to re-emerge. The process coincided with the flourishing of pilgrimage activities, as observed from the phenomenon

Although the Christian world, with its shared beliefs in Jesus Christ and the Virgin Mary, could be considered a single community, referring to it as a vast community called Christendom would be overly broad. Such a broad scope would be close to saying that all humans belong to a single community, which lacks the granularity necessary for distinguishing self and others within a political community from an evolutionary perspective.

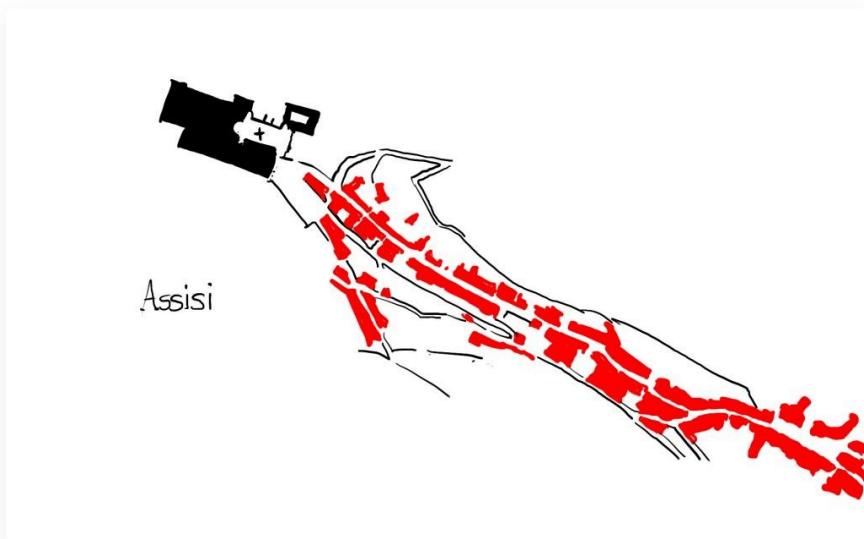
In the classical world, different city-states worshiped different gods, such as Athena, Apollo, and Artemis, among others. These differing beliefs effectively distinguished separate large communities. In the Christian world, these ecological niches of faith could not remain vacant. Consequently, various regions promoted their own patron saints, who would be associated with relics like a thigh bone or a jawbone. Bruges venerated St. Andrew, Paris honored St. Denis, Toulouse worshipped St. Sernin, and Venice revered St. Mark, to name a few examples.

Accompanied by these relics, cities constructed grand cathedrals that elevated their prestige and served as a nucleus for shared identity. The architectural competitions for these large cathedrals reflected the ambitions of these city-states and fostered the growth of strong professional groups. The construction of a cathedral, which could take anywhere from a few decades to several centuries, brought together builders, artists, craftsmen, and various service industry personnel. As one project ended and another began, these professional groups moved accordingly. Notable among these groups were the stonemasons, The chief architect of a cathedral was typically a master stonemason, whose skill is too valuable to be fixed to any feud, and thus has a free status, whose organization evolved into the fraternal organization now known as Freemasonry.

These sacred sites, particularly in Western Europe, France, and northern Iberia, formed a web-like pilgrimage guide map. The commercial activities servicing the pilgrimage routes gave rise to a new urban commercial network on the eve of the resurgence of Western civilization. Pilgrimages allowed people to leave their homelands and break away from the near-vegetative lifestyle described by Spengler.

Moreover, exploration is an innate human impulse. When people set sail or embark on unknown journeys, they are often filled with romantic emotions. It is this spirit that has enabled humans to spread across the world, reaching remote

islands in the depths of the ocean like Hawaii, Easter Island, and Tasmania with only a canoe.



When I visited the Basilica of St. Francis in Assisi, Italy, I saw how this significant religious center experienced decline. In the past, more shops would have been scattered along the road leading to the monastery. By examining the quantity and appearance of these shops, one can infer the strength of the urban vitality and determine whether there were important destinations nearby.

Real estate professionals can easily notice that a sacred site in a city is often regarded as an anchor store.

What is an anchor store? In a high-end mall, Chanel may be an anchor store; it attracts shoppers from a wide region, and these visitors may make other purchases when they enter the mall. Similarly, Uniqlo, McDonald's, movie theaters, and art galleries can all increase foot traffic and potentially serve as anchor stores. Stores located near or adjacent to anchor stores benefit from increased foot traffic, resulting in higher rents and greater value.

There are several types of structures in urban spaces that are similar to the structures of anchor stores.

First, when a sacred site is at an endpoint or elevated location, the path leading to the sacred site, or pilgrimage route, often features commercial streets, markets, or temple fairs. For example, the commercial street in front of Asakusa Temple in Tokyo is a case of a permanent temple fair.

Below the Temple of Jupiter on Rome's Capitoline Hill is the Roman Forum, which itself is a market place and temple fair. Public buildings from various Roman eras, including temples, courts, and senate, were constructed around this square, with the market gradually forming roofed arcades for sheltered sections and larger open-air areas. The division and proportion between these two sections conceals a balance between comfort and efficiency and between rigidity and flexibility.

Second, when a sacred site is in the central area, people will establish shops and various buildings around it. A common form is a circular street surrounding a cathedral, with a square typically in front of the main entrance of the cathedral. For example, St. Stephen's Cathedral in Budapest is surrounded by a wide open space, making it easy to capture panoramic views. In contrast, St. Paul's Cathedral in London is nestled among a cluster of buildings, with streets and squares surrounding it that are narrower than those in Budapest.

After the decline of classical civilization, the second early spring of Western civilization was in the Middle Ages in Europe. On the ruins of cities and villages that had been withered by wars before, commercial cities sprouted again. In this process, we can see it from the phenomenon and pilgrimage activities It has a lot to do with it.

Although the Catholic world also believes in Jesus Christ and the Virgin Mary, you can think of them as a community, but if you say that the whole world is a big community called Christendom, the scope of this community is too large, it is It seems to say that we are all human beings. To say nothing is to say that we

have not built a community. From an evolutionary perspective, such a system lacks the granularity of social evolution that distinguishes self from other in composing political communities necessary for competition within the community.

In the classical world, different city-states worshiped different gods, some city-states dedicated to Athena, others dedicated to Apollo, Artemis and so on. These differences in beliefs serve to distinguish different large communities.

In the Christian world, there's no way these niches are going to be vacant, and you're going to see their patron saints being rolled out everywhere. They will dig out some saint's stump, a thigh bone or a jaw from somewhere, please go back to your hometown and worship it. St. Andrew in Bruges, St. Denis in Paris, St. Satnan in Toulouse, St. Mark in Venice, and so on.

Along with the relics of these saints, a city builds its magnificent cathedral, which together increase the city's prestige. Form the nuclei of identity.

The engineering competition for the megachurch reflected the ambitions of these city-states and produced extremely powerful professional bodies. The construction process of a cathedral lasted from a short period of ten years to a long period of hundreds of years. The whole process formed a gathering of construction industry, artists, and various handicraft and service industry personnel. Large projects are subject to one another, and professional groups follow the flow of projects. Among the well-known ones are Freemasonry, which is called Free Mason in English, which literally means free-flowing stonemason. The chief designer of the cathedral is generally a master stonemason.

These holy sites form a web-like pilgrimage guide map in Western Europe, especially in northern France and Iberia. Businesses serving pilgrimage activities were formed along these pilgrimage routes, constituting the urban commercial network on the eve of the rise of a new round of Western civilization.

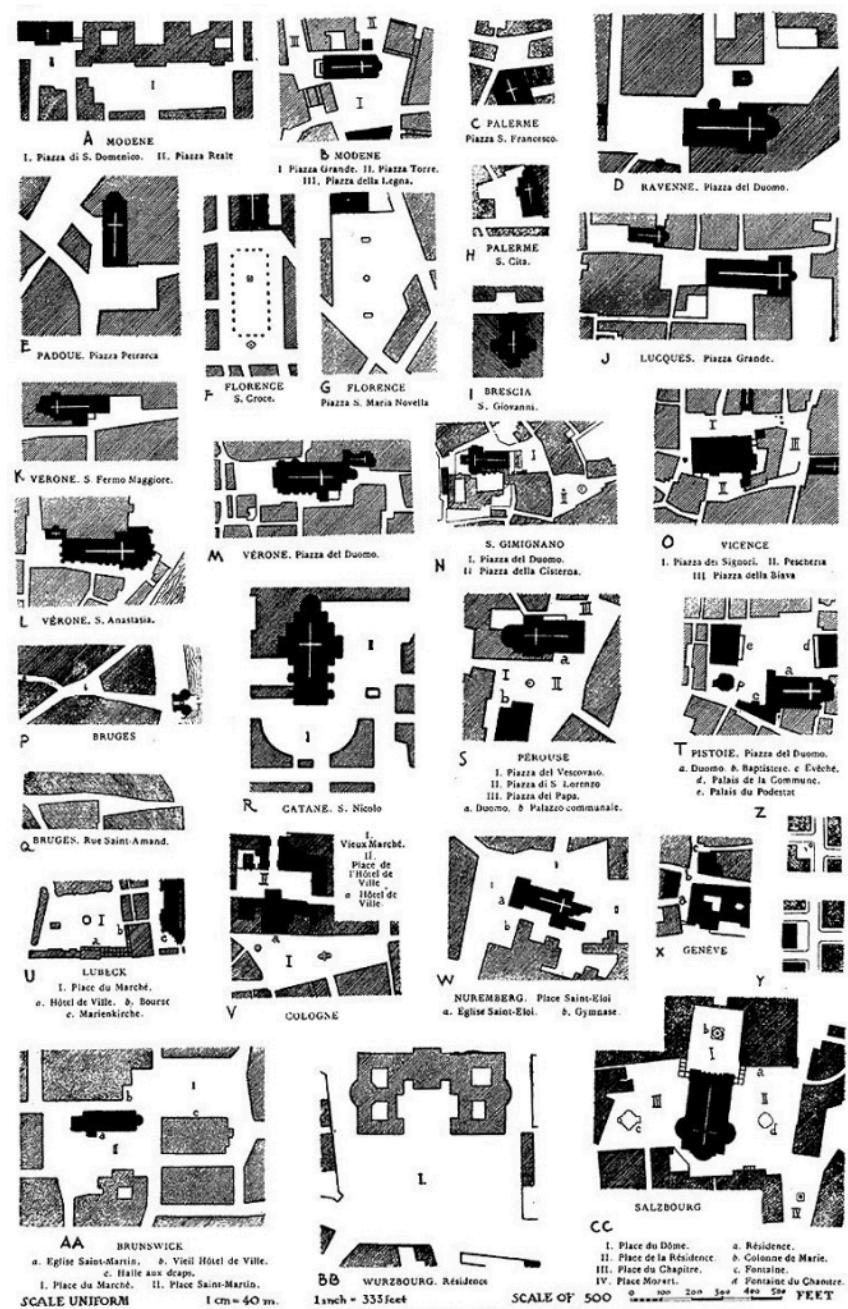
The pilgrimage took the people out of their native lands and out of what Spengler called a plant-like way of life.

Moreover, exploration is an instinctive impulse of human beings. When a person boards a boat to sail out to sea, or packs a bag on his back to embark on an unknown journey, he always has romantic feelings. It is this spirit that has

allowed human beings to spread all over the world, reaching islands deep in the ocean such as Hawaii, Easter Island and Tasmania only by canoe.

I visited Peassis, Italy, where the San Franciscan Monastery is a very important religious center, as you can see, this is a city that has experienced decline, in the past, there would be more shops on the road leading to the monastery , you can restore the strength of the city's vitality in each place through the number and appearance of the shops, and judge whether there are important destinations nearby.

People in the real estate industry can easily find that a holy place in a city is regarded as an anchor store.



What is an anchor store? In a high-end shopping mall, Chanel may be a main store; Chanel will attract people who have nothing to do with it to watch. When these people enter the mall, they may also buy other things; similarly, Uniqlo, McDonald's, movie theaters, art galleries, etc. All of them may increase the flow of people, and all of them may be surrounded by anchor stores. And the stores on the only way to the main store will benefit from this. The closer to the main

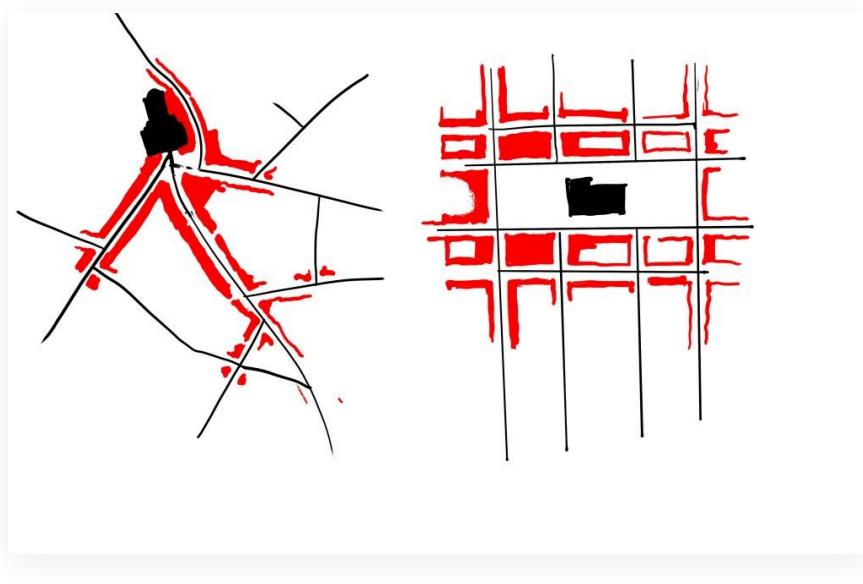
store, next door to or opposite the store, the higher the rent and the more valuable because of the large number of people.

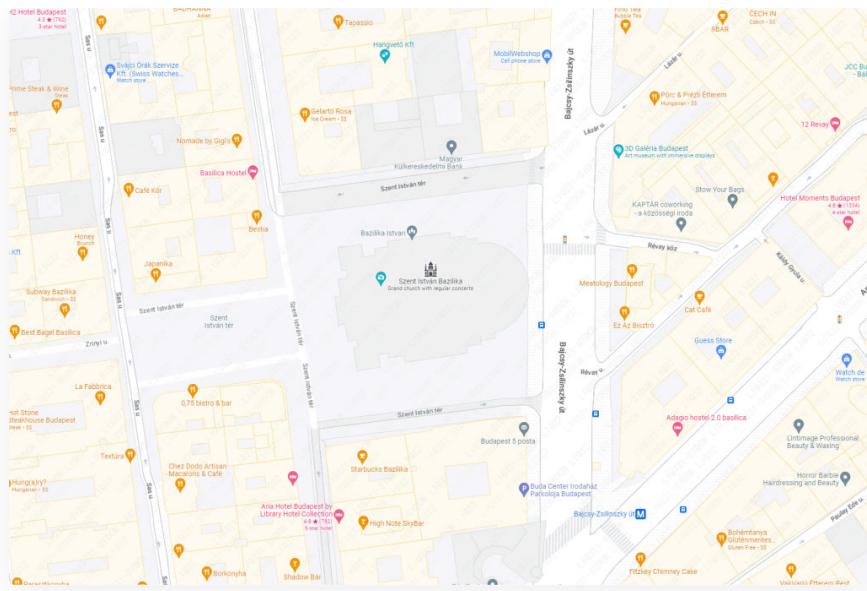
The several structures created by the Holy Land in the urban space are basically the structures of several anchor stores.

The first type is that the holy land is at one end, or on a high place. The road leading to the holy place, the pilgrimage road, or, in Japan, the sando, and the road outside the Japanese shrine, is called Omotesando. It often presents the state of commercial streets, markets, and temple fairs. Actually, I have already talked about the commercial street in front of Sensoji Temple. A case of permanent stalls in a temple fair.

Below the Temple of Jupiter on the Capitoline Hill in Rome is the Roman Forum, the Forum, which itself is a free market and a temple fair. The public buildings of ancient Roman dynasties, including temples, courts, and parliament buildings, were built around this square, and the market gradually formed a covered corridor as a part that could shelter from the rain and a larger open-air part. . The division of these two parts also hides a balance of structure, comfort and efficiency; a balance of fixity and flexibility; we won't discuss it too much.

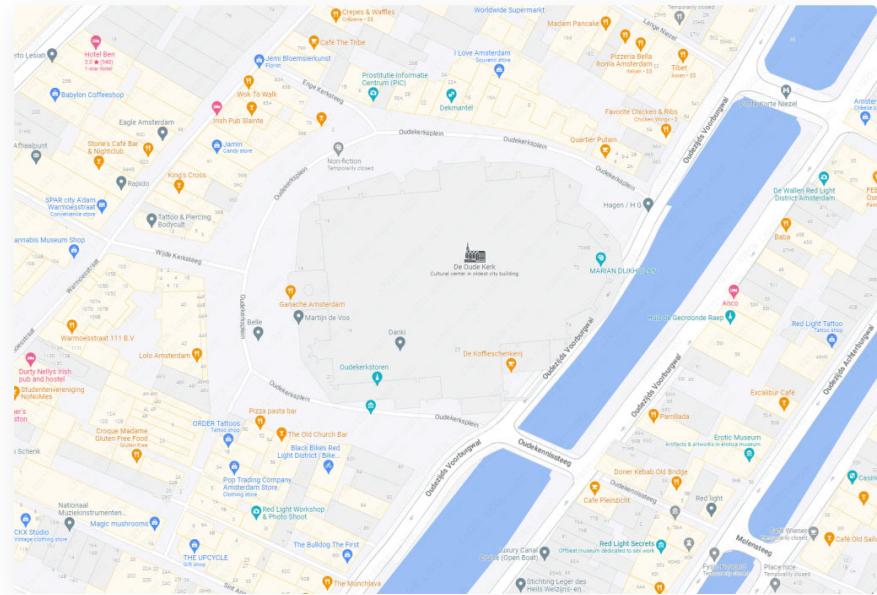
The combination of the temple and the market, all the cities built by the Romans have such a structure; of course, this is not their invention, Athens also diagonally crosses a square that serves as a market, and then walks towards the gate of the Acropolis.

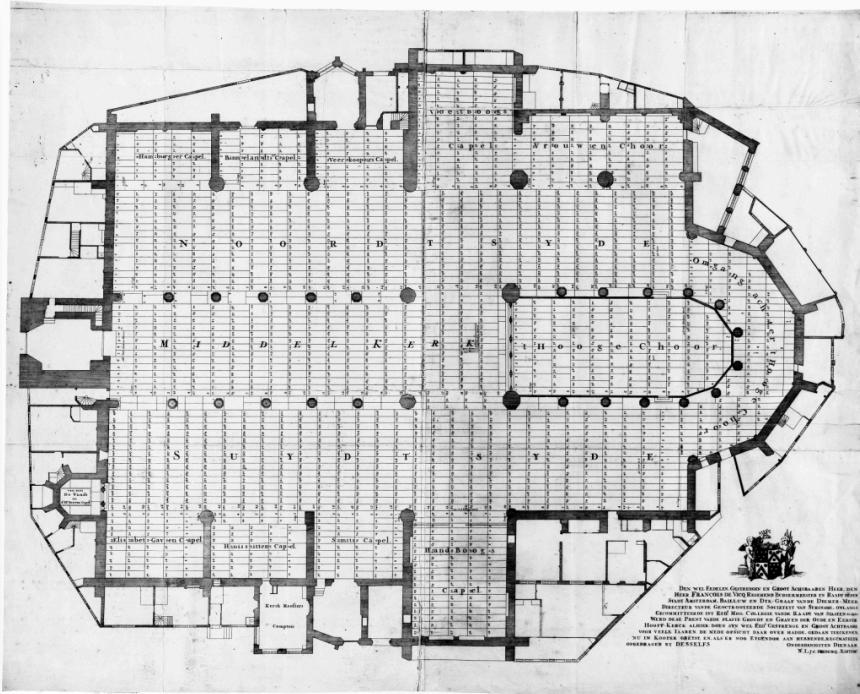




The second type, when the holy land is in the center, people will build shops and various buildings around it. The common form is a circle of streets around the main church, or wide or houses, and the front of the main entrance is generally enlarged as square. As wide as Budapest, there is a wide open space of more than 30 meters around St. Stefan's Church. In this way, it is easier for you to take a panoramic view of the church; St. Paul's Church in London is also surrounded by street squares, the street is more than ten meters wide, and the main entrance is slightly wider; this is much narrower than Budapest, so St. Paul's Church gives the impression that it is nested in a pile Inside the building. It's not too compact though. In fact, it can be even more compact. Because the church usually has only one door for the public to enter and exit, and it is generally surrounded by very closed solid walls. So the streets around it are one-sided streets from a commercial point of view.

What is a one-sided street?





On a 100-meter-long street, if each shop is 10 meters wide, the original two sides can accommodate 20 shops, while the street facing the church wall only has the other side, and the same 100-meter-long can only accommodate 10 shops. In this way, the services that can be provided in the same area are much less. Although the facade of the church can be beautifully decorated, it always dilutes the vitality of its adjacent street. So in my opinion this would not be the best structure. No need to worry, in Amsterdam, you will see that on the outer wall of the main church, there is a circle of small shops like psoriasis. These shops cover the solemn and beautiful exterior walls of the church, leaving only the entrance and exit space for the church. These small shops can be directly attached to the church, and less walls can be built, which is indeed very economical and efficient. If the small shop catches fire, it may damage the church. However, this is the earth, even if a person lives on the grassland, he may be burnt to his ass by wildfire.

This kind of addition has greatly improved the commercial value, which is very pleasing to the eye in my opinion. However, this is not the most compact solution. The most compact plan is also one of the most brilliant architects in human history, the 16th century Venetian architect Palladio.

This is Vicenza's cathedral Palladio Basilica, Basilica, is a Latin word, meaning the assembly hall. The church, it seemed, was an ornate public hall of continuous

vaults. But its first floor is actually all shops. You have to go through a big staircase and go up to the second floor, which is the church. This is like many shopping centers today, where the cinema is placed upstairs. If you want to watch a movie, you will pass by various shops downstairs, which is convenient for you to go shopping. This is actually nothing new. The ancients had made similar arrangements five hundred years ago or even earlier.

But when you try to praise Palladio's cleverness, you make a mistake. The essence of the scheme is not what he offered. In fact, the shops existed before the church was built. The proposal of the church just respects the existence of these shops and integrates them into the new plan. What is really smart is not the architect, but the value orientation of Vicenza. An important public building is not enough to outlaw ordinary shops. Every store is a money-making institution, an organization, a tradition, and a culture, on which the livelihood and lifestyle of the members of the community are attached.

A monument, a shrine, and its compositional relationship to the city around it is an indicator of the degree of commercial freedom of a city and a people, and is likely to be related to its wealth, tradition, and creativity. It doesn't have to be particularly accurate, but it must not be an insignificant piece of evidence.

According to Hayek: Man makes choices by action, not by reason. The collection of human spontaneous actions will experience the selection of the environment, and finally generate results, which have a more delicate structure and digital logic than the design of great men.

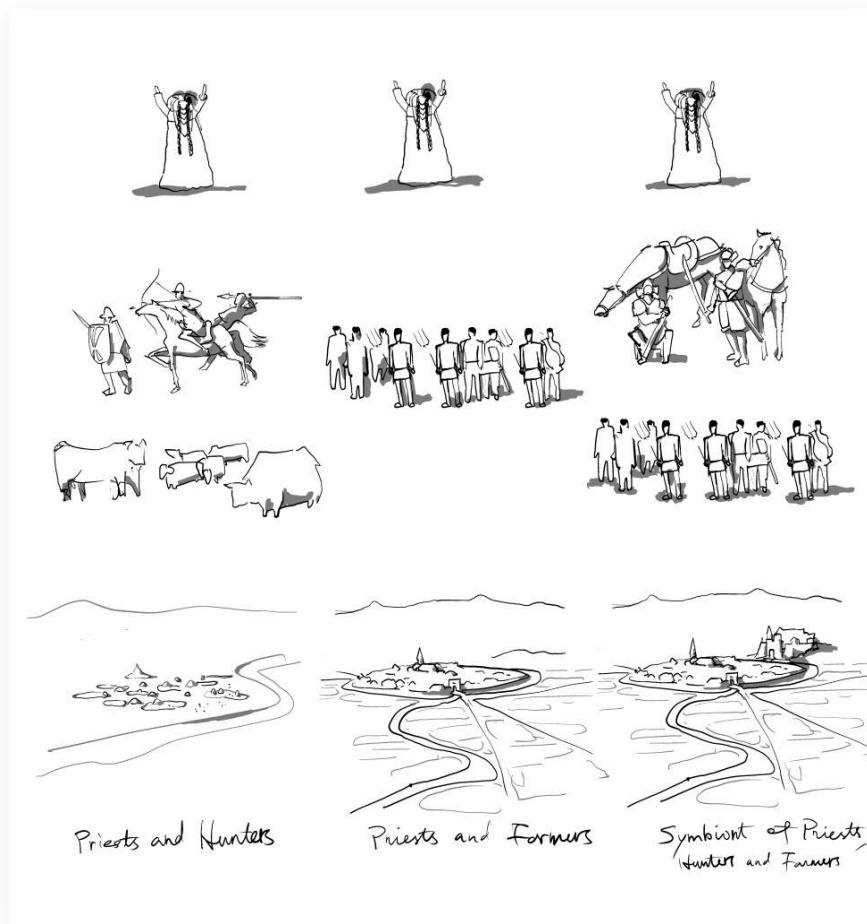
That's it for this issue of The Stale Shredder.

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04 An Origin of the City, a Symbiont of Hunters and Farmers

From Hunting Gathering to Agriculture



Some surveys (such as Gallup Global Emotions Report) stating that peoples may have more positive view toward their lives, even without higher income or longer life expectancy.

This observation may contradict the conventional wisdom of our society, which largely values the pursuit of development and success. However, it's not particularly surprising when one considers that some African societies are culturally closer to hunter-gatherer traditions than societies in Europe, North America, or East Asia.

In these societies, people gather tropical fruits from trees and hunt various animals. The men and women are strong and beautiful, full of the joy of physical activity. Their daily labor lasts no more than four hours, leaving ample time for singing and dancing. Life is lived without long-term plans, often planned no more than three days in advance. While illness and hunger are occasional problems, death, when it comes, is swift and suffering is short-lived.

Max Weber once stated that workers from these hunter-gatherer societies would not work longer hours if their wages were increased. Rather, they would work fewer hours because they only intend to earn a certain amount of money. If their wages are doubled, they will work half as much and spend more time in leisure.

Considering that 95% of the 2.5 million years of human history were spent in this way, it could be argued that human nature and our innate qualities were primarily shaped by this lifestyle. The ability to endure, plan for the long term, and nurture grand ambitions are comparatively recent cultural developments.

We, the people of agricultural and industrial societies, measure hunter-gatherers by our standards, much like what Wang Guowei suggested: "we gauge the lives of these simpler folk using our own desires for status. We are often unaware that their desires for a fulfilling life have been better satisfied than ours." Indeed, archaeological evidence suggests that the transition from the relatively healthy, happy, and leisurely lifestyle of hunting and gathering to engaging in agriculture was a forced act.

The earliest evidence of humans collecting plant seeds to make flour-like food dates back to approximately 300,000 years ago, predating the appearance of *Homo sapiens*. However, a significant shift occurred about 12,000 years ago, a period known as the "Younger Dryas event," which was a mini ice age making the climate dry and cold. To secure a more stable food source, the ancient people in the Middle East, particularly in the Euphrates River Valley, had to depend on cultivated crops and their seeds for survival, thus marking the dawn of the Agricultural Age.

Yuval Noah Harari, in his book "Sapiens: A Brief History of Humankind," argued that humans took up agriculture to feed the tens of thousands of workers constructing the Tower of Babel.

Regardless of which view one accepts, the fact remains that humans adopting agriculture is a relatively recent phenomenon. Before this, only the dead were settled. But now, to care for their crops, people had to become settled. As crops

could only be harvested every few months, grain had to be stored in containers and granaries. This development led to settled villages, marked by grain silos, which combined with holy places, temples, or markets, eventually became larger human settlements, almost cities.

The oldest cities appeared in the Levant, which is the western part of the Fertile Crescent, including modern-day Israel, Jordan, and Syria. One city, whose name is well known to us, is Jericho, which has a history of 11,500 years.

The discovery of a 10,000-year-old stone tower in Jericho has led some archaeologists, like Barkai from Tel Aviv University, to argue that the structure was likely designed to intimidate the local populace. It served as a constant reminder of their insignificance and encouraged respect and submission to the burdensome and tiresome lifestyle imposed by agricultural communes, along with the pressures of the social hierarchies in these new societies.

Agriculture was indeed a distinct profession that dramatically altered human lifestyles. Humans, originally highly mobile creatures, became stationary with the onset of agriculture. They started to care for crops, developed an affinity for the land, and their lives became more monotonous, almost plant-like according to Spengler's perspective.

Who has the power?

The advantage of being a farmer lies in their consistent and abundant food income. They owned houses and granaries, allowing them to store food and possess many private properties. They were able to sustain a consistent diet and enjoy a more predictable lifestyle in the short term. Hunter-gatherers, in contrast, led a nomadic life, eating irregularly, and all their possessions were only what they could carry.

Furthermore, agriculture supports a much higher population density. As previously discussed, a square kilometer of grassland could not support even one hunter, but the same area of farmland can sustain hundreds of farmers.

In modern conversations about net assets, profit margins, growth rates, etc., farmers seem more successful than hunters, more akin to the "winners" of life. If life were a stock market, the farmers' stocks would be blue-chip, while hunters' would be considered junk stocks.

However, this perspective is not necessarily accurate. Hunters, from a young age, were trained in archery and could kill almost instinctively. While farmers could

be healthy and strong, they could hardly match the combat prowess of hunters. When farmers encountered hunters, they found themselves unable to protect their possessions or their lives. This cycle has been repeated throughout history.

The term 'hunter' I use here is a broad one. They could be hunter-gatherer tribes, nomadic tribes, or any culture influenced by these lifestyles. For example, hunting game was a favorite pastime of English kings and Manchu emperors. These activities were not mere entertainment but serious training and even selection processes for successors and military commanders. This can be considered a cultural legacy passed down from their barbarian ancestors, making them broadly defined 'hunters'.

Though the hunter populations were often small, they were, in many ways, the protagonists of history. In the late Roman Empire, the Roman legions were powerless against the invading Germanic tribes. The empire relied on Franks, early Germanic immigrants, to defend it as they were more martial than the agricultural Latin people. The Byzantine Empire relied on Varangian warriors, or Vikings, to fend off attacks from various Turkic, Avar, and Bulgarian nomadic tribes.

The Sui and Tang Dynasties, according to their official accounts, originated from Wuchuan, north of Yinshan in Inner Mongolia, which was not an agricultural area. The Li family, founders of the Tang dynasty, were skilled horsemen and warriors. However, by their fifth generation, Emperor Tang Ming Huang, the martial spirit of the family had faded, and they became more artistic. The military responsibility is mostly on generals and regional commanders who were non-Han people, and when facing internal challenges provoked by these 'barbarian generals', the court recruited other barbarian generals from the western frontier to quell the unrest.

At the turn of the Ming and Qing dynasties, it was no different. Dorgon's Manchu Banner Men, traditionally hunters, were only forty to fifty thousand strong, crushed the Ming empire with a peasant population over a hundred millions.

Farmers were extremely vulnerable when faced with the formidable hunters. The hunters had the potential to slaughter the farmers. This situation, much like the Mongol conquests of the middle asia, indeed had occurred.

But the slaughter of farmers was not necessarily the most advantageous for hunters. Replacing farmers and occupying their land offered little gain to the

hunters' way of life. However, if the hunters left the farmers alone and collected protection fees from them, a stable source of long-term income would form. From the farmers' perspective, paying the hunters protection fees in exchange for their protection, and being spared from the slaughter by other hunter tribes, was a viable option.

Protectors and Proctectees

This brings us to the main point of this section. A symbiotic relationship often forms between hunters and farmers. A relationship between protectors and those being protected. The relationship between sellers and buyers of martial power. They are the two sides of a typical symbiosis in city states.

Once hunters enter this symbiotic mode, they transform into warriors and nobles, the higher ranks of urban society.

Different situations lead to different interactions between hunters and farmers, between sellers and buyers of martial power.

1. Hired Warriors: Sometimes, the hunters find themselves in the position of guest armies, unable to suppress the farmers. At these times they are like mercenary guards, similar to the Varangian Guards. Moreover, this interactive relationship can be reversed. This is exemplified by the Mamluks, who started as guards and ended up rulers of Egypt; or by Francesco Sforza, a mercenary captain who became the Duke of Milan.
2. Allied: the Crusaders was initially an ally of the Byzantines. But became invited conquerors.
3. Invasive: in most of the other cases., when hunters have the upper hand in this symbiotic relationship, they are military colonists, and the farmers are the conquered;

When they form a relatively harmonious and stable community with the farmers, they are seen as the relationship between the warrior nobility and civilian tenants.

High Tension

The symbiotic relationship between hunters and farmers inherently carries strong tensions.

The Spartans of ancient Greece were believed to be very inhumane towards their slaves, who were called Helots.

Helots' daily task was to farm for the Spartans. But their situation seemed even worse than that of ordinary slaves. According to Herodotus, the population of the Helots was seven times that of the Spartans. One can imagine that if they were organized, even if they were just using farming tools, they would pose a significant threat to the Spartans.

Each year, the Spartans would conduct a purge, killing any influential or brave Helots who might become leaders. They had to ensure that the Helot community remained leaderless and scattered, absolutely devoid of any organization.

Generally speaking, systematic violence within a society would lead to its moral collapse.

Therefore, this phenomenon cannot be understood with the logic of internal relations within the community. Prior to classical Greek times, in 12th century BC the Dorians invaded the Peloponnese from the north. The Spartans were a branch of them. In other words, the Spartans were foreign hunters, military conquerors. The Helots, on the other hand, were native Greeks. They came from different communities. Furthermore, the Spartans did not work on integrating themselves into the local society, and did not let the Helots engage in service industries that required close cooperation with the rulers. They were treated purely as an economic resource.

This highly tense form of symbiosis is indeed special, but not necessarily unique. The rulers of the Yin Shang dynasty liked to use living human sacrifices. Thousands of human sacrificial bones were unearthed from the Yin Ruins. The Shang people conducted hunting activities, and their hunting targets included alien humans who lived outside their colonies. These activities could not only be a kind of sacrificial activity or pure hunting entertainment. The nature of population control and economic exploitation of the conquered people could be seen, which seemed to echo the relationship between the Spartans and the Helots.

The Varna caste system of ancient India consists of three primary castes. The first, Brahmin, are the priests and ideological administrators. The second, Kshatriya, are warriors and nobles. According to the Aryan theory, these two castes are descendants of the Eurasian steppe-originated invaders, who had a custom of worshipping cows, hence broadly descendants of hunters. The so-called Aryan descendants may not be bloodline descendants, but they are, at the

very least, political and professional successors. They conquered the Indus River Valley and placed the native agricultural population under their rule.

The third caste, Vaishya, is made up of agricultural, commercial, and artisanal citizens. Their origin is either at the periphery of hunter groups, joining the hunter community earlier than the natives, or they are the mixed-race offspring of hunters and locals. In any case, they are the united front targets of the conquerors.

The fourth caste, Shudra, are the descendants of the conquered native agricultural population of the Indus Valley. They lack citizenship and do not undergo rites of passage.

These castes display a clear symbiotic relationship between hunters and farmers. However, the potential for unification and integration between hunters and farmers is also evident. In many modern societies, after several generations or dozens of generations of vertical integration, the descendants of hunters and farmers have mostly integrated. But this kind of integrated society of warriors and civilians, appearing homogenous and static, is actually a temporary state in history; the existence of foreign order, the hierarchical differences between warriors and civilians, the symbiosis within opposition, and the dynamic evolution between each other, are more typical over larger timescales.

In cities worldwide, traces of this class-based symbiotic opposition are remarkably apparent. The most common form is the castle.

Castles, often regarded as possessing romantic qualities, are associated with noble morals and lifestyle. Yet, did you know that in most cultures, the ancestors of the nobility were barbarians, or hunters? The symbiosis of hunters and farmers, as rulers or protectors of the farmers, led to their settlement among the farmers.

Despite their superior military ability, hunters were few in number, perhaps only one-tenth or one-hundredth of the farmers. Hence, they had to first protect themselves from potential retaliation from their protectees, the local farmers.

The Protagonist

In England, there are numerous castles, many of which were built during the Norman Conquest. The Normans fought their way through but, to effectively rule a large country with their mere tens of thousands of knights, they built

castles wherever they conquered. Between 1066 and 1087, the Norman conquerors built 36 castles in central England.

The Manchu Qing dynasty entered the pass with tens of thousands of Eight Banners soldiers to rule hundreds of millions of Ming people. The Eight Banners troops were not spread out like pepper powder. Within the great wall, there were seven garrisons in Jiangning, Fuzhou, Hangzhou, Jingzhou, Xi'an, Chengdu, and Guangzhou, each with several thousand soldiers. Apart from these seven, there were more than a dozen other locations with Eight Banners garrisons. They generally had an independent enclave, called Manchu City, Tartarian City or Banner City.

Manchu City, the fortress of the hunters. In the context of the continuous settlements of farmers, it forms several isolated islands. Similar to the warrior nobility of many cultures throughout history, they form a fortified area in or near civilian cities. These Manchu Cities were the primary bases of Qing rule. Moreover, during times of war or revolution, such as the Taiping Rebellion and the Xinhai Revolution, these Manchu Cities were crucial. For example, the Manchu Eight Banners in Nanjing resisted the Taiping Rebellion in a scorched-earth defense, sacrificing themselves for the honor of their race .

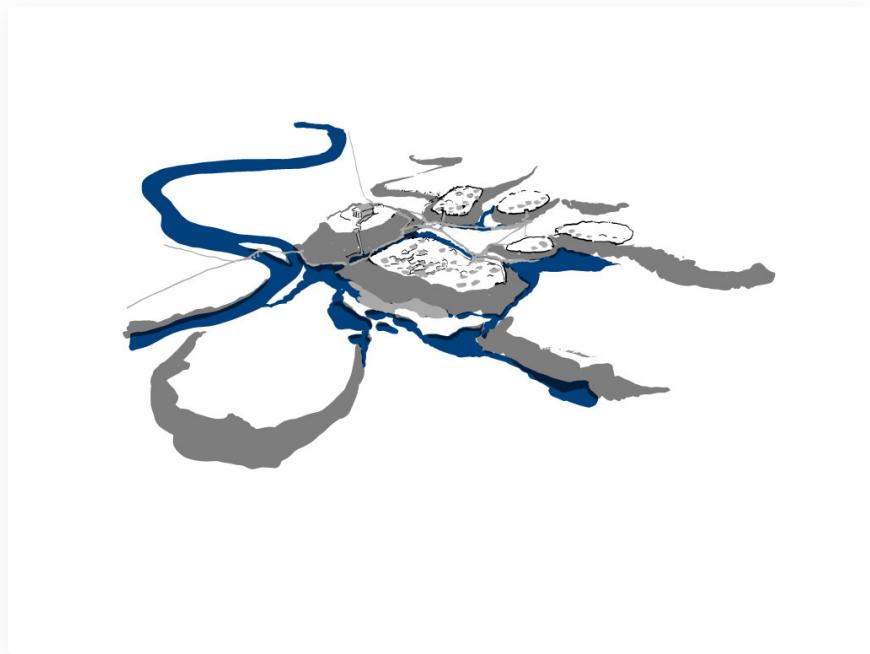
The symbiosis of hunters and farmers can almost be directly equated with "colonialism," seemingly full of contradictions and tension. However, this symbiotic relationship exhibits great vitality. Moreover, it is not only the main form of the initial origins of cities but also the precursor of many of today's world cities. The Tower of London, for instance, is the fortress from which the Normans ruled the native English. The Jin Dynasty Peking, or Khanbaliq, is clearly the outpost set up by the nomadic tribes in the agricultural areas at the foot of the mountains.

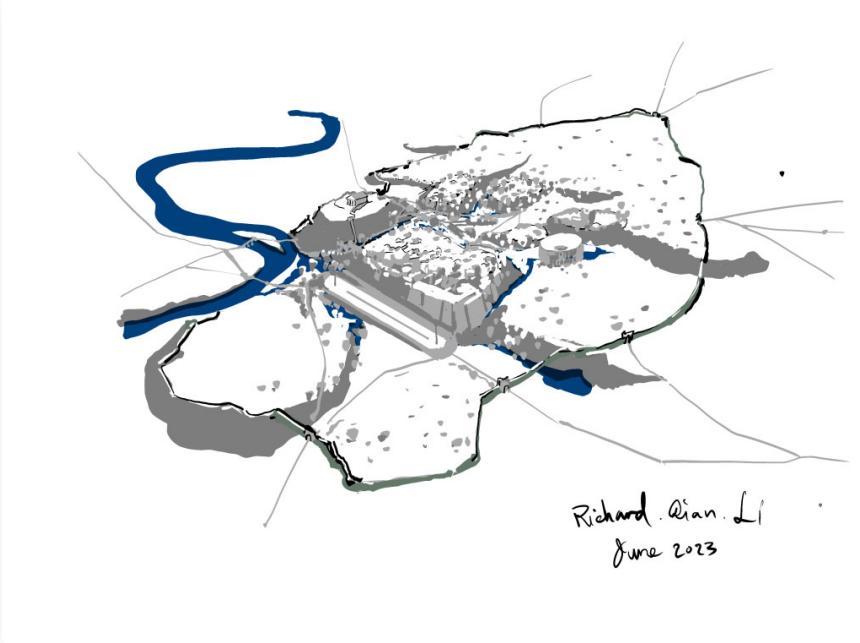
That is to say, this kind of symbiotic relationship has become the protagonist of the evolutionary system. This precisely indicates that this symbiotic relationship possesses elements of order and organization, efficiency advantages, and the ability for sustainable development.

As this series unfolds, I hope to further elaborate on these relationships.

05 An Origin of the City, the Symbiosis of Hunters and Farmers (2) - a bit Spenglerian Philosophy

(Edited June 20, 2023)





(Figure above: early rome, around 700BCE, clans maintain their own defense on hills and some common places like the temple on the Capitole;

Figure below: individual defense fused into blocks and streets, common envelope(Servian wall) is constructed by common defense, marking a successful creation of a city state.)

I discussed in the previous issue that the symbiotic relationship between hunters and farmers is the origin of ancient urban communities. Hunters constitute the warrior nobility, while farmers form the common people. Many heroes in national founding myths are shepherds, such as Israel's David, who was the shepherd who killed Goliath with a slingshot. The oldest human literature, the hero Enkidu in the Epic of Gilgamesh, is also portrayed as a shepherd. They first herded sheep, and after becoming monarchs, they were often referred to as "shepherds of the people."

The audience "blossom in his heart" asked: For a nation, can barbarism overcome civilization? For each individual, can cruelty overcome gentleness? This seems to carry some undertones of the Dark Forest Law. If that's the case, wouldn't it be too gloomy?

I will try to answer briefly: Barbarism overcoming civilization is a notion that exists, but it may be an excuse made by those who claim to be civilized for their failures. But in reality, who is barbaric and who is civilized is not easy to determine, so one should not fully believe such assertions.

Throughout history, people have three types of interactions with history: one, those who wield the power and have larger influence to the course of history; two, those who are responsible to write and interpret history; and three, those who are mostly influenced by the history written by others.

People who shape history, such as the Emperor Aguda of the Jin Dynasty, or the Dutch East India Company, are few in number, accounting for only 1/1000, but they create the main currents of history. However, they don't pay much attention to shaping historical records, nor do they create particularly complex theories for themselves, and, like some kings of the Carolingian Empire, they are not very literate. The phrase "not very literate" is in the Latin sense; Charlemagne, of course, was proficient in his own mother tongue, it's just that the writing system at the time hadn't yet been established.

Those who write history are usually scholar-officials in China, or left-wing intellectuals in the West, with the former generally much more absurd than the latter. They are all particularly adept at compiling materials, but they don't really understand the actions of those who shape history because they have never stood in their shoes. On the contrary, they think their work is very important, as they are setting their hearts for the universe and their lives for the people. But in fact, the history they write often belittles the true creators of history, placing themselves on a particularly high pedestal.

On the one hand, they mislead the general public, while on the other hand, they cultivate a new generation of scholar-officials and left-wing literati.

The number of the general public is much larger, and the version they like or can read is what we usually know as history. In this kind of history, those who really create history are often portrayed as barbaric and backward.

For example, many people have a stereotypical impression of the Jin Dynasty as nomadic shepherds wearing animal skin hats, but archaeological evidence shows that the Jin people's blast furnaces were very advanced. Other information beyond history will reveal the truth, such as the description of Jin soldiers in folklore stories - "iron butchers", which are entirely French heavy cavalry equipment. There are also stories like the "Mengchong warship" ridden by Jin Wushu. You can know that the Jin Dynasty was actually very developed in manufacturing and shipbuilding, even more developed than the Song Dynasty, although they couldn't surpass the Song people in writing lyrics.

Gentleness does not necessarily lose to cruelty. Generally, being gentle is not a bad thing; but weakness and indifference are another matter. They essentially reflect people's constant desire to take advantage of loopholes and free rides, failing to take on the responsibility of maintaining social order, and letting it degenerate and become chaotic. Farmers often lose to hunters, and it's not just because of the lack of fighting power of farmers. In fact, there are tens or hundreds of times more farmers than hunters. If farmers can't beat hunters, it's because they lack organization and the will to protect their way of life. They may have been reduced to quasi-slaves without initiative in the previous society, and it doesn't matter who their master is. The fact is that farmers are not destined to be weak, and it's not that farmers are destined to be inferior to hunters. After all, farmers are the descendants of hunters, people are all similar, it's just the circumstances that are different. If farmers enter the frontier blue ocean, they can also become brave pioneers. Like Americans on the East Coast moving to the West, they become tough cowboys. Western Japanese farmers may become samurai lords when they get to the Kanto region. German farmers who went to the Eastern European plains to cultivate became Junker military aristocrats.

Roman farmers fled to the sandbanks on the beach to take refuge, establishing the maritime nation of the Republic of Venice, which dominated the Eastern Mediterranean for four to five hundred years.

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The lifestyles of farmers and hunters, from the perspective of evolution, represent two evolutionary strategies. One is short-term stability but long-term fragility, the other carries higher risk but also the potential for explosive growth. The combination of these two strategies forms the civilization discussed in this program, the social organization platform of cities. Their combination forms a division of labor that is not homogeneous, but hierarchical.

In reality, the combination of hunters or nomadic tribes and agricultural tribes is rich in detail, and it is not necessarily simple, brutal, or one-sided.

In the founding myth of Rome, their first leader, Romulus, was a shepherd. Moreover, it is said that he was an abandoned child, raised by a she-wolf, and that he grew up drinking wolf milk.

Needless to say, you also know, it must have been that shepherd Romulus was particularly brave, he had a way with dealing with wolves, so he boasted that he grew up drinking wolf milk. Romulus, it is said, was driven out of his hometown of Alba by his fellow villagers. He probably was very tenacious, with the aura of a mafia boss, you can call him Brother Rom. He and his brother mixed with a bunch of bachelor shepherds, and became their leader. Later, they built a stronghold on the Palatine Hill by the Tiber River. The Palatine Hill, though called a hill, is just a small hill about 30-40 meters high, with a relatively flat top, covering an area of 400 by 300 meters, about a dozen hectares, any real estate project in China today is larger than this. The location of this hill was not chosen randomly, it is west of the Tiber River, and on its other three sides, there are wetlands and seasonal ravines between it and other hills. So it essentially has a natural moat, which you can't see today because the Romans later filled them up to build houses.

Such a place was the greatest center of classical Mediterranean civilization. Its extraordinary development is of great interest. As for Romulus, as long as his remains were not found with his name or iconic objects, he remains a mythical figure. However, even myths are not made up arbitrarily. They must have a real background.

Settling in a fortress, for a real shepherd, is not much of an advantage. If you want to have a lot of sheep, you need to find a broad valley and live a nomadic

lifestyle.

Although it's not clear in the historical stories, we can reasonably imagine that Romulus' shepherd band was not purely herding. There were many settled agricultural tribes living around them. Including the Etruscans, Sabines, Samnites, and the Latins who spoke the same language as Romulus himself, etc. Romulus probably also managed land, hired tenant farmers, and provided them with protection. He might also have collected protection fees from nearby villages, or provided some judicial services. To provide judicial services, you need the ability to enforce judgements, so Romulus should be quite competent as a judge, at least for enforcement. In addition, they might also trade with the people around them, or serve as bodyguards, debt collectors, etc.

In the founding myth of Rome, the first big thing Romulus did after founding the city was to snatch a bunch of girls from the neighboring Sabine village at a banquet to be their wives. According to current laws, he would be considered a full-fledged rapist.

But in the story, this seems to be a great achievement. Then, the village of the kidnapped girls and the Romulus' stronghold had a so-called "war". By that time, the Italian region had already entered the Bronze Age, and both sides should have some very lethal weapons, but there seemed to be few casualties in the battle. In the end, the women could not be taken back, and the fact that everyone became relatives could not be changed. So, the people of the Sabine village simply moved to Quirinal Hill next to the Palatine Hill, where the Italian presidential palace is today, and the two tribes formed a stronghold city-state.

Romulus' stronghold city-state, like Water Margin's Liangshan, welcomed anyone who came to join. After Romulus' death, the kingship was not passed to his son, or even to his shepherd folks. The newly established patricians elected a descendant of the Sabine people, who had their daughters kidnapped, Numa, as the new king. You can imagine him as Song Jiang being elected by everyone after Chao Gai's death. Numa, indeed, was like Song Jiang in the legend. Numa didn't like to fight, he was known for his wisdom and piety, a leader who was good at ideological management, teaching the Romans to respect the gods and lives.

We can see that the founding myth of Rome is very classic. The integration of hunters and farmers here is not as one-sided as one might think. Romulus represents the bravery of hunters, while Numa Pompilius, a Sabine, whose people had been settled and engaged in farming for a longer time, are closer to a

farming tribe. They were not as strong as Romulus' band, and they were second in the formation of the symbiotic body, but they were not completely passive. The elites among them could at least compete for the position of the priest and ideological managers of the sacred land. The process of Rome's founding myth is a process of alternating leadership between the religious and military powers.

Therefore, farmers in the symbiotic body are not necessarily passive. They have a great chance to attain the position of priests. The Germanic barbarians ruled the Latin people, but the Latin people infused Christianity into the Germanic people and spread it to the north of Europe.

(* This paragraph talks about "Water Margin", also known as "Outlaws of the Marsh". The novel has Chao Gai and Song Jiang as the martial founding leader and the intelligent successive leader respectively.)

After hunters and farmers form a symbiotic body, they may merge, or even completely assimilate.

Hunters were originally protectors and active maintainers of the symbiotic body. Their image is both frightening and respectable. However, if they are assimilated by farmers, they may lose their warrior traits, becoming hollow nobility, appearing redundant and detestable. This signifies the degeneration of the urban community and is also the reason why traditional urban communities lose stability and move towards destruction. This process of martial virtue degeneration is particularly fast on the North China Plain, from Dorgon to Qianlong, it only takes about 100 years, three to four generations. To reach exhaustion and extinction, it can hold out for another hundred years. It is also extremely rapid in the fertile plains of Mesopotamia and the Nile. From the time Cyrus II occupied Babylon to the cultural prosperity of the Artaxerxes era, it is 100 years. Then to the extinction of Darius III, it is another 100 years.

In the hilly areas, where farming and herding are mixed, and the elements of commerce and the sea are richer, it seems to be slower. For instance, the case of Rome, from its founding in the 8th century BC, to the Roman Empire period, when fighting was mainly dependent on barbarian generals, it took seven to eight hundred years. Or in the Isle of France, from the time the Capetian knights took the throne, to the Louis XVI era, when the king and nobles were abandoned by the citizens, it was also about 800 years.

The order vacuum caused by the loss of warriors will be filled by others. One of the candidates is monks, or priests. In troubled times, monks often arm

themselves to maintain order, similar to the historical background of the Shaolin Temple on Mount Song.

If the monk group is especially successful, they may even seize its world.

That's the case with Egypt's 21st Dynasty, the cities they left behind are mostly huge temples, Luxor and Karnak;

Japan's so-called Sengoku daimyō, in essence, were armed landlords. In places closer to the capital, where the landlord's armed forces are relatively weak. The influence of temples has surpassed that of the landlord militias, and even that of the court. A large number of people depended on monasteries, even to the point of forming monastery cities. Japan's big city, Osaka, was originally built by the warrior monk group, Ishiyama Hongan-ji.

In Europe, we often see monasteries that are exactly like castles. They also count as traces of the survival of temple congregations in troubled times.

We know that Zhu Yuanzhang developed from the rebel army of the Ming Sect (Manichaeism). However, after Zhu Yuanzhang seized the world, he actually suppressed the Ming Sect. If he hadn't done this, today there might still be many land temples worshipping Maitreya Buddha, Mazda altars look like the Temple of Heaven, or Confucius or Zhang Tianshi statues being called the Left Envoy of Light. (*joke from the novel The Heaven Sword and Dragon Saber by Jin Yong)

In addition to this, the underworld and grassroots police officers may also fill the vacuum and become rulers. Heroes like Liu Bang, Li Zicheng, and Cheng Yaojin emerged.

More directly, it is the armed colonists from outside. You can call them conquerors, or barbarian immigrants. Whether called Libyans, Nubians, Hyksoss, Dorians, Aryans, Huns, Goths, Franks, Lombards, Normans, Russ, Xianbeis, Magyars Humans, Ottomans, Mughals, Jurchens, or something like that could be hundreds of, recurring patterns.

Once the new hunters become the rulers, the next cycle of assimilation with the peasants begins.

The above are some supplements to the symbiotic interaction between hunters and farmers.

06 A Game of Casting Risks, the Calculation on Castle Building

Now, I will delve into the discourse of castles.

While palpable remnants of fortresses like Qianmen Gate Tower in Beijing, the city walls and gates of Xi'an and Nanjing are prominent, a significant portion of the Chinese populace may not view the castle as a recurrent urban landscape (in contrast to Europe or Japan).

Indeed, within the borders of China, a multitude of castles have been built historically. We know that many noble families of the Han dynasty had fortresses, and numerous clay fortress models have been found in Han tombs; many local magnates in later dynasties also constructed fortresses, some of their designs bear a resemblance to those of Norman castles. Even today place names designated as a certain fortress or stockade are still common.

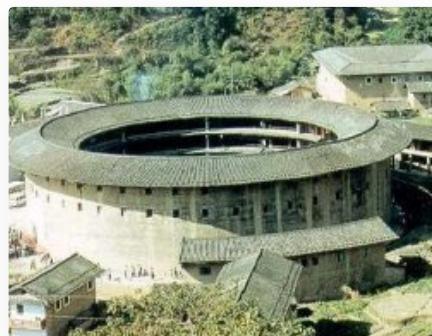
Of course, the majority of these ancient fortresses have unfortunately succumbed to the passage of time. Nonetheless, even today, castles can still be glimpsed in China:

For instance, the weisuos(guard camps) of the Ming dynasty, characterized by its rather simplistic block design, traces of which can still be witnessed in places like Yantai and Xiamen(Amoi). The renowned Kowloon Walled City of Hongkong, which has since been dismantled, was one such fortress. These weisuo fortresses are relatively low in military engineering sophistication, with designs that are monotonous and elementary.



(Figure: the Ming Dynasty garrison in Yantai)

Another type comprises various local fortresses constructed by local chieftains, landlords, and village collectives. They typically utilize the natural terrain, and their designs are richer and more complex. The most well-known among these are probably the earthen buildings (tulou) of Zhangzhou in Fujian, and the diaolou clusters in Kaiping, Canton. This category of local fortresses, albeit numerous, tend to be smaller in scale and are often situated in regions where the imperial order could not reach, hence exhibiting a pronounced need for organized-self-defense among the locals.



(Figure: tulou or earthen buildings in Fujian)



(Figure: defensive mansions in Kaiping, Cantone. by Kevin Poh)

Such places are generally remote from large cities, hence the presence of these fortresses may not be particularly conspicuous.

The existence of castles, however, is far more overt in Europe. Countless cities, such as Edinburgh, Budapest, and Lisbon, are dominated by their imposing castle skylines. In England, Wales, along the Rhine or in the Apennine Mountains, the remnants of various fortresses from successive dynasties are so numerous and densely scattered that they are within mutual sight. While there are many ancient castles among those currently standing in Europe, most were constructed after the 11th century.

In cities across Japan, irrespective of their size, it is typical to find one or several remnants of castles. According to a statistic I came across, there exist over 100 various castles in contemporary Japan, while historically, the number surpasses 5000. Japanese castles primarily emerged within a relatively concentrated time frame that was later than their European counterparts, with the majority erected during the 16th century. This was a period subsequent to the import of European technology during the Age of Exploration, and before the Tokugawa shogunate's policy of self isolation.

The best-preserved castles in Japan today, such as Kumamoto Castle and Himeji Castle, which I have had the opportunity to visit, are renowned for their massive

earthworks and architectural scale, as well as the intricacy of their military technological details. They suggest a serious preparation for extensive warfare. The original owners of these two fortresses were not Japan's most powerful lords; for a feudal city-state with a population merely ranging from tens of thousands to a few hundred thousand, the commitment and expenditure involved in such construction projects is truly astounding.

One may glean an impression that, barring new world countries like the United States, the Old World's developed countries seem to abound in castles. **The more developed is the country, the more abundant are its castles.**

From an empirical perspective, one could even propose a hypothesis: Could the construction of castles in every village have stimulated development?

How should we interpret this phenomenon?

Aren't castles symbols of warfare and militarism?

Feudal lords in Europe and Japan were considerably impoverished compared to the great monarchs and emperors of China and India. Yet, even without the pressing threat of imminent warfare, they were willing to refrain themselves on other expenses, accumulate massive debt, all to build their formidable fortresses.

Certainly, these efforts were not in vain.

Let us examine how castles altered the political climate of city-states:

For any monarch aiming to seize another's castle, the calculation required is analogous to that of a modern company undertaking a merger or acquisition.

He would have to evaluate the costs and benefits. Seizing a castle would yield an additional source of income. However, the process of seizing also entails costs. Having acquired another's company, if you wish to gain genuine control, it necessitates the restructuring of its management, an action which incurs substantial costs.

To forcibly capture a city-state generally requires having military forces several times larger than the opponent's, as the radius of your siege circle is significantly larger than the opponent's defense circle. This vast width necessitates a much larger number of soldiers. Furthermore, while besieging the opponent's city, you also need to construct earthworks around the city to prevent surprise attacks,

typically beyond the range of the city's defenses projectiles. This enlarges the radius of the siege works. Although possibly far more rudimentary than a permanent castle, features like ditches, walls, and watchtowers are generally indispensable. All of this roughly amounts to the cost of constructing half a castle.

You must also be prepared to counter potential reinforcements attacking from behind. Sometimes, behind the besieging troops, another line of defensive works is constructed, akin to building a larger ring fortress outside the opponent's city.

This forms the standard configuration for a siege.

In 52 BC, Caesar commanded the Roman legions to besiege the Gauls in Alesia. The perimeter of the Gauls' fortress was approximately two to three kilometers; Caesar surrounded it and built the first ring of siege works, termed 'circumvallation', spanning 16 kilometers, composed of trenches, walls, and watchtowers, to prevent enemy breakouts from the city. Then, to block the Gauls' reinforcements from outside, the Roman legions constructed another 21-kilometer long defensive work called 'contravallation'. This secured Caesar's 70,000 besieging troops between the two walls and put the Gauls of Alesia under a long-term siege.

Caesar's case was successful. He first defeated the Gauls' reinforcements relying on the fortress and then, as the Gauls inside Alesia were numerous but their food supplies limited and breakout attempts hopeless, they could not outlast Caesar and eventually surrendered.

However, in most cases, a castle would not house too many people. It would have a well for secured drinking water supply and food storage to last for years. If you use tens of thousands of people to besiege a few thousand inside the castle for months, with the cost being ten times that of the enemy, it would not be economically beneficial even if you take the stronghold eventually.

In 1565, the Ottoman Empire's navy carried 40,000 soldiers to land on the island of Malta. The defenders were the 600 Knights Hospitaller from Malta and over 2,000 soldiers from various Christian countries in Europe, along with 3,000 armed islanders, totaling six to seven thousand. After four months of siege, although the defenders were exhausted and reduced in number, the Ottoman army had also suffered over half casualties, and infectious diseases were rampant. When the European reinforcements landed on Malta, the Ottoman Empire had to retreat.

To take a castle, you need a significant political advantage, material reserves, and be prepared to pay a high cost. Failure means mutual loss, with the besieging party's cost being many times that of the defenders.

For any monarch of any major country, mobilizing 40,000 fully-armed soldiers to besiege a city-state for a year and a half is a major undertaking that could easily cause political fluctuations and unforeseeable risks. Such actions cannot be frequently undertaken. Generally, forcibly occupying a city will be economically disadvantageous unless there is a particularly strong political significance.

Attacks on castles are rarely forced; in the English Wars of the Roses, the red and white armies often bypassed enemy castles and rarely dared to storm them.

The essence of a castle, obviously, is not for someone to attack; on the contrary, its existence is to prevent attacks, so it must be intimidating and appear strong.

Today, in architecture, a coating that looks like stone is often used to paint the exterior walls, making it look more expensive. This technique can be said to be a completely traditional craft, because a thousand years ago, knights in England were painting coatings on wooden castles to disguise them as stone castles.

If you are a lord, what you have to do is to let everyone know that it's a losing deal to forcefully take your castle. If your territory generates a profit of \$1,000,000 a year, then, according to the investment market valuation, your valuation might be \$15,000,000. What you need to ensure is that the cost for your opponent to take your castle exceeds \$15,000,000.

For example, you could say to your adversaries: "Let me tell you, this piece of land of mine garners at most £1,000,000 in tax revenue per year. I have spent £5,000,000 over five years, living frugally, to build this castle. If you want to conquer me, you must spend at least £50,000,000. Certainly, you don't have £50,000,000. If you borrow it from the Bank of England, they would charge you £5,000,000 in interest per year, making your venture a guaranteed loss."

However, if you decide to make peace with me, I can provide you with 50 smoked swans each year as a tribute. So, I suggest you consider my proposition."

Thus, a castle may appear to be a military hardware at first glance, but in fact, it is a peacekeeping and order-maintaining instrument. In reality, most castles in Europe have never been assaulted. In countries densely dotted with castles, like France during the Middle Ages, the nation was fundamentally structured from the ground up, as described by Machiavelli, such a country is hard to destroy. Even if the royal family perishes, the essence of the country still exists in its

thousands of rural castles, and national order can be easily restored from them. On the contrary, like Darius of Persia, in a country lacking militarily independent city-states, once the emperor falls, the imperial structure crumbles, quickly falling into Alexander's hands.

Constructing a castle does carry significant costs, but it serves as a resource for stability. It's much more economically feasible than enduring catastrophic warfare and totalitarian oppression.

How to design a castle using the least amount of money, yet imposing a significant cost on the opponent, that is the art of castle building.

In this episode, I introduce the basic form of castles, which encapsulates the fundamental principles of castle construction.

This is the straightforward design known as the "Motte and Bailey," constructed by the Normans in the 10th and 11th centuries across France and the Great Britain.

These are two peculiar French-like terms that lack corresponding words in Chinese. You could refer to them as "high fortress and ground fortress." However, using the familiar Japanese terminology may be more explanatory - they're equivalent to Honmaru and Ninomaru.

Assume you're a baron or a similarly ranked landlord, you could find a steep little hill within your territory; if you can't find one, you could pile up soil yourself, the higher the better. This is your Motte, the high fortress or Honmaru. You could dig soil around the hill in a circle and pile it up in the middle, hence while piling up the soil, you're also digging a trench. The edge of the slope should be vertical to prevent anyone from climbing it with bare hands. A wall is then built on top of the earthen slope. Inside the wall is a tall tower, called a "Keep" in English, or a "Tenshukaku" (Castle Tower) following Japanese terminology. From the Tenshukaku, you can overlook several to tens of kilometers, ideally marking your territory visible at your land's border.

The ground floor of the Tenshukaku is typically a warehouse, kitchen, and granary. It also stores wine, which could serve as a long-term consumable if there's no fresh water source - water stored long-term was hazardous.

As an aside, the word "chateau" used for wineries comes from French, equivalent to the English "castle," hence winemaking and wine storage were common functions of a castle.

Back to the Tenshukaku, the middle floor is where the master and his family reside. In any ancient European castle you visit, the master resides on the second floor(or first floor per British english).

The attic or top floor houses the service staff and sentries.

Sometimes, there can be more than three floors, with four or five layers, including a basement, a treasury, and a prison for holding important prisoners. In the War of the Roses, for example, opposing kings like Henry VI were confined in the Tower of London. The highest part of the Tower of London is called the White Tower, which is a Keep or Tenshukaku.

The area of the Motte or Honmaru is often very small, only a few hundred to a few thousand square meters, unless for a Shogun or the Emperor of Ming with many wives, then he would need tens of thousands of square meters inside your Honmaru to accommodate his harem. However, for a small landlord, the Honmaru and the Tenshukaku are never large.

To accommodate other functions, a larger courtyard must be built in addition to the Motte or Honmaru. This courtyard, slightly higher than the ground level, has its own wall and trench, and its own arrow towers on the wall. This is referred to as the Bailey, the lower fortress, or Ninomaru.

Between the Ninomaru and the Honmaru, there is also a trench, and one must cross a bridge and climb steep steps to reach the Honmaru. This is normally the only route to the Honmaru.

Inside the Ninomaru, there's typically:

A well—this is crucial; every castle needs an independent water source, unaffected and unharmed by outside enemies. Even if a castle is located on a hill, it's usually a small hill, as very few are located on high mountains. This is mainly due to the limited access to fresh water.

A blacksmith for weaponry, and more often just for weapon repair.

A stable, as a small castle usually houses a few cavalrymen.

A hall: it serves as a court, a meeting room, and a banquet hall.

A chapel: for conducting ideological and political work. Several soldier dormitories.

A market sometimest.

The Layered Defense

The Bailey, ground castle or Ninomaru, is the same concept with three names. So is the motte, high castle or Honmaru.

The Ninomaru is larger in diameter and lower than the Honmaru, making it easier for enemies to breach. But even if enemies break through the Ninomaru, it's not yet the end. Those defending the castle can all retreat to the Honmaru. With the stored food and wine there, they can hold out for several months.

All that can be damaged in the Ninomaru are most building assets. There are no treasures, important figures, or prisoners.

Also, the entire interior of Ninomaru is exposed to the range of the Honmaru. Those in the Honmaru have the advantage of height, making it significantly advantageous to hit those below. Therefore, even if the attackers invade the Ninomaru, they can't hold it. They are very likely to be repelled by the defending army from above.

If you want to end the battle, you still need to have the ability to breach the Honmaru and storm the Tenshukaku.

The Motte, Tenshukaku, and Honmaru - only occupy 20% of the total castle area, requiring only a few people for defense, but the shooting range is 100%. Its defense is 100%, range 100%, requiring over half of the total cost of the castle. It can be defended by a small but loyal troop.

The Bailey, or Ninomaru - occupies 80% of the castle area and extensive functionality, but only costs the rest half of the total. Its defense is weaker, but it's sufficient to ward off 90% of the most common mobs and bandits. When the enemy is particularly strong, the Ninomaru can be abandoned without leading to a total defeat.

The Motte and Bailey model has various modifications.

This structure can be expanded and upgraded. If the Ninomaru is not enough, it can be expanded layer after layer, with outer layers like the Sannomaru, Nishinomaru, Kitanomaru..(third, west, and north enclosures...), setting up multiple barriers for the enemy, forming a snail-like structure. The moat can change from one ring to two. The wall can change from one layer to two, and

two to three. However, the outer wall must be shorter than the inner one. The deeper the defense, the more solid and expensive it is. 80% of the cost is used to deal with 20% of the most vicious enemies, while 20% of the cost covers 80% of the functions.

To protect the merchants and industrialists affiliated with the nobility, the outermost wall encompasses the civilian blocks. Because this is the lowest part within the city, it's referred to as the down town.

1) Cost Logic:

If you spend one unit of currency, you can get a checkpoint with a 50% probability of successful defense; however, if you spend another unit of currency, you won't get a 100% success rate, maybe just 70%. When you spend three units of currency, you get an 80% successful defense rate checkpoint. The marginal benefit is diminishing.

Thus, it's better to spend the same three units of currency on creating three checkpoints, each with a 50% successful defense rate. In this case, the enemy's success rate of breaking through all checkpoints is the cube of 50%, i.e., 12.5%. This means that the overall success rate of your defense is 87.5%.

This is why advanced castles are layered with checkpoints and traps.

The simple city walls like those in Ming Dynasty county cities, which are just a single layer, are mainly for dealing with bandits and civilians.

In theory, you could make the entire city as grand and sturdy as the Tenshukaku, but that would be too expensive. Besides, your resources are finite. With the same expenditure, this would inevitably not be the plan covering the maximum defensive area. If you only adhere to the standards of the Ninomaru, the defense ability is too lax. The safety threshold your total investment achieves is too low. Therefore, you must strategically invest your funds. The same goes for real estate; the interior and exterior of a residential complex's gate, areas frequently passed by people, can be decorated with expensive and exquisite landscaping. However, other parts of the complex can use modest lawns and plants. The first and second layers of a building's exterior walls, parts that people can view up close, should use the most expensive materials; but the higher parts can use cost-saving materials, as long as they look good from a distance. This is a general principle of cost allocation.

2) Customer Perspective: The customers of the castle are the invaders. Among them, small thieves are very common, and the castle as a whole needs to be unshakeable in the face of such petty rebellions; powerful enemies that could annihilate a country are rare. When facing such formidable enemies, it's inevitable to suffer minor losses, but you should be able to maintain your core territory. If you aim not to suffer any loss in the face of a powerful enemy, the cost would be unbearable.

3) Loyalty Structure: The same applies to your team. Those most loyal to you, ready to die for your country, are few, so don't expect many people to hold your final position for you. You need a small, loyal, and efficient team to defend a small but formidable stronghold. The majority of the less important facilities can only be guarded by peripheral followers.

4) Irreversible Structure: All cities with three layers of city walls have the inner wall taller than the outer one. The outer face of the city wall has extensive protections, while the inward direction is mostly exposed. Enemies may occupy the outer wall, but before they can enter the inner wall, they must cross a deadly trap.

Castles come in various sizes, but this layered structure is the most mature pattern in history.

I often talk about Rome's Palatine Hill and Capitoline Hill. The Capitoline Hill is small but high; the Palatine Hill is large but low. The two are adjacent, separated by a moat.

Isn't this the Motte and Bailey structure? Capitoline Hill is clearly Rome's high castle. In reality, Rome was rarely attacked. The only time it fell was in 390 BC when the Gallic army occupied most of the city. At that time, Rome's young soldiers retreated to the narrow top of Capitoline Hill, where they held out for seven months. The Gauls eventually withdrew without capturing this high fort.

07 City as the Hardware of Organization - a summary of previous chapters

Summarize the previous chapters.

- 1) The natural unit for people to participate in the struggle for survival is not the individual, but their **band** of kinship. It can be extended to all identifiable relatives by blood. Its typical size is thirty to fifty people.
- 2) These families have their ups and downs, and one of the elements is the ancestral grave. bands with a common ancestral graves are easier to form identification with each other. A union of multiple bands is formed through the institution of shrine dedicated to common ancestry, that is, a **tribe**.
- 3) In addition to common shrine, other religious beliefs can also form a larger community of people. These larger communities, alliances of tribes, or **city states**, gradually became the main entities of the competition in human society. Therefore, places of worship are the initial hardware for the formation of cities. Cities are formed to organize people.
- 4) **A sanctuary's function** is more than religion itself. Generally, a temple often serves the functions of,
 - 1 can easily be used as a warehouse and a treasury;
 - 2 As a bank, grant relief or profit-making loans;
 - 3 The crowds gathered in the temple make the front of the temple the best location for a marketplace. Since ancient times, the temple and the market have been linked together—the so-called temple fair;
 - 4 A temple, because it contains important property and holy relics, is also often a fortified stronghold, and it is a refuge for the followers in times of war;
 - 5 The priests of the temple are also the earliest writers, astronomers and mathematicians, so the temple is often a research and educational institution for writing, astronomy and mathematics;
 - 6 The knowledge of astronomy and mathematics of the priestly class made them the earliest experts in irrigation and experts in dividing and measuring farmland.
 - 7 Priests can conduct judicial decisions through fortune-telling or theological interpretation. So the temple is often a kind of court.

- 8 A decision-making body for war and policy.

In short, sanctuary has great significance for the development of society. Having mature and multifunctional religious sites is an important symbol that distinguishes cities from villages. Religious places, in order to strengthen their authority, erect monumental buildings and objects.

5) The development of religious holy places is one aspect, and the other aspect, **the agricultural revolution**, is also very important, which is the invention of agriculture and animal husbandry. Among them, the agricultural way of life can support a particularly large population density, a part of which can be separated from food production, specialize themselves in religious activities or the construction of monuments. The construction of monuments was a major mode of competition among the different tribes and city-states. Therefore, the agricultural revolution and the vast farmland are also the basis for the rise of urban civilization.

6) Farmers who enter the agricultural lifestyle often produce sizable production surplus. Their way of survival is relatively stable and does not participate in fierce competition. In a world of Bronze Age or Iron Age, with escalating violence in wars, the political power of most of the farmers was left behind. Farmers turned into peasants in the society was equivalent to the most downstream producer in the food chain, falling into the role of pure resource contributor. As a result, warriors, often hunters and herdsmen, appeared, forming a division of labor with the agricultural population and becoming the protectors of the peasants. The warriors and heros, are the origin of the king. They are both protectors and oppressors of the peasants. However, this symbiotic relationship between the two forms a **symbiont** that constitutes a complete biome at the dawn of the city.

Evolution is done under the pressure of competition. Under such pressure, one loses his/her "natural status", is forced to be integrated into a more complex organization and order, into the operation of the community machine, heavy agricultural labor and organized violence against one's own kind, to oppress and be oppressed. These actions made the city what it is, a **new species of multicellular organism**, or one may say, a physical container of complex orders.

Analog can be made that the ruler is like the nervous system of the human body. The brain lives in the meninges and is isolated from the blood to prevent the invasion of daily bacteria and viruses. In this way, brain cells can live a long life,

which is equal to the human life span. Similarly, the rulers live in the Citadel, the central castle of a city, separated from the common people by tall walls. The fall of the Citadel of the city means the brain death of a city state, loss of functionality, and the demise of the city-state.

Therefore, the defense of a city is usually a Russian nesting doll-like structure, layer after layers. The more in the middle, the higher it is, the more difficult it is to conquer. Fighting from the outside, the invaders have to jump over layers of death traps. But hitting from the inside out is straight forward. Therefore, the outermost circle of the city wall, normally of the downtown, is not only a city to protect the commoners, but also a concentration camp for the commoners, a security util.

7) In some cases, the roles of **king** and **priest** were intertwined, particularly when religious practices were relatively simple and did not require high levels of professional expertise. However, in more complex religious systems, the roles of kings and priests, those who maintained both political and religious order, often became distinct professions. It was common for kings and priests to depend on each other while also engaging in power struggles. In reality, they needed to take turns playing leading roles in different situations, forming a collaborative relationship. City-states with better coordination exhibited richer organizational patterns, while those that achieved lower-cost or more effective ways to maintain order had a greater chance of survival.

8) Whether theocracy or kingship held dominant positions were **manifested in the city** as the inner city, the acropolis, or the citadel. What are in the citadel? Typically, it housed the royal palace, temple, and granary simultaneously. In some cases, the high priest also assumed responsibilities in warfare and jurisdiction. Occasionally, the king also served as a priest. In republics, there were only priests without kings, the temple often occupies the primary location in the citadel. Whereas for some European princes, who served the distant Catholic Church in Rome, often had castle that primarily taken by the royal palace, with the chapel in a secondary position.

In this series so far, still many important patterns have not appeared. In my next chapters, I will talk about the role of trade and natural resources in urban evolution. Of course, their importance in the formation of order is not less than that of religions and forces.

08 Over the Plain and Streams

(Edited on July 4, 2023 by the author)

As mentioned in Chapter 2:

A long-standing holy place needs to meet the following conditions: first, there should be no mudslides or landslides, which will make the tombstones disappear; second, there should be no floods accumulating silt or covering the original marks. Not to say that all ancient people knew how to choose such a location, I just visited the burial sites of the Hallstatt culture in Austria, which was covered by landslides for a few millennia before its recent rediscovery, signifying a quite common result.

But, if one has the luck or knowledge to choose the right place, his tool of a united front will be there, his band may become a nation, otherwise the tool will be lost. This is a screening process in evolution.

Sanctuary Became Settlement

You can find that sites with good sanctuary conditions may also be suitable for settlements if they have a steady supply of water and food.

Every locational choice of city has advantages and disadvantages.

(Nile Delta,) (Ramses II's capital)

You may treat the city as an evolving subject. Competition and cooperation between cities carry on in many ways. One of the fundamentals is that city always needs **grain and fresh water**.

The distribution of cities, in most cases (we exclude a few cases, which of course have very strong observational value), in most cases, **the distribution of cities and the distribution of cultivated land** are roughly the same. Moreover, it is consistent with the distribution of irrigated land. There needs to be a large surplus of food in order for the population to gather in the cities.

The formation of irrigated land requires technology, such as drainage, the technology of draining the water from swamps to form cultivated land, and water diversion irrigation technology. Irrigation requires the ability to divert water firstly, and secondly, to distribute water fairly. All the people participating in the project should get water as equally as possible, so as not to cause conflicts.

Another example is that after the regular flood in the Nile Valley, the marks on the land were washed away, requiring a new organizational technique for cutting and allocating the land. These knowledges were often developed and kept by the priesthood.

The development process of plains is characterized by gradual change, and it is worth noting that some areas that appear as plains today were once predominantly swamps or wetlands in ancient times. A striking example of this transformation can be observed in the lower reaches of the Yellow River, spanning from Jinan to the north, extending southward to the region below Tianjin, including the Xiongan New District. This vast expanse of land was previously a sprawling wetland prior to the Warring States Period, with no recorded cities or notable settlements. As the water level gradually receded from the late Warring States period to the Han Dynasty, the area underwent development, the recession of the wetland eventually giving rise to the establishment of Bohai County and Pingyuan County (渤海郡和平原郡). Consequently, the population density in this region began to increase.

The emergence of prominent cities such as Cangzhou, Dezhou, and Tianjin can be attributed to the flourishing Yuan and Ming canal shipping industry.

Among the most significant plains are the middle and lower reaches of the Yellow River Plain, the Mesopotamia Plain, the Nile Valley, and the Indus and Ganges River Plains. These expansive plains boast the longest history of agricultural development and encompass the largest areas. It is on such fertile irrigated lands and vast plains that the ancient world's four major agricultural civilizations and urban conglomerations thrived.

(figure above: use the Po Valley as an example, most of the larger cities avoid the bottom of the valley and lie near the mountain base, particularly where a branch stream enters the valley. Mantua lies on a small mount in the middle of the valley. Ferrara, Venice and Ravenna seem to be the exceptions, whose economy were more dependent on the waters of the Po Delta.)

Larger and Smaller Plains and Valleys

Naturally, beyond these prominent plains, there are numerous other vast and smaller-scale plains that have also facilitated the growth of notable cities. For instance, the Ganges River Delta, the Yangtze River and the Pearl River Delta, several plains in Java Island, the Po River Plain, and the plains in southern

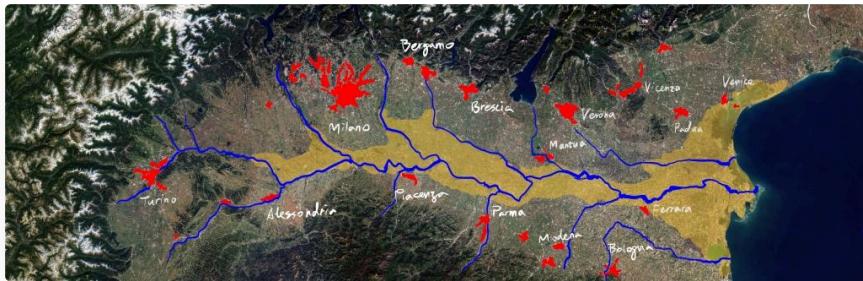
Russia and Ukraine, to name a few. While it is impractical to list them all, these regions have contributed to the establishment of significant urban centers.

Relatively large valleys are sufficient for the presence of a single or multiple cities. A notable example is Mexico City, situated in a fertile valley that benefited from abundant irrigation and ample sunlight due to its low latitude. Utilizing Stone Age technologies, the indigenous managed to form a large city of 200,000 to 300,000 people even before the colonial era/ without metal tools. Similar patterns can be observed in other regions, such as Taiyuan, the largest city in Shanxi, and various cities located in the vast Fen River valley, as well as Jincheng and Changzhi situated in the Shangdang Valley, and Datong positioned in the Sanggan River Valley. Smaller cities, too, can be found in smaller valleys.

Japan has three larger plains. The first and most notable is the Kanto Plain, which encompasses Tokyo, the bustling capital city. The second is the plain area that encompasses Kyoto, Osaka, and Kobe, which holds great historical and cultural significance. Lastly, we have the Nobi Plain, where Nagoya is located, serving as a vital economic hub. It is worth mentioning the potential fourth significant plain, the Ishikari Plain, where Sapporo, a major city, is situated.

Among the five Central Asian countries, Kazakhstan stands as the largest, covering a vast expanse of 2.7 million square kilometers with a population of 16.71 million. Uzbekistan, although smaller with an area of 450,000 square kilometers, which is about one-sixth the size of Kazakhstan, boasts a population of 19.9 million. This is primarily due to the presence of extensive plain agricultural areas in the Amu Darya and Syr Darya valleys, which have historically supported the dense concentration of ancient city-states like Samarkand, Bukhara, Tashkent, and Khwarazm.

In Yunnan, China, the Hengduan Mountains bear resemblance in size and elevation to the Valley of Mexico. However, due to the narrowness of the valley and limited arable land, it has not been able to develop a city of similarly large population.



(figure above: use the Po Valley as an example, most of the larger cities avoid the bottom of the valley and lie near the mountain base, particularly where a branch stream enters the valley. Mantua lies on a small mount in the middle of the valley. Ferrara, Venice and Ravenna seem to be the exceptions, whose economy were more dependent on the waters of the Po Delta.)

On the Edge

The size of city-states is closely linked to the amount of cultivated land they can control in their surroundings. Every plain with hundreds of square kilometers of arable land becomes a significant site for the establishment of an important city. However, it is NOT necessary for these cities to be located **in the middle of the plain**. Typically, they are situated near rivers traversing the plain, close to mountain base, and relatively upstream.

The availability of water is a crucial factor, and the **degradation** of water sources can lead to a decline in the quality of cultivated land. This phenomenon is particularly evident in certain valleys. A prime example is the ancient city of Angkor, where declining water levels and the subsequent loss of irrigation resulted in the decline of this once thriving civilization.

Grain Imports

There are, of course, exceptions to the rule. Some large cities have limited arable land in their immediate vicinity, yet their size surpasses that of the surrounding cultivated areas. Ancient metropolises like Syracuse, Athens, Rome, and Venice fall into this category. These cities heavily relied on sea-borne transportation for importing food from distant regions. Neither did the cities such as Kaifeng and Beijing in ancient times depend on local food production but rather relied on the canal transported food from the regions on the Yangtze River.

In the modern world, it has become a common phenomenon for large cities to detach themselves from dependence on surrounding areas for food production

and instead rely heavily on distant food imports. However, this trend is relatively recent and does not have a long history.

As an exception, we exclude the plains in the southern United States or the plains of the Congo River in Africa, which are larger but later developed.

Fresh Water

In addition to food, water is indispensable and needs to be solved nearby.

The foundation of Jerusalem's existence is its constant water supply, Gihon Spring, or Our Lady's Spring. Since the Stone Age, it has been the place where shepherds and merchants obtain water. In arid regions, water is the greatest strategic resource. It almost guarantees the development of a location.

The Connection between Water and Market

Judging from the current archaeological excavations, as early as the Bronze Age, there was a fortress guarding the spring. Those who guard this spring can charge a fee. It may not be in the form of collecting water fees, but by operating the market and collecting market fees. This spring is still there today, under the ancient city, the so-called City of David. Around this spring, there are very complex reservoirs and waterway works. This spring water system is famous because it is mentioned several times in the Bible. The stories are very rich.

Legend has it that David conquered Jerusalem by adopting Shawshank's way of redemption.

Moreover, slipped in from a waterway mouth, and suddenly attacked from the inside. The captured Jerusalem.

The water resource of a city is, of course, a matter of life and death. Here are some **common solutions**.

1) Venice collects rainwater and stores it in **water cellars**. Everyone went to the mouth of the water cellar to get water. However, the water collected in this way is relatively small and needs to be used sparingly.

Upstream Privilege

2) There is a river, and it is possible to draw water from the river. However, for relatively large cities, it is inevitable that the sewage will also be discharged into the river. In this way, the river water may be polluted. Take London as an example, The water from the upper reaches of West London is relatively clean;

while the water flowing to East London is already very dirty, and people downstream drinking this water are at risk of intestinal diseases. And the water doesn't taste good either.

Of course, the improvement of sewer systems is crucial, preferably by bypassing the entire city and diverting them downstream. This technology has been well-established in ancient civilizations such as Mesopotamia, the Indus Valley, and the Roman era. However, urban technological advancements deteriorated on a large scale after the classical age, leading to the absence of sewer systems in many areas and times.

Consequently, a situation arises where wealthy individuals or nobles can afford to live upstream near clean water sources, while those who work in the city have to make do with ordinary water.

For instance, in Beijing, we observe that the Emperor's Palace, the Old Summer Palace, and other noble residences are located in the Xiangshan to Haidian area, benefiting from first-hand mountain spring water.

Similarly, in London, Buckingham Palace and Kensington Palace are situated upstream along the Thames River.

Vienna's imperial palace, Schönbrunn Palace, is also strategically located on the outskirts, where the mountain springs are transformed into picturesque waterfalls cascading down the hillsides.

Hence, some of the water features we see serve not only as decorative showcases but also as drinking water projects. In other words, drinking water projects are transformed into decorative and prestigious displays.

Massive Public Works for Water Supply

In terms of drinking water engineering, the ancient Roman era demonstrated far greater maturity than the situations described above. They constructed water delivery channels, called aqueducts, spanning several kilometers or even dozens of kilometers from the surrounding mountains to directly supply mountain spring water to the city. These aqueducts typically took the form of viaducts, often consisting of multiple lines complementing each other to ensure a stable supply of drinking water. Remarkably, some of the ancient aqueducts in Rome remained functional until modern times.

Initially, witnessing these waterways was astonishing for me. However, it soon became apparent that such infrastructure was unearthed in numerous cities across Europe, and it was considered standard equipment of that era. Large and small cities, as well as military camps, were all equipped with these systems. Even a Roman military camp with fewer than 10,000 people, including the garrison and their families, had well-designed waterworks. This reflects the significant efforts the Romans invested in municipal engineering. Ordinary people would access water from public outlets, while the wealthy and public buildings, such as bathhouses, would receive direct water supply.

The ancient fountains in Italian cities, hundreds of thousands of years old, relied on natural gravity as they received water from the end of the waterways.

Notably, these fountains were not powered by electricity (in contrast to almost all modern Chinese fountains).

Modern urban water supply schemes closely resemble those of ancient Rome, drawing clean mountain spring water from upstream sources. In fact, the area of the upstream water intake in a modern city is often several times larger than the city itself. This holds true for cities like Beijing and New York. Due to relatively low natural precipitation in temperate monsoon areas, a larger collection area is required.

Singapore, being a small city-state with a large population, experiences higher rainfall due to its equatorial location. Hence, its drinking water collection area can be smaller. Singapore has implemented specific engineering measures to protect these watersheds and prevent drinking water pollution. The city-state has created reservoirs by separating bays from the sea, bringing in fresh water and conducting environmental treatments in the surrounding areas to divert pollution sources and sewage systems. This constitutes a massive engineering feat.

Water Failures

In the absence of aqueducts and with serious surface water pollution, reliance on groundwater through wells becomes necessary. Wells are a viable solution for small villages, but when it comes to large cities, challenges arise.

If various forms of waste and wastewater produced by ancient cities cannot be effectively discharged downstream, the polluted surface waters gradually contaminate the groundwater. Over time, the groundwater becomes unfit for drinking.

This is why the Sui Dynasty did not continue using the ancient city of Chang'an but opted to build a larger new city from scratch.

Beijing faced a similar situation, where most of the Yuan Dynasty did not continue using the old city from the Liao and Jin Dynasties. This was not due to a preference for the new over the old; rather, it was because the groundwater in these ancient cities was highly polluted.

Therefore, it is common to find ancient cities moving overtime.

During the Ming and Qing Dynasties, the courts did not rely on well water but transported clear water from the Western Mountains using water trucks. This type of water supply was expensive and exclusive.

Silting

Pi-Ramesses was a grand city constructed by Ramses II and was one of the largest and most opulent cities in ancient Egypt. It was originally thought the demise of Egyptian authority abroad during the Twentieth Dynasty of Egypt made the city less significant, leading to its abandonment as a royal residence. It is now known that the Pelusiac branch of the Nile began silting up c. 1060 BCE, leaving the city without water when the river eventually established a new course to the west now called the Tanitic branch, leading to the city's abandonment and subsequent deterioration.

The Well/Fountain, the Square and the Market Place

Wells and water outlets are essential public facilities and share similarities with temples. A small square is often found near the mouth of a well, serving as a natural gathering place for various communities in the city. In some cities, free markets even take place there. Sometimes, wells are located adjacent to or integrated with churches and temples. In Beijing, the small streets called Hutongs derive their name from the word "well." A street naturally forms a geographical community centered around the mouth of a well.

Monumental Fountains

Now and then decorations are incorporated into beautiful fountains to showcase the city's wealth and promote the prestige of the benefactors.

09 Flood Plains, Honey Traps

(Edited by the Author on July, 12, 2023)

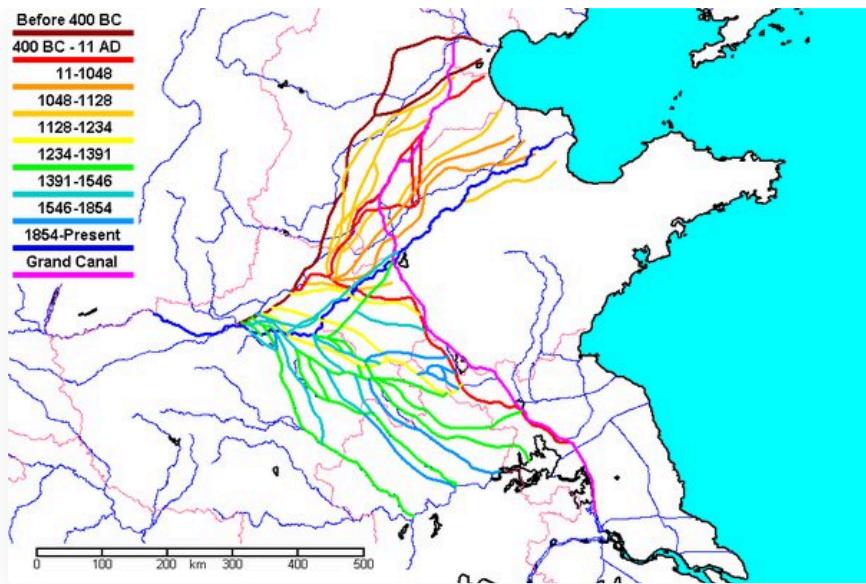
Mountains, Seas and Rivers, Olds and Youngs

We often perceive the mountains, rivers, and seas depicted on maps as ancient and unchanging, but this is hardly true.

Mountains are generally very old, with some dating back **millions of years**, most mountains have maintained a similar appearance over time, except for those with active volcanoes. When an active volcano erupts, it can deposit thousands of meters of volcanic material on flat ground, forming new mountainous structures. These eruptions can result in the creation of craters or bays with diameters of tens of kilometers. But volcanic eruptions are generally infrequent events, and their magnitude declines as the radioactive elements within the Earth become depleted over time. Landsliding takes place at only steep slopes and are normally limited in scale. In macro scope mountains can be almost seen as static for the span of human history.

The sea, influenced by ice ages, experiences fluctuations in sea levels over **tens of thousands of years**. As a result, coastlines undergo significant changes. For instance, the coast of the Bohai Sea was once located at the foot of the Taihang Mountains, submerging a large portion of the North China Plain. The Bohai Sea has even completely disappeared at certain points in history, leaving behind swamps. Over time, the coastline has receded to the periphery of the continental shelf, leading to the integration of the mainland and the Japanese archipelago. But it is not easily observed for the span of an individual life.

Rivers are far more dynamic and undergo rapid changes. For instance, the Han River, which was a major river in ancient times, experienced a diversion due to the 186 BC Wudu Earthquake. This diversion caused the upper reaches of the Han River to flow southward into the Jialing River. Consequently, today's Han River represents only the lower portion of the ancient Han River. Similarly, upper Rhine once drained into the Dnaub. The first capital for the State of Illinois, Kaskaskia, was on the eastern side of the Mississippi River, as Mississippi changed course following the flood in 1881, it is now on the western side. This happens in a person's life and creates many undesirable results.



(figure: Yellow River's courses in history)

Rivers in plain areas exhibit even faster transformations. I previously addressed this topic in my podcast. This chapter delves into the relationship between hydrology and cities, offering additional materials and perspectives, albeit with some repeated information. In summary, the primary types of aquatic landforms can be classified as follows:

1. Plateaus, such as Columbia Plateau and the Loess Plateau.
2. Small valleys within steep mountains, such as Yosemite and Zermatt Valleys.
3. Large river valleys, floodplains, deltas, and swamps. This category holds particular significance.
4. Lagoons formed by sand embankments resulting from seawater erosion, such as Venice Lagoon and Currituck Sound in Virginia.

These are expanded below:

The first type is the plateau. Often ancient plains, plateaus were raised by tectonic movements. The elevation is not uniform, and there is a large difference in height between the high and low places.

In areas with large elevation differences, where the ground water velocity is relatively fast, the cutting effect of river water is dominant. On the high terraces, the surface soil will be washed away by the flow of water, and the riverbed will be washed deeper and deeper, forming gullies as if cut by knives and axes. In the

deepest case, like the canyon of the Colorado River in the United States, it will be thousands of meters deep. In this process, the higher plateaus will be farther away from the river, and the water on the higher ground will become more and more scarce. Some originally fertile terraces lost irrigation after the river channel sank, and the soil became dry and barren.

On the Loess Plateau, the hydrological conditions for agriculture used to be better than they are now. It is also the birthplace of the great powers in the East Asian continent in the past dynasties, and it is also likely to be the earliest settlement of the Chinese civilization. It is believed that both Xia and Zhou originated from the Loess Plateau. It gave birth to the most powerful state of Jin among the states of the Eastern Zhou Dynasty. Liu Han during the Five Hu period. The predecessor of the Sui and Tang Empires, the Northern Wei Dynasty. The predecessor of the Song Dynasty, in the Five Dynasties, there were four except the Late Liang.

In Shanxi, there are surprisingly many places that can become ancient capitals, such as Anyi, Quwo, Jiangcheng, Pingyang, Jinyang, and Pingcheng. From these cities great nations arose.

I also mentioned before that the Angkor civilization is in the plateau area of Tonle Sap Lake. It is generally believed that the plateau area lost irrigation due to river erosion. Leading to the decline of Angkor.

Plateaus have acted as the cradle for numerous ancient civilizations. Presently, many fertile plateaus still exist, such as the Hetao area, the Fen River Valley, and the Mexico Basin.

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The second landscape emerges when water flows from the plateau into the plain with strong erosive force, creating **steep valleys**. Due to the narrowness of these river valleys, extensive arable land is scarce, limiting their capacity to support large populations and major cities. Nevertheless, these valleys often serve as vital commercial passages.

As the river rushes out of the mountains, it enters **the third landform - the flood plain**. Notable examples of flood plains include the North China Plain, Jianghan Plain, Songnen Plain, Liaohe Plain, and Pearl River Delta.

The flood plain can be divided into three sections. The first section just lies where the river exits the valley and enters the Great Plains. The terrain in this

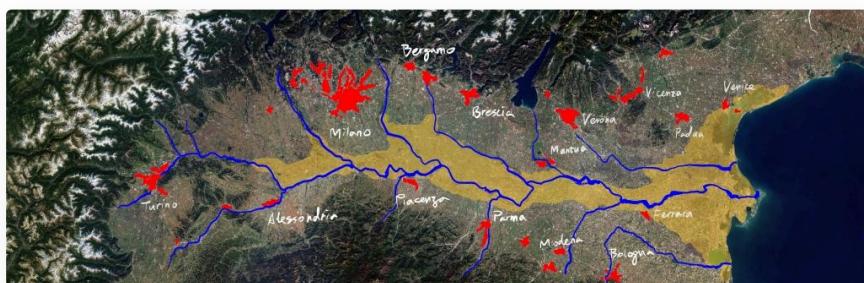
area is normally slightly sloped, making it an ideal location for major cities to develop.

In previous discussions, (My Podcast) episode 44 covered Beijing, and episode 3 mentioned Washington briefly. Episode 2 touched on London and Vienna as well. However, there are numerous other cities that fit this description. If you observe from north to south along the eastern foot of the Taihang Mountain, you will encounter a series of cities along the Beijing-Guangzhou Railway.

For instance, there's Yanjing, present-day Beijing, a historically strategic location. Shijiazhuang, once known as Zhending, was another strategic site contested during the Anshi Rebellion and many other wars. Handan served as the capital of the Zhao State, and Linzhang in Hebei was the largest town developed by the Wei State. Yecheng served as a capital, and Anyang in Henan was the capital of the Yin and Shang Dynasties.

Similarly, if you follow the northern or southern foot of the Alps, you will come across a series of important cities, such as Vienna, Munich, Zurich, Turin, Milan, and Verona. These locations were not chosen by accident.

The Po Valley has displayed a similar setting. Most of the large cities are located at the mountain foot. Turino has the highest location, which is in the smaller upstream basin. Others are aligned on the north and south edges of the flood plain, with a few exceptions: Mantua, on a small mountain in the middle of the plain; Ferrar, Venice and Ravenna, which are more related to the lagoon economy. Ferrara's lagoon feature has disappeared for the modern landfills.



The common features among these places are as follows: 1) Proximity to rivers with access to water sources and transportation. 2) Positioned away from flood-prone areas downstream. 3) Presence of vast irrigated land, conducive to grain production. 4) Strategic locations at the intersection of valley commercial routes

and foothill avenues, which was discussed in Podcast Episode #44. 5) Often featuring hills suitable for castle fortifications and leisure activities.

Upper Sites

The large cities at the foot of the mountain can also be divided into two categories: **the upper section and the lower section of the foothill**. Modern large cities at the foot of the mountain are generally in the lower section. And older settlements will appear in a higher position upstream of today's big cities. You can find city sites from the Warring States Period at the Yamen Gate (衙门口) of Shijingshan in the upper reaches of Beijing. Mancheng (满城) in the upper reaches of Baoding (保定) is the site of an older city in Baoding. The ancient city of Zhongshan is in Pingshan County (平山县) upstream of Shijiazhuang. These ancient cities in the upper part of the foothills are characterized by more steep terrain, defensive location, and rivers flowing by. The valley flats will be relatively small, with arable land but not too much. This kind of terrain falls into the criteria of the terrain features required to build small reservoirs during the 1959 Great Leap Forward Movement in Communist China. By damming the mouths of the valleys, the rivers would flood these small high plains. Therefore, where there is a small reservoir today in China, the underwater area is likely to be a site of archaeological value.

Down into the Marshes

From the foothills road, into the center of the flatter and wider plain, whatever the terrain is today, in ancient times it was often represented by lakes, swamps or wetlands. Swamps and wetlands are areas of expansion of cultivated land. To develop these areas, it is necessary to master the techniques of drainage and irrigation.

Started from the mountainous plateau and the heights of the foothills, and then began to gradually develop the wetlands on the plains into farmland. is a common developmental trajectory.

Islands in the Wetlands

Above the swamp, there are some higher hills or some small mounds exposed, like small islands in the sea. There are many such hills in the Yangtze River Basin, such as Guishan and Snake Mountain in Wuhan, Huqiu in Suzhou, and Jinshan in Zhenjiang.

In the Yellow River Basin, on the flood plain from Taihang Mountain to Mount Tai, the place name in ancient times was often called some hill (丘). For example, Chuqiu (楚丘), Diqu (帝丘), Fengqiu (封丘), Shangqiu (商丘), Taoqiu (陶丘), and Kuiqiu (葵丘). According to previous statistics, there were 53 place names with 丘 hill in the books, Chunqiu and Zuozhuan. Moreover, many of these hills are very important cities in history, including:

- Chuqiu, which is recognized as the hill of ancestral temples by Chu people in Puyang, Henan today. It is also the cemetery of the ancient ancestors of this tribe.
- Diqu is the capital of the legendary Gaoyang Emperor Zhuanxu. In Qu Yuan's Lisao, he said that he was a descendant of Emperor Gaoyang. So Chuqiu and Diqu seem to be talking about the same place, or different places that are very close to each other. Diqu is a very important place in ancient mythology. But now it is a small village.
- Taoqiu was the capital of Cao State in Spring and Autumn Period. It is also the place where Fan Li, as mentioned in the historical records, made his fortune in business under the pseudonym Tao Zhugong after he retired. It has been described as a major trade post. Obviously, in the Eastern Zhou Dynasty, there was a huge population and well-developed transportation around here. The surrounding river and lake network will be much more navigable than today, and water transportation was much more important than land transportation.

Early Population Explosion

Primitive agriculture, when combined with new irrigated land development, seemed to provide an endless supply of food. This abundance reflects the legendary "Garden of Eden" state, which mirrors the earliest human civilization's transition from the hills and smaller plains on the Euphrates River's right bank into the heartland of Mesopotamia. This represented a period of exponential growth, with resources expanding and population sharply increasing.

In archaeology, this stage is referred to as the Obeid period, which likely spans from 8,000 to 5,800 years ago. Villages of the Obeid period often lacked walls, indicative of a society where food was plentiful, and there seemed to be little reason for conflict.

Despite the richness of this period, only a few tales remain, among them the myth of a great flood, and the archaeological remains from the Obeid period

buried under layers of sediment.

The flood plains of ancient times were both bountiful farmlands and death traps, traps that were both hydrological and social. Successive waves of civilizations, originating from the highlands, fell into these traps. The history of East Asia is a collection of stories where various forces attempted to develop agriculture on the plains, only to be eventually defeated.

The Trap

The mounds, often cited in the Zuo Zhuan of the Spring and Autumn Period, are difficult to locate today. These formations arose in a way similar to sand dunes in the desert. Sediment accumulated during floods, resulting in the mound protruding above the surrounding swamp, making it suitable for human settlement. However, after a few more cycles of flooding, it could be covered or flattened.

These mounds in the alluvial plain's core area are transiently beautiful and might not feel risky at all within a few generations. They may become popular dwelling sites for a time, but in the long run, they are unstable and do not develop into lasting large cities.

What if an ancient nation chose to enter the heart of the flood plain?

The Migration/Colonization Pattern

The Warring States period of ancient China provides an apt historical context for the discussion. During this time, the State of Wei migrated from the rugged terrains of present-day Anyi in Shanxi Province to the Liang region around Kaifeng. "King Hui of Liang", one of the main characters in Mencius, refers to the title adopted by the king of Wei post-relocation.

Originating as a feudal duchy, Wei bore resemblance to the European feudal states where ordinary citizens were under the stewardship of nobles and dignitaries rather than being direct subjects of the Holy Roman Emperor. Traditionally, the citizens of Wei were under the command of the nobles and not directly under the king of Wei. However, upon relocating to the grand city of Daliang, the vast land surrounding it came under the direct jurisdiction of the king of Wei.

Another tale involves Ximen Bao's governance of Yecheng. Usually, the lands of Wei were managed by the nobles. However, Ximen Bao was not a noble of Wei,

and Yecheng was not his fiefdom. He was a hydrology expert and a bureaucrat, personally appointed by the king of Wei, akin to the governor of Lima appointed by the king of Spain. He was in charge of managing the king's finances.

By occupying the regions of Liang and Yecheng, the king of Wei amassed wealth surpassing that of all traditional nobles in Wei. He could then recruit warriors and migrants from all over, establishing one of the strongest absolutist states in the early Warring States period, initially experiencing a period of immense prosperity.

The process was similar to the migration of the State of Zhao from Jinyang in Shanxi to Handan in Hebei.

Yecheng and Liang, later known as Bianliang or Kaifeng, possessed expansive irrigable land and a convenient waterway network. They attracted numerous regimes from the western and northern regions beyond the Taihang Mountains. In addition to Wei, Yecheng hosted later regimes like Zhao, Ran Wei, Qian Yan, Eastern Wei, and Northern Qi, which all originated from the lands of Jin and Yan.

After the construction of the canal in the Sui Dynasty, Bianliang became the most critical city in the North China Plain. The Bianhe River's water transportation could reach the Huaihe River directly, and then through the canal, it could reach Yangzhou and Suzhou, the most prosperous grain-producing areas. For hundreds of years after the Tang Dynasty, it was the principal city in Kanto and the most crucial military governor (Jiedushi). The regimes of the Five Dynasties, the Later Han, Later Zhou, and Northern Song, all originated from Jinyang and sought development and established their capital in Bianliang.

Other examples include the ancient kings of Upper Egypt establishing their capital at Memphis in Lower Egypt or Turkic Islamic pioneers developing the Bengal region.

However, the hydrology of alluvial plains is incredibly unstable. As previously mentioned, the six cities under the ground of Kaifeng were periodically inundated and buried under layers of silt. The foundation of the lowest city of Kaifeng is buried several meters below today's city surface. Every flood left several meters of silt behind.

Between the Yellow River and the Hai River, and between the Bian River and the Si River, no river has a fixed course. Bian River's navigation was easily blocked by silt. In the Yuan Dynasty, a new canal, closer to Dadu, was built from Jining and Dezhou, bypassing Bianliang and causing a drastic drop in Bianliang's economic status. This is a characteristic of delta cities: population increases are rapid, but disasters are also dramatic, leading to abrupt rises and falls. This is a common trait among the four major river civilizations of ancient times.

Some cities, such as New York, Venice, Constantinople, Hong Kong, etc., which have less direct adjacency to flood plains and more to do with maritime activities, are not discussed above.

Three Types

To summarize, from a hydrological perspective, there are generally three types of locations chosen for major cities:

- 1) Cities on high ground often have ancient cities, but high ground often encounters the problem of soil degradation.
- 2) Cities on the foothills of mountains, where the hydrological environment is most stable.
- 3) Cities at the heart of alluvial plains, which, in ancient times, had astonishing population explosions and prosperity. However, they often encountered disasters due to floods and changes in river courses, typically based on a small hill or mound.

Among these three types, the second type is most likely to develop into major cities that transcend eras.

10 By Men and their Mules, Routes being an Evolutionary System

(Edited by the Author on July 24, 2023)

In this chapter, we transition from discussing hydrology to examining the importance of trade routes. What significance does trade hold in the fabric of society? There exists a perception that trade does not generate value, but merely shifts goods from one individual to another. But is this truly the case? Permit me to deliver the response succinctly: no, it is not. Trade is not just a simple exchange; it indeed produces substantial value. As a student of economics, I can elucidate. The immense value rendered by commerce resides in the division of labor it facilitates. This division allows each individual to leverage their comparative advantage and pool the skills and abilities of a diverse group. For now, I will not delve into the specifics. Much of this material overlaps with content covered elsewhere, such as Xue Zhaofeng's economics class explanation of the "Principle of Comparative Advantage", which is notably comprehensive. Commerce serves as a pivotal force driving the ascent and descent of civilizations. City road systems and those beyond urban boundaries can be categorized as infrastructure. Understand infrastructure as constructs put in place specifically to diminish the costs associated with commercial transactions.

Elements of the City for Trading

Within cities, as we've previously discussed, temples functioned as the earliest credit institutions. They issued currency and stored commodities.

Warehouses played a crucial role. In barter transactions, they simply had to change the ownership records of the goods in the warehouse to complete the transaction. There was no need for physical movement of the commodities.

Markets served as centralized trading locations. They facilitated the accumulation of commercial credibility and prestige for each trader. Repeated transactions among regular trading counterparts fostered trust, thus reducing the risk and costs of their transactions.

Noble warriors provided protection for market transactions and sometimes served as arbiters for commercial disputes.

Transactions without such protection and arbitration incurred incredibly high costs. Without enforcers of order, as I noted in the 77th issue of the podcast, merchants could become thieves at any moment.

Road infrastructure was designed to lower transportation costs, enabling transport activities to consume as little time, effort, and resources as possible.

Routes

In this episode, I'll mainly discuss terrestrial trade routes.

If you observe the ancient trade routes on the map, regardless of the patterns within the city, whether they be grid-like or more complex, beyond the city limits, they generally radiate outwards. Each radial road connects two main destinations on the map. The age of these destinations hints at the age of the roads between them and vice versa. These radiating lines are by no means straight. They are not any easily understandable type of arc either. They combine elements of straightness, curvature, and slight swaying, forming a very ambiguous shape. If you have a foundation in analytical geometry, you'll find these lines are almost impossible to describe with equations. As an architect, I can tell you these shapes are the least preferred by architects. They seem to fall short of classical beauty, or you could say they seem lacking rationality.

However, roads are essentially an evolved system. People will travel various routes, and over time some of these become relatively fixed. Others are overgrown with wild grass and no longer in use. The great Le Corbusier once quipped that the winding shape of the road was carved out by mules. This isn't a direct quote, but the idea is: mules always head in the least strenuous direction, bypassing steep slopes and rocks. Humans, on the other hand, walk straight because they have a clear direction.

His attitude towards the shape of roads is somewhat sarcastic. But what he mocks is precisely the essence of the evolutionary system. On the road, humans and mules walk together. Humans guide the direction, but mules are also crucial as they carry goods. Humans have a purpose; they know which direction to go, while mules prefer the path of least resistance. They don't like going up and down hills and prefer to walk along contours. On the grand scale, humans guide mules, but they can't constantly control them, as it would be too tiring. They mostly follow the mules' preference, correcting the direction only when there's a deviation. Thus, the path of the road is the weighted path integral of human and mule will at each instant.

Indeed, humans aren't necessarily rational either. There's a saying that the relationship between human consciousness and the subconscious is like a rider and an elephant. The subconscious can be trained by consciousness to a certain extent, but it may be much stronger than the conscious mind. In other words, at this level, humans are a fusion of rationality and animal instincts.

A caravan's route may not be rational or necessarily the most efficient. It doesn't need to be rational. They simply add an option to the system of trade routes. Among many routes, over time, the one that is most familiar and relatively efficient will prevail, becoming the main trade route. It might not even be the most efficient one, but it certainly is relatively efficient. And it is much more likely to be more efficient than a straight route designed by humans.

The straight routes that Le Corbusier believes are dictated by human will are often less efficient. If I were to travel from Shanghai to Nanjing along a straight line, it would pass over Yangcheng Lake, cross over the Purple Mountain, which would be quite costly. Also, it would only pass through Kunshan and Wuxi but miss important destinations like Suzhou, Changzhou, and Zhenjiang. The probability of my going to Suzhou from Shanghai isn't necessarily lower than going to Nanjing. Moreover, there are far more destinations along this route. Therefore, actual roads twist and turn, avoiding various natural obstacles. They lead to places where bridges already exist, places with important resources, and towns with many consumers.

This kind of efficiency is complex and difficult to fully assess with arbitrary human design.

As a result of evolution, these winding and shaking roads may be attracted by a certain well, may lean towards a stone-producing mine, or may be due to any reason you can or cannot identify.

In Beijing, the Chaoyangmen Outer Street, the Xizhimen Outer Street, and the Beiyuan Road outside Anzhenmen, which I am quite familiar with, are all traditional roads of this shape. They are straight within the city gates, and once they leave the city, they twist and turn towards their destination.

In London, Holborn Street, one of the main roads leading out from the northwest gate of the ancient Roman city of London, likely has a history of around 2000 years.

New York's Broadway is a road walked by the natives, older than the history of New York City itself.

These roads still often serve as the main streets of these cities today. They all have that ambiguous, winding direction.

The word "old" is mentioned here. Being old in itself holds no special value; it merely refers to something that has experienced a lengthy history. It may have endured many environmental changes and various challenges. If it still possesses vitality, it demonstrates the great adaptability inherent within it, indicating that it is a survivor of stringent selection.

All roads lead to Rome. According to Fairgrieve, a writer on geography and global hegemony:

If you observe the topography of the Italian Peninsula carefully, you will notice that the Apennine Mountains form an arch. The arc's convexity, to the right, presses the eastern side of the peninsula, making it steep and narrow, rendering north-south land travel on the peninsula's eastern coast quite difficult. The western hilly area is comparatively expansive. From the north, traffic from the densely populated Po River Plain heading south generally cuts diagonally across the Apennines. Regardless of the pass you take, you have a high probability of progressing along the valley areas of the Arno or Tiber rivers. These valleys are winding, but they are the flattest. Heading south along the Tiber River, you will arrive in Rome. This road system is the result of evolution, one of which is the Via Cassia, one of the Roman roads.





In classical times, the most developed Greek city-states in southern Italy were Brindisi and Taranto, located in the heel of Italy's boot shape. From there, entering the hilly area of Central Italy, you would follow the winding roads between the hills of Campania and eventually pass through Rome. The outcome of this system's evolution is the Appian Way.

In this sense, you will find that Rome's location itself is the result of road evolution. Thus, the rise of this small village to a great nation is not solely reliant on the courage and wisdom of its successive kings and consuls. The geographical location likely played a crucial role.

After Rome became a great power, Rome was the starting point of several major roads, creating the situation where all roads lead to Rome. This situation can be said to be a result of human engineering, affirming the results of mule behavior. They followed historical trade routes and developed in the direction of the smoothest terrain.

The construction of Roman roads was a resource-consuming process. However, these high-quality roads, which prevented road water accumulation and reduced vehicular bounce, saved travel time and physical exertion, ultimately saving energy and playing a productive role. The essence of infrastructure is to save the

energy consumed in transportation and trade. Once the trade route becomes relatively stable, it will form network effects and path dependence in economics.

That is, everyone takes this road, and its value increases. Roads promote urban development, and the city will in turn consolidate the value of its trade routes.

Both of these relationships exist simultaneously.

A city not on the main trade route will not grow. However, at the intersection of important trade routes, a city is likely to grow.

Moreover, the rise and replacement of water transport tools, leading to the rise and fall of different trade routes, is also a major reason for the rise and fall of cities.

Here I mentioned the "intersection of trade routes". Trade routes are so long that any point on them is not easily distinguished from other points. Only those intersections of trade routes, whose advantages are very apparent, are almost a guarantee of urban prosperity. Major world cities are almost always associated with the intersection of trade routes.

I previously discussed Beijing in issue 44. It is located at the intersection of the major roads at the foothills of the Taihang Mountains, the major roads at the foothills of the Yan Mountains, and the two major roads leading to the regions beyond the Great Wall. I won't repeat that today.

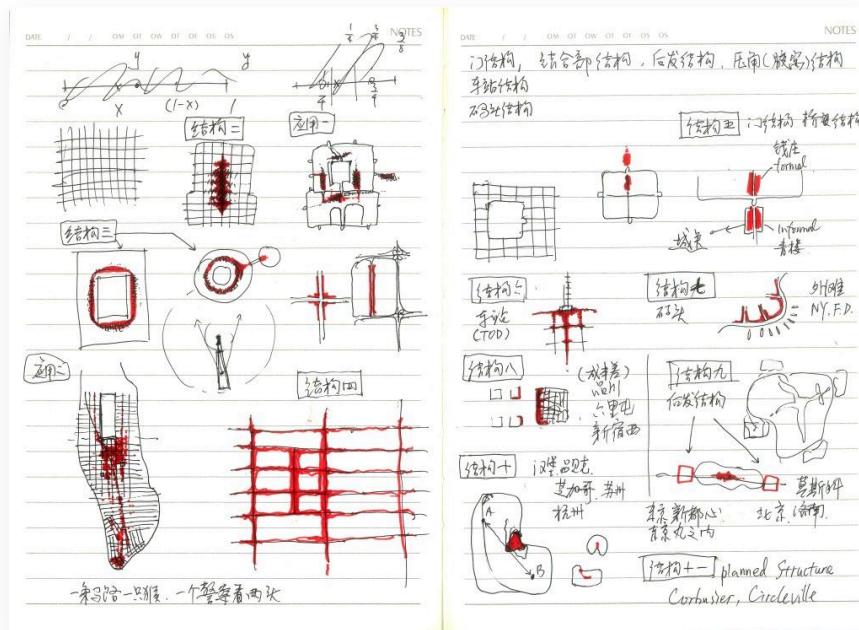
In the next issue, I will talk about a few of Europe's grand imperial cities, London, Paris, and Kyoto.

11 Morphism of Narrow Pass: Bridge, Sandbar in River, City Gate, Mountain Pass

(Edited by the author September, 2023)

Trade Route Concentration: Identifying Hubs of Commercial Activity

Where are trade routes most likely to converge? Where will commerce thrive?



I aim to guide you through an examination of specific structures.

Bridges

Starting with the simpler and clearer structures, bridges and city gates are first on our list.

The economic elements we observe on the earth surface—people, land, various products, and services—are separated by multiple obstacles. These obstructions could be mountains, rivers, walls, and sometimes railways or highways. They partition the land into areas that are internally connected but externally disjointed. Topologically, these can be seen as a collection of islands, large or small.

Of course, these "islands" have mutual exchanges. The driving force that forms a robust connection between them manifests as significant potential energy.

Typically, only a few limited connections exist between these islands.

Topologically, these points of contact are like bridges. It is at these bridge-like points where potential energy is released, creating powerful flows.

Historically, bridges were resource-intensive to construct and maintain, making them scarce. As construction techniques evolved and became more efficient, the creation of bridges became less costly, leading to an increased number of bridges between some islands. Thus, the potential energy harnessed by old bridges and contemporary ones differs substantially.

In a traditional city sector with an ancient bridge, the road spanning that bridge invariably assumes prominence. Such roads, especially near the bridge's end, likely form the city's commercial heart.

For instance, the Wanguo Bridge over Tianjin's Haihe River, now known as Jiefang Bridge, once encompassed the primary banking street in Tianjin's French Concession. Similarly, the road spanning Beijing's Yinding Bridge in Houhai, named Yandai Xiejie, represents a traditional commercial street.

Venice's Grand Canal once had only the Rialto bridge, and its vicinity became Venice's marketplace. The street it gave passage to emerged as Venice's primary commercial avenue. Cities like Tokyo and Osaka have numerous commercial districts bearing bridge-related names, such as Shimbashi, Nihonbashi, and Shinsaibashi, emphasizing their significance.

But it's not always about river bridges. Overpasses spanning railways can also be of great importance. Take Beijing's Wudaokou, a road crossing the railway through Chengfu Road. Locals from northwest Beijing humorously dub this the "center of the universe." In Shenyang, Nanwuma Road, intersecting the Shenyang-Dalian Railway, stands out as the core business district in Tiexi District. Many of Tokyo's business zones are situated where streets cross railways, with places like Omotesando, spanning the Yamanote Line railway tracks, resulting in the Harajuku commercial district.

The intersection of Camden High Street in London's northern suburbs with both a canal and a railway creates a bustling commercial area. Washington's H Street, spanning above Union Station, has undergone significant transformations over the years, consistently revealing new developments.

City Gates

City gates are a common feature in traditional cities and, much like bridgeheads, they are areas of high traffic potential. Streets that lead through these city gates often become busy commercial hubs. In the 74th episode of my podcast, "Border-Human Dam", I pointed out the similarities between city gates and bridges. There's often a difference between the inside and outside of these gates, in terms of ownership, society, and legal standards.

Outside the city gate, governance is often more relaxed, fostering a diverse mix of people. This environment can quickly lead to the rise of a commercial center, forming what's known in some cultures as a 'Guanxiang community' but could be referred to as an "extramural district" in English. This isn't unique to East Asia.

For instance, during the Roman Empire, both Vienna and London exhibited a clear distinction between the inside and outside of their city walls. Inside was primarily occupied by Roman troops, settlers, and rulers. Meanwhile, outside the walls was a hub of commerce, teeming with local residents and traders from across the empire. These extramural districts often sprawled along main roads, sometimes even overshadowing the city itself in size and activity.

Ford and London Bridge

Let's delve into the history of London.

When the Romans first set foot in Britain, London wasn't their primary settlement. Their initial capital lay 80 kilometers northeast: present-day Colchester in Essex. On the other hand, Dover, the closest mainland landing point from continental Europe, sits 100 kilometers southeast of London. Both Dover and Colchester hold significance, separated by the expansive Thames estuary. To traverse the land, one had to loop westward around London. During high tide, the Thames stretched a mile wide in London, necessitating ferries. Yet, at low tide, its sandbars surfaced, allowing for shallow crossings.

The spot in London that allowed these crossings was crucial. It was the closest point for crossing the Thames without boats and also marked the easternmost point where classical engineering could span the Thames with a bridge. In the 1st century AD, the Romans, with their superior engineering, entered Britain. By AD 43, they had erected a fortified city in today's London vicinity to

safeguard a bridge they constructed over the Thames. This city was the Roman-era London, and the bridge, now iconic, was the London Bridge.

The bridge became a pivotal connector for the eastern half of England, converging various trade routes onto London. Adjacent to the London Bridge, a pier facilitated ships from all corners to sail upstream the Thames. This strategic position enabled the city to flourish, becoming the largest in Roman-era Britain.

Over two millennia, the bridge saw numerous reconstructions, yet its essence and location persisted. London swiftly rose to the stature of Britain's capital, later asserting dominance globally in the 18th and 19th centuries.

London's existence, rather than merely hosting the London Bridge, fundamentally stems from it.

Geographically, rivers meander, leading to alternating deep and shallow sections – essentially deep channels and shoals. Such sandbars in rivers facilitate easier crossings and, when dividing the channel, make each segment narrower and ideal for bridges. This factor, illustrated by the sandbar in London's Thames, situated in today's Southwark on the south bank, played a pivotal role. Now a part of the South Bank, Southwark once was a central island in the river. It's now home to key landmarks like Shakespeare's Globe Theater and the towering Shard.

In essence, London's position as a trade route convergence was inevitable.

Sandbars, Île de la Cité

Sandbars in rivers are significant geographical features. While the sandbars in London's River Thames aren't visible today, there is a renowned island on the Seine River in Paris where the Notre Dame Cathedral stands.

This island played a pivotal role in the emergence of Paris as a major city. Analogous to the principle mentioned earlier, this island's location was, broadly speaking, the most convenient crossing point on the Seine. Long before the Romans set foot, during the Celtic Iron Age, this locale was a crucial juncture for a primary north-south trade route. This route bridged the Rhone Valley, where Lyon is situated, with the Seine River basin, connecting the Mediterranean Sea to the English Channel. Additionally, trade routes from the Aquitaine plains in southwestern France and the Orleans region in the south intersected here, leading northward to the affluent Flanders region, the epicenter of Europe's textile industry. By the Celtic era, Paris had already attained prosperity, even

minting its own gold coins. Notably, Paris didn't source gold locally but leveraged bridge tolls and market stall fees for coin minting.

The island wasn't just an optimal bridge-building spot; it was also strategically defensible. Naturally encircled by the river, this Seine island, known as Île de la Cité, the City Island, functioned as a fortress in earlier times. To lay siege to an island fortress, one would need both a terrestrial advantage to control access and a naval superiority to block the waterways, making such sieges considerably challenging.

Merchants, upon crossing the bridge to the City Island, conducted their business within the market inside this stronghold. The feudal lords of the island, the Capet family and counts of Paris, safeguarded these merchants. They also fortified themselves with funds from these merchants.

Sanjo Bridge of Kyoto

In ancient Japan, prior to the Middle Ages, the location of the capital shifted frequently. The historical capitals were situated across various basins and plains in the Kansai region, predominantly within the present-day prefectures of Osaka, Kyoto, and Nara. These sites are relatively close to one another. By 794, the capital settled in what is now known as Kyoto, where it remained for over a millennium.

The ancient route, named "Tosando," served as a connection between eastern and western Japan. It originated from the east, traveled through the flat terrain on the southern edge of Lake Biwa, and navigated through a mountain pass. This path led to a bridge that crossed the Kamogawa River, known as the Sanjo Bridge. The exact date of the bridge's original construction remains unknown. However, historical records indicate that in 1589, Toyotomi Hideyoshi instructed Masuda Nagamori to restore it, suggesting the bridge's age significantly predates this event.

Numerous historical tales are associated with this bridge. One notable story recalls the incident at Ikedaya, near the bridge's entrance, where Sakamoto Ryoma, a prominent figure pushing for modernization was assassinated in 1867. In essence, every traveler from the Kanto region began their journey to Kyoto just by crossing the Sanjo Bridge, evoking a multitude of emotions and reflections.

Adjacent to the bridge's entrance, a charming commercial street stands as a testament to the past. This area, boasting a rich history, serves as a classic representation of a city center from the Edo period.

In essence, the Sanjo Bridge acts as a gateway to the mountain pass.

Mountain Passes

Mountain passes have historically played a crucial role in facilitating trade and communication between regions separated by mountain ranges. Similar to bridges and city gates, they often become focal points of human activity and, over time, can foster the development of settlements and cities in their vicinity.

Yet, mountain passes present a distinct challenge: the actual passable regions often have limited expanses of flat, constructible land. As a result, significant urban developments don't typically rise directly at the mountain pass. Instead, they are found some distance away, where the terrain is more accommodating for large-scale construction and expansion.

For instance, while the Eight Paths of the Taihang Mountains have undoubtedly influenced the establishment and growth of major cities at the foot of the Taihang Mountains, none of these cities sits directly atop the mountain pass, such as Juyongguan. Similarly, cities like Turin, Milan, Verona, and Treviso in Europe owe their strategic importance in part to their proximity to Alpine passes. Yet, they aren't situated right on these passes.

Mountain passes, given their challenging terrain, are more likely to host smaller settlements designed to cater to travelers' immediate needs. For example, on the ancient route west of Tokyo, after an arduous journey over the mountain ridges, weary travelers would find respite in the quaint village of Karuizawa. Similarly, on the Tokaido route, those preparing to navigate the Hakone Pass, or those waiting their turn, would find rest in the small towns nestled at the foot of the pass. Such dynamics have given birth to traditional resorts near Tokyo.

These towns and villages at or near mountain passes typically developed a unique culture, born out of the constant flow of diverse travelers. Over time, they would not just offer physical rest but would evolve to provide cultural and recreational experiences, making them enduring attractions in their own right.

12 the Evolution of Trade Routes Affected by the Competition between Governments

In the previous two chapters, I discussed various factors by which geography fosters the growth of cities. For instance, cities situated at mountain pass crossroads, at the nexus of water and land transport, or on riverbanks suitable for bridge construction or fording, among others.

However, while these geographical advantages make these sites particularly apt for the emergence of commercial hubs, it doesn't mean they automatically become global trading centers. Their success isn't solely attributable to geography. Put simply, even with prime geographical conditions, if the ruling class is self-centered and narrow-minded, and the merchant community is feeble and cannot self-govern, such geographical advantages can be wasted.

Paris and Troyes

From a narrow perspective, Paris occupies a unique geographical position. Yet, when viewed on a broader scale, within a few hundred kilometers, it indeed has competitors.

Prior to modern times, a notable competitor was the Champagne region, located over 100 kilometers east of Paris.

Nowadays, when we mention Champagne, we typically refer to the renowned wine. But in the Middle Ages, Champagne was more illustrious as a count's territory and the commercial epicenter of Northwestern Europe.

Its geographical positioning, especially its core city, Troyes, posed a significant commercial challenge to Paris. Like Paris, Troyes was situated on an ancient Roman route and served as a nexus between the Rhone and Seine river valleys. Goods from Italy, Spain, North Africa, and even further east – such as pepper, precious metals, silk, and notably dyes – traveled up the Rhone. Alternatively, they crossed the Alps to the west of Turin, passing the Senis Mountain Pass at an altitude of 2080 meters, and then headed north by land. These goods converged with furs and textiles from Flanders, a region that is part of modern-day Belgium and was the European textile industry's heartland back then. The amalgamation of dyes and fabrics, and the immense value this union created, was the cornerstone of this trade.

During the 12th and 13th centuries, the Champagne fairs in this region flourished, a testament to the competitive trade policies championed by the Count of Champagne.

In many narratives, the Middle Ages are portrayed as insular, dark, and regressive. Such a view is, in many respects, an inheritance from the revolutionary ideologies.

The reality of the Middle Ages was decidedly more nuanced. It was an era of collapsing authoritarianism. Regional rulers often welcomed merchants to bolster their territories' competitiveness. Trade not only generated tax revenue but merchants also brought strategic resources and military technology – all highly coveted by the militaristic rulers. Hence, policy competition was essential to attract investments and traders.

The Count of Champagne was exemplary in this policy-driven approach. He ensured the safety and property rights of merchants within his territory. He entered into trade agreements with other lords to guarantee the free passage and property security for traveling merchants.

The County of Champagne offered judicial services for commercial disputes, allowing for cost-effective resolutions. Naturally, in the process, the Champagne authorities reaped significant tax benefits.

The storage and financial services supporting the Champagne markets became increasingly sophisticated. Italian merchants from afar often didn't need to carry physical currency or even visit the market personally. Transactions could be completed via messengers using financial credits – akin to a medieval version of PayPal.

Paris and Champagne, once rivals for trade routes, saw their competition conclude when the fate of their respective protectors was sealed. In the 10th century, the Capet family, counts of Paris, ascended to the French throne. By 1314, Louis X, the twelfth-generation king from the Capet lineage, inherited the County of Champagne from his mother, resulting in the French royalty annexing Champagne. With its political architects gone, Champagne's prominence as a trade center dwindled. From then on, Paris eclipsed Champagne, firmly establishing itself as the heart of the French region.

The story doesn't end there. It's not as though Paris simply stepped into Champagne's shoes. The King of France, as the ruler of a vast nation, didn't rely

on commerce the way the Count of Champagne did. Quite the opposite, in fact. Autocratic rulers of large nations often perceived the rise of bourgeois merchants in commercial cities as threats to their dominance. As a result, merchants in Paris found themselves in a subordinate position within this nation, meaning Paris couldn't quite match the glory of Champagne in its prime.

Bruges, Ghent and Antwerp

The decline of Champagne created a void in the commercial system, and it was to be filled by competitors operating on a broader scale. This new player was Bruges in Flanders.

If the main trade parties were goods from Italy and Flanders, it made sense for the Mediterranean trade representatives - the Genoese merchants - to skip France altogether and sail directly to Bruges in the North Sea. Thus, Bruges, along with Ghent, Ypres, Antwerp, and a few other Flemish cities, emerged as Europe's new trade hub, succeeding Champagne.

Amsterdam and London

The saga continues. In the 16th century, the Low Countries were caught in the throes of both religious and ethnic turmoil. During the Dutch War of Independence, Flanders - present-day Belgium - fell under the control of the Habsburg dynasty. The ensuing warfare led to significant population displacement and tightened political controls.

Antwerp lost its esteemed position as a trade nexus. Meanwhile, in the north, Amsterdam and Rotterdam, part of the newly independent Dutch Republic, outshone their Flemish counterparts. These cities witnessed the birth of modern capitalism and were at the heart of the Dutch maritime dominance in the 17th century, often referred to as the 'Golden Age' of the Netherlands.

Yet, the grasp of absolute monarchs was to stretch even further. By 1672, France had become Europe's preeminent absolute monarchy and had expanded its borders, looming ominously over its Dutch neighbor. In the war of that year, Louis XIV nearly flattened the Netherlands. Meanwhile, England underwent the Glorious Revolution, decisively becoming a parliamentary-driven capitalist nation. Consequently, Northern Europe's center of commerce shifted from Amsterdam to London, across the Channel.

Merchant States

In the series of events detailed above, we observe that a global trade hub must be a place where merchants are at the core of its societal governance, where they have autonomy, and there's a high degree of commercial freedom.

Absolute monarchs may indeed control major commercial cities and have the chance to expand their rule. However, the consequence of such control is the city losing its status as a trade hub. This pivotal role is then taken over by neighboring regions with a more business-friendly environment.

Euroasian Trade Routes

The West Asian region has always functioned as a hub in the trade networks in Euroasian continent. In terms of the actual trade routes, there's a northern path traversing the Black Sea leading to the Inner Asian Steppes; the central route goes through the historically significant Fertile Crescent, connecting to the Persian Gulf and regions in Iran; and the southern route takes one through Egypt and the Red Sea to the Indian Ocean.

Related to these three trade routes, various trade cities prospered. This includes Mediterranean trade city-states like Venice, Pisa, and Genoa; Black Sea's Constantinople and Trabzon; Levant's Aleppo; Alexandria in Egypt; and Aden along the Red Sea, to name a few.

During the medieval times, these routes were under the dominion of various lords from the Byzantine Empire, Umayyad Caliphate, and Abbasid Caliphate. None of these powers could monopolize the East-West trade. However, by the 15th century, the Ottoman Empire seized control of all three passages. This allowed them to enjoy the lion's share of the benefits from the East-West trade by leveraging monopoly rents.

This led to diminishing profits for European merchants in the Mediterranean region.

However, this scenario didn't last for long. Soon after, Portuguese sailors discovered a trade route circumventing the southern tip of Africa, the Cape of Good Hope. This sparked a shift in the trade epicenter. While the old trade hubs experienced an irreversible decline, new trade points began to emerge along the Atlantic coast, African shores, and in the Indian Ocean.

This shift is reflected in modern pop culture too; for instance, the family of the protagonist in the recent movie "Bohemian Rhapsody" hails from the East

African trade city of Zanzibar. Other noteworthy trade points include Goa on the Indian coast and Malacca

West Pacific Trade Routes

Similarly, in the Yuan Dynasty, the largest trade center along the coast of East Asia was Quanzhou (or Zayton). The Ming Dynasty wiped out the international trader community in Quanzhou, and imposed a sea ban to prohibit private maritime trade. In this way, the trade transit point was transferred to Ryukyu on the sea. Before that, Ryukyu, an archipelago with some indigenous inhabitants, was commercially insignificant. From then on, it suddenly became a big port. The modern Ryukyu Kingdom was born at this point in time. After the Opium War, international trade points began to be established on the coast of the East Asian continent, and Japan also opened up maritime trade, and Ryukyu became no longer important.

Malacca and Singapore

Malacca, long before Zheng He's voyages, was a major hub of strait trade. This status persisted through the period of the Malacca Muslim Sultanate, the Portuguese colonization, and into the era of the Dutch East India Company. However, while each commercial colonial group occupied the port of Malacca, clashes were common with neighboring sultanates, which even led to diplomatic conflicts with Java, Annam, and even the Ming dynasty.

The shift began with the British Governor Stamford Raffles. In 1819, Raffles discovered the island of Singapore. Initially appealing due to its sparse population, thus offering a significant development potential. Separated from the mainland by a strait, it was easier for the powerful British navy to isolate, making it less susceptible to the surrounding conflicts. This seemed to better fit the British model for a trade port. The British leased the island of Singapore from the Sultan of Johor and began its development.

Subsequently, Singapore gradually overtook Malacca as the central hub of strait trade. Today, everyone knows of Singapore, but few remember Malacca.

Shanghai and Hongkong

In 1920, the most significant trade metropolis in East Asia was undoubtedly Shanghai, with Hong Kong trailing behind. However, by the 1950s, commercial cities like Shanghai, Wuhan, and Chongqing were "liberated" by the communists

and detached from the global trade system. This resulted in a large portion of East Asian trade shifting to Hong Kong.

In 1945, post-war Hong Kong had a population of only 600,000. By 1951, it surged to 2 million, 3 million by 1960, 4 million by 1972, and 5 million by 1980. Every 20 years, the population doubled.

Yet, as mainland China initiated its economic reforms and opening-up policies, rejoining the global trade system, Hong Kong's population growth rate started to decline. From 5 million in 1980, it increased to 7.5 million over the next 40 years, a growth of only 50%. In contrast, Shanghai's population growth rate overtook Hong Kong's in the 1990s. From 10 million in 1980, Shanghai's population soared to its current 26 million, more than doubling. Financially speaking, Shanghai's GDP, at 490 billion USD, also surpassed Hong Kong's 360 million USD. Even the emerging city of Shenzhen's GDP now exceeds that of Hong Kong.

Of course, Hong Kong's per capita output still significantly outpaces these mainland regions. But it has receded to become merely one node in the commercial network, rather than the singular, dominant node it once was.

Government and Trade

Upon examining these cases, one can discern the profound impact of policies on the progression of trade routes. This phenomenon might aptly be described as "policy competition." Not all policies emerge from deliberate planning; some may arise from either intentional or unintentional decisions. Intriguingly, those in competition may remain oblivious to their rivalry. They might be indifferent to urban growth, especially if it doesn't coincide with their objectives. Policy influencers, while potentially curbing commercial liberties, could stand to gain, albeit momentarily, from their interventions.

This overarching "competition" is extensive, encompassing the actions and strategies adopted by myriad individuals and entities. Effective governance acts as a catalyst for commercial growth. Yet, the structured order introduced by dominant centralized forces typically challenges commercial autonomy. The intent behind such opposition is to undermine self-governing commercial entities. These self-regulated commercial groups are affluent and at the forefront of technological innovation. Their ascent heralds the looming decline of autocratic governance. Such influential commercial entities can confront and even overturn authoritarian regimes, altering political terrains and structures.

Historical precedents include medieval Venice, and more recently, Florence, the Netherlands, and England.

These autonomous commercial factions constitute the backbone of their respective nations, rendering monarchs and military forces as their instruments. The policies of these nations lean away from rigid ideologies, prioritizing market dynamics and effectiveness. This ethos has equally advantaged the U.S. and other territories influenced by British traditions. They bask in the lucrative returns of commerce and international trade.

Recap to Previous Chapters

The same conclusions can be extended to almost all cities. Take Berlin, for instance, which serves as a nexus between the trade networks of the Elbe and Oder river systems. Warsaw stands as the hub of the Vistula river basin. Vienna occupies a strategic chokepoint on the Danube River, lying between the Alps and the Carpathians.

In summary, the growth of a city is intimately linked with the evolution of regional trade routes. Routes that optimize energy consumption often persist through evolution:

- Trade routes typically extend between resource points. They are influenced by terrain, generally following valleys or passages between mountain peaks. Routes tend to stretch along directions with minimal elevation changes to conserve the energy of both humans and livestock.
- Boats possess a far greater cargo capacity than human or animal carriages, making waterways crucial transport channels. Interconnected water systems foster commercial networks, promoting convenient exchanges and often creating zones with similar technological and cultural advancements. Meanwhile, between unconnected water systems, there might be technological and cultural disparities, generating a strong incentive for exchange. The most accessible land connections between river basins often evolve into key trade routes.
- Ferry crossings and bridges give rise to commercial cities. Within such cities, it's common to observe islets in the middle of rivers, typical geographic landmarks for ferry points and bridge constructions.
- Trade routes, with their intricate twists and turns, are the outcome of various complex factors, combined in a weighted function.

- These routes are not necessarily rational; they are the results of evolutionary selection. Inefficient trade routes sap the energy of their users and face obsolescence. The geographic information embedded in historic routes often surpasses what can be rationally deduced.
- Trade routes facilitate the emergence of commercial cities. Junction points in these routes frequently give birth to cities, especially at intersections of waterway routes. Commercial cities often attract the attention of political powerhouses. On occasion, these cities can maintain their independence, but more often, they come under the sway of dominant political entities. When these powers draw resources from significant commercial cities and integrate with them, these cities can transform into imperial capitals.
- Political dynamics and the rulers' stance on commerce can influence the rise and fall of trade routes. Among several alternative trade routes, the one offering the best business environment often becomes dominant. Conversely, policies that undermine the business environment can lead to the decline of both trade routes and commercial cities.

13 The Big Picture – Technological Transmit and Resistance Theory (1) Feet on the Trails, Canoes on Coastlines, Chariots in the Steppe

(Edited by the author in September, 2023)

Technological Potential Field

In Wuqiao, Hebei, there's a thriving tradition of producing acrobat troupes. Yet, performing only in their hometown isn't sustainable. Locals have become too accustomed to their acts. To captivate a broader audience and maximize earnings, they must venture out and tour other regions.

In ancient Americas, indigenous people crafted sharp blades from obsidian and flint. Flint Ridge in Ohio was a prominent source of flint, yet many other areas were devoid of it. Consequently, flint from this region was frequently traded and transported to various parts of the North American continent—even as far as the Rocky Mountains and the Gulf of Mexico, artifacts made from Ohio-sourced flint have been discovered.

In 2003, if I encountered a German in Beijing, there was a high likelihood they were an architect. One might wonder, why were so many German architects in Beijing? It was because their skills and expertise were in greater demand and thus more valued in Beijing than in Germany, where there was already an abundance of architectural expertise.

Technology tends to disseminate from regions where it's prevalent to those where it's scarce. Various goods and skills follow a similar trend, spreading from places of abundance to those of shortage. This diffusion process generates immense benefits.

Imagine a stone perched silently atop a mountain. If allowed to roll down, the descent releases a tremendous amount of energy. This energy, familiar to us, is known as potential energy. In English, "potential energy" refers to the power stored when static, only to be released during motion, much like how electricity flows from areas of high voltage to those of low voltage.

Likewise, technology and goods possess this inherent potential energy—a driving force propelling them towards diffusion and proliferation.

Theory of Resistance

Propagation, like in electrical circuits, faces resistance. Consider the peaches from Shenzhou(a smaller city famouse for peachoid produce in North China): while there's demand in Shijiazhuang, 100 kilometers away, the 'peach potential' isn't realized easily. Traveling on foot with kilos of peaches for three days to sell them isn't efficient; the costs outweigh the profits. Essentially, the 'resistance' between these places is too high for trade. Only with faster transport methods, like mule carts, did this resistance diminish, enabling trade. Today, I present a concept: envisioning the world map as a circuit diagram.

Regions either have high or low potential. Technologies and goods, akin to electric currents, flow from high to low potential areas. This flow's resistance is influenced by transportation convenience and efficiency. In isolated regions, despite a potential difference, the flow is hindered. However, areas with seamless connectivity, despite their physical distance, experience strong flows due to low resistance. Over time, these regions equilibrate in terms of technology and goods availability. Let's delve into this grand flow visualization.

The Era of Canoeing

Human carrying capacity is limited when on foot. Before the advent of transportation, only extremely valuable items like flint, obsidian, salt, and gems were deemed worth transporting over long distances.

Thus, the earliest invention for substantial transportation was the dugout canoe, followed by simple sailboats. The oldest discovered canoe, unearthed in the Netherlands, dates back about 10,000 years. Primitive sailboats, seen as modifications of the canoe, date back 6,000 years from the Cucuteni-Trypillian culture in Ukraine and Romania.

Canoes were revolutionary. Carrying loads on foot over long distances is exhausting, but a person in a canoe could transport much larger loads and potentially travel faster. Essentially, the canoe reduced "resistance" on suitable routes by manyfold. Large sailboats took this further, reducing the resistance even more. They turned rivers like the Danube and Nile, and seas like the Mediterranean, Baltic, Red, and Arabian seas, into ancient 'superhighways'.

Imagine ancient humans 10,000 years ago, setting off from Somalia in Africa, paddling along the coastline. They'd stop for food or freshwater, or shelter during bad weather. How long would it take them to reach the Pearl River

Delta? Modern humans might take two years with the advantage of money and modern amenities. Our ancestors would've been slower. From a technological standpoint, five to ten years is feasible. They typically undertook shorter journeys due to lack of clear long-distance objectives.

The origin of rice remains a topic of debate. One day the oldest samples are found in the Mekong Delta, the next in the Yangtze Delta, followed by even older samples in the Pearl River Delta. These discoveries reflect the interconnected nature of ancient coastal trade. As a result, similar-aged samples are found in all these regions.

Coastal cities might appear distant from each other, spanning thousands of kilometers. Yet their trade relations might be tighter than between a coastal city and an inland city merely a few hundred kilometers away. The Liangzhu culture in Hangzhou has lineage traces to Austronesians (Pacific Islanders and Taiwanese). Linguistically, they're believed to be closer to Thai.

Trade Winds

In the subtropics, monsoons, also known as trade winds, reverse direction cyclically every year, making annual cyclic voyages convenient.

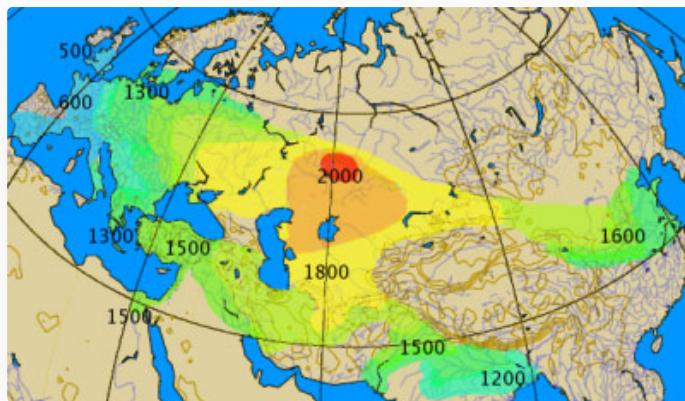
Actually, 5,000 years ago, how long would it have taken to travel from the ancient city of Harrapa by the Indus River in present-day Pakistan to the ancient city of Ur in present-day Iraq? Estimated as at most two months. Moreover, it's possible to make a round trip within a year, riding with the trade winds, efficient and energy-saving. A significant portion of the technology in the ancient Indus Valley civilization has to do with the exchange with the Mesopotamian civilizations. The maritime spread of this technology to the Indus River, 2,000 kilometers away, facilitated the rise of the ancient Indus Valley civilization. Their trade connections are evident.

The Mediterranean region benefited greatly from the trade winds. 3,200 years ago, the ruins of Phoenician colonies spanned from present-day Lebanon to Portugal and Morocco, covering distances of four to five thousand kilometers. Yet, they all belonged to the same trade circle and had a comprehensive understanding of each other's existence. Ancient Greek city-states weren't confined to the Greek peninsula. Closer regions included all the islands in the Aegean Sea, Crete, cities on the western coast of Anatolia, Rhodes, Cyprus, Brindisi in southern Italy, Taranto, Naples, Syracuse on Sicily. Further locations

extended to Crimea by the Black Sea in the east and Marseille in present-day France in the west, all under the umbrella of Greek culture.

During this era, mainstream traded goods included artifacts, fur, amber, pearls, and other relatively expensive items. They also traded in bulk commodities like grain and olive oil, which made sense to transport via large ships. Notably, the tin ore, essential for making bronze tools, was a prominent trade item. Making bronze tools required both copper and tin ores. While copper ore was somewhat rare, tin ore was even rarer, affecting the manufacturing of weapons crucial for a nation's survival. In ancient times, tin ore often traveled thousands of kilometers, akin to today's uranium-235—a strategic material.

On a serene Earth, one could perceive that the vast expanses of land were akin to areas with subtle currents. Yet, it was along coastlines and rivers where more dynamic currents took shape. These waterways, vital for navigation, breathed life into their surrounding regions, becoming hubs of activity. This vibrancy illuminated areas close to water, highlighting them as early cradles of civilization, even as large swathes of continental interiors remained relatively untouched and mysterious. Consider an Athenian merchant of the time: he might have been more acquainted with Rhodes, despite it being a considerable distance away, simply because a brief sea voyage would lead him there. Meanwhile, Mount Olympus, although closer and a daily sight, might have been less explored due to the daunting terrestrial journey it posed. An Egyptian familiar with the Nile, stretching a thousand kilometers up and down the river, might not like to venture into the desert just a few tens of kilometers from the riverbanks. This was the world in which early civilizations existed.



The Age of Chariots

In ancient times, the vast hinterlands were largely unexplored, with major civilizations mainly situated near seas or major rivers. This situation changed dramatically due to the introduction of the horse and the invention of the wheel.

The wheel's invention dates back around 5,000 to 6,000 years ago. Archaeological evidence of early wheels has been found almost simultaneously in regions like the Mesopotamian basin, the Caucasus, Ukraine, and Romania. This suggests that the technology spread rapidly.

Following the invention of the wheel, horses were domesticated. Before horses, oxen were used to pull carts. Horses then became a more versatile alternative for oxen in hauling carts. The earliest evidence of horse domestication traces back over 5,000 years ago in the vast Eurasian steppes, specifically in the region north of the Black Sea, present-day Ukraine.

Notably, the aforementioned regions are all closely knit, essentially encircling the Black Sea.

The true chariot had wheels with spokes, making it relatively lightweight. If one were to map out all the unearthed chariots globally, based on their historical timeframes, much like contour lines on a map, the highest point, or the earliest occurrence of spoked chariots, would be in Central Asia, in today's Russian Federation, near the northwestern region of Kazakhstan, specifically around the state of Zintashta-Petrovka.

This area is recognized as the birthplace of chariots. From here, the ancient chariot technology spread throughout the world. Around 4,000 years ago, starting from this point, it took about 200 years for similar chariots to be found throughout Central Asia and the Eurasian steppes. Another 200 years later, they reached Mesopotamia, Central Europe, the Indus Valley, the Mongolian Plateau, the upper reaches of the Yellow River, and Egypt. By the time of King Wu Ding of the Shang Dynasty, 800 years had passed since the chariot's initial appearance. Western Europe, the Jianghuai region, and the Bengal Delta still had not seen the emergence of chariots.

One can observe that chariots spread more swiftly in arid, open steppes. Their transmission was slower in forested areas and downstream marshlands of major rivers. In cold mountainous regions, the chariot's presence was virtually nonexistent.

This is because the tactical advantage of chariot technology was particularly evident in the plains. In swamps and forested areas, even though the chariot remained an advanced technology, its advantages were diminished, resulting in a slower spread.

However, groups mastering chariot technology would modify terrains, like forests and marshes, to make them more chariot-friendly. They would drain swamps using hydraulic engineering, transforming them into prairie-like farmlands. Royal highways were built through forests and mountainous areas, facilitating smoother vehicular passage.

The King's Highway

The concept of the King's Highway is one that the Chinese are well acquainted with. Dating back to the 3rd century BCE, the famed Qin expressways (秦驰道) and straight roads (直道) are testament to this. The expressways connected to the provinces and counties of the Qin Empire, serving both military and administrative functions. The straight roads led to the Hetao region's Jiuyuan county, situated on the southeastern edge of the Eurasian steppe.

However, the concept of the King's Highway is not exclusive to East Asia. The Roman roads are clearly a parallel system. The Via Appia, built in 312 BCE, predates the Qin's straight roads by a century.

Even earlier, there was the Persian Empire's Royal Road. Historian Herodotus documented its construction in the 5th century BCE. However, archaeologists believe that its western half was constructed by the ancient Assyrian Empire, as early as the 7th century BCE. This Royal Road of the Persian Empire began on the eastern shores of the Aegean Sea, traversed challenging passes in Turkey, and ascended the 1000-meter-high Gulek Pass. It linked the Assyrian capital of Nineveh, present-day in Iraq, with Susa in modern-day Iran, stretching southeastward to the Persian capital of Persepolis. This Royal Road set the precedent for grand highways around the world. Notably, the Assyrian and Persian empires spanned what can be described as the golden age of chariots. These vast road networks made the deployment of chariots across challenging terrains on a grand scale possible.

War Horses and the Middle Ages

Chariots played a pivotal role in the military expansion across the Eurasian continent, leading to the rise of several civilizations. Notable among these are

the Shang dynasty of China and the Aryan kingdoms of India. The trade routes of Central Asia, precursors to the famed Silk Road, developed in this context. The Age of Bronze, dominated by chariots, gradually gave way to the Iron Age, where cavalry began to assert its dominance. This transition was evolutionary rather than sudden.

The progression from the initial introduction of cavalry to its maturity required a series of technological breakthroughs. For instance, only small horses were suitable for pulling carts. Armored knights required larger, stronger horses to bear the weight of both the rider and the armor.

Advancements like the saddle, stirrups, and spurs enhanced the combat prowess of knights. By the time of the Five Barbarians and Sixteen Kingdoms, around the 4th century, these technologies were essentially mature. This period is a critical juncture, marking the boundary between ancient and medieval histories. The nomadic tribes from the Eurasian steppes, possessing vast numbers of war horses and formidable cavalry, toppled mighty empires like the Wei-Jin and Roman in a relatively short time frame.

The best-equipped cavalry legion in East Asian medieval history can be traced back to the fictional Murong Fu in Jin Yong's novels. However, his real-life counterparts—the armored cavalry of the Murong Xianbei and the Tuoba Xianbei during the Sixteen Kingdoms period—were unparalleled in subsequent generations. Their weaponry and armor shared lineage or influence prevalent across the Eurasian steppes, stretching from Omsk in Russia to the grasslands of Ukraine. During this era, Inner Asia undeniably became one of the world's focal points. From this point until the Mongol Empire's zenith, the trade routes of the Eurasian steppes, Central Asia, and North Asia were continually revitalized, birthing many significant cities and states during the Middle Ages.

Grassland Highways

The transportation capabilities of horses and vehicles are ten times greater than human power, and their speed is even faster. This reduced the resistance within the Eurasian hinterland to just a tenth. During his military campaigns along the Black Sea, the Mongolian general Subutai reportedly slept on horseback and covered 2,000 kilometers in just a week. This remarkable pace has led to the legend of the "600-li express". It's akin to treating oneself as a courier package. The distance from Mongolia to the banks of Russia's Volga River spans more than 4,000 kilometers. Given such a riding pace, one could traverse the entire

Eurasian steppe in just half a month. Although such a feat would be exhausting, in reality, using only a tenth of that speed, covering this distance in about six months is more realistic.

While the carrying capacity of horse-drawn carriages and horses might be lesser than that of ships, their speed is comparable. Furthermore, they can access a wider range of terrains.

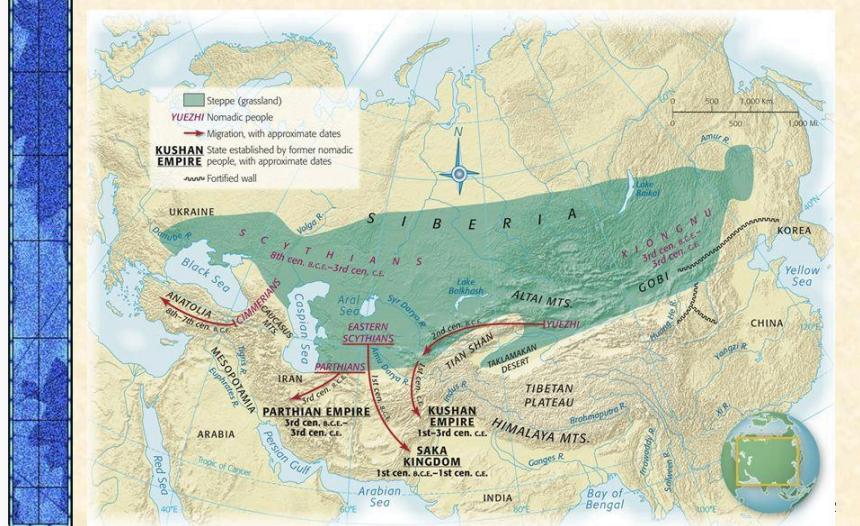
Thus, during Inner Asia's golden era, the famous Silk Road did not transport bulk goods that were usually carried by Mediterranean ships. Instead, it mainly facilitated the movement of luxury goods, precious metals, and weapons—high-value items. Heavy commodities were still majorly transported via seas, rivers, and canals. Yet, the grassland trade routes were exceptional in disseminating technology, especially military tech.

Cities such as Darius the Great's capital, Samarkand, Bukhara, Khotan, Kucha, and Chang'an, became pivotal hubs for medieval global trade.

Along the route from Constantinople to Chang'an or Ye City, many great empires emerged. To the west, there were the Sassanid Persian Empire, Abbasid Caliphate, Seljuk Empire, Ottoman Empire, Khwarezmian dynasty, and the Western Liao. To the east, the Former Qin Empire, Xianbei, Sui and Tang dynasties, Liao, Jin, Western Xia, and Mongol Empire made their mark. Their rise was deeply tied to controlling the grassland trade routes and mastering advanced military techniques.

During the medieval period, the Eurasian steppe functioned as the world's largest highway and technology exchange center. A plethora of Central Asian products, techniques, and cultures flowed to East Asia during this window of opportunity. One can visualize a cosmopolitan Chang'an—diverse in languages, religions, ethnicities, and heavily influenced by Persian aesthetics.

Pastoral Nomads of the Eurasian Steppes, 1000 – 100 B.C.E



Pastoral Nomads of the Eurasian Steppes, 1000 – 100 B.C.E

14 The Big Picture – Technological Transmit and Resistance Theory (2) Canals, High Seas, Railways, Autobahns, Telegrams and Internet

(Originally from a lecture in 2019; Edited by the author on September 13, 2023)

In our previous discussion, we touched upon the golden era of trade routes across the Eurasian steppes during the medieval period.

Canals

During this era, maritime and riverine navigation continued uninterrupted. Especially noteworthy were the canals. A single mule could carry around 120 kilograms. Where roads existed, carts could be used, with a single cart capable of transporting over 600 kilograms. However, on water, one horse, when pulling a towpath, could drag a barge with a payload of up to 30 tons. This is 50 times more efficient than cart transportation.

Typically, canals weren't entirely man-made from start to finish. Instead, they often utilized natural waterways wherever possible. When a natural river had segments with steep gradients, making upstream navigation impossible, canals could employ locks, functioning much like elevators, to elevate boats. This was one of the advantages of canals. Another characteristic of canals was the unstable water levels at the junctions of different basins. Some sections might lack water, rendering transportation impossible. In such situations, goods, often grains, would be offloaded and stored until water levels rose, making transportation feasible again.

The Grand Canal, spanning from Beijing to Hangzhou, stands as the longest in history and was the most crucial canal in the ancient world. The canal, during the Sui Dynasty, originated in Kaifeng. Following the course of the Bian River, it passed through the Huai and Yangtze rivers, reaching all the way to Hangzhou. It transported a myriad of goods, primarily channeling the grain from the Suzhou-Hangzhou region to Kaifeng, and further to Luoyang or Chang'an to sustain the vast population of the capital region. As we can observe, the capitals of the Sui, Tang, and Five Dynasties gradually moved southeast along the canal, shifting from Chang'an to Luoyang, then to Kaifeng, and occasionally even relocating to Yangzhou. This shift shortened transport routes, reduced transportation costs, and was driven by the dynasties' strategic imperatives.

During the Yuan, Ming, and Qing dynasties, the primary role of the canal was to transport grains from the southern regions to Beijing. Thus, the route was adjusted to a more direct path, bypassing Kaifeng and instead passing through Shandong.

In the Ming and Qing dynasties, the canal functioned like a highway within the empire or could be viewed as the empire's technological artery. Along the canal, major northern commercial cities emerged, from north to south, including Tongzhou, Tianjin, Cangzhou, Linqing (the backdrop for the story "Jin Ping Mei"), Xuzhou, Huai'an , and Yangzhou.

Tolls collected from the canal constituted a significant portion of the empire's fiscal revenue. The professional managers overseeing this revenue formed a distinct societal class.

When police investigate criminal cases, by observing the modus operandi, they can determine the county the perpetrator hails from, reflecting the continuation of certain techniques across generations. During the Middle Ages, from Italy to Poland, and from the Middle East's Baghdad to Samarkand, the majority involved in commerce and finance activites in the cites were Jews. They constituted a significant portion of the urban population. The major medieval city of Kaifeng even had a Jewish community. Similar to the Jews, Armenians were widespread across the Near East and Middle East, often forming Christian business communities. During the era of the Republic of China, Harbin had a sizable Armenian community. In medieval South Asia and Southeast Asia, Muslims dominated the merchant class, and many cities had Muslim communities, though they were less prevalent in rural areas.

At each of the toll stations along the Grand Canal of China, the professionals managing the revenue and taxation often hailed from Shaoxing, known as "Shaoxing Shiyi (clerks from Shaoxing)." When they moved to other regions, they would be termed as "Cangzhou Shiyi" or other similar titles, based on their new location. Zhou Enlai's ancestors were among the Shaoxing Shiyi, managing the toll stations in Huai'an. In his youth, Zhou went to Tianjin for his studies. If one understands the significance of the Grand Canal, they'd recognize that such patterns of movement weren't random.

Northern Chinese traditional dishes aren't highly regarded, while Huaiyang cuisine is quite acclaimed. Along the Grand Canal, between the two, lies the cuisine of Shandong, or "Lu Cai." Lu Cai outstands from the northern cuisins,

and Beijing cuisine is largely its descendant. These culinary styles spread along the canal. Similarly, Peking Opera, or "Jingju," evolved as a result of southern opera troupes moving to and developing in Beijing.

Canals served as efficient conduits in the Middle Ages but with conditions. Their upkeep demanded the resources of vast empires. The consumption and extraction they facilitated might often overshadow their production value. This feature was especially pronounced in China. A declined empire loses its ability to sustain the functionality of the Grand Canal.

Canals were an efficient medieval conductor of branch lines. It needs the maintenance of a great empire. And his absorbability and consumption may be greater than productivity. Its dimension is more prominent in China.

Pre-Modern Maritime Trade Era

Let's return to the overarching narrative. The golden age of cavalry saw the rise of powerful empires like the Göktürks Khaganate and Mongol Empire, as well as prosperous inland trade routes.

However, the emergence of another mode of transportation was undermining the foundations of these Inner Asian Empires' success. During the Middle Ages, while horsemen dominated the continents, seafaring was still slowly evolving. The deep-sea navigation abilities of the Middle Ages are often overlooked. This isn't to say that long-distance sea voyages did not exist; they were simply high-risk.

When the Eastern Jin Dynasty Chinese monk, Faxian, traveled to India, he traversed the Pamir Plateau on foot. But on his return to the Eastern Asia, he sailed from Bengal, passed through Sri Lanka, and arrived in Java. From Java, he set off for the Chinese coast. He initially aimed for Canton but was blown off course to the Shandong Peninsula. Faxian wasn't a sailor; he learned during his travels along the Ganges that maritime routes were more convenient for returning trip. The sea routes he traveled were well-established by then. This implies that these maritime trade routes always existed but were not documented by intellectuals like Faxian before.

Another monk from the Tang Dynasty, Yijing, traveled directly by boat, passing through Sumatra to reach India.

The Sinbad voyages tell tales of medieval Arab traders sailing the Indian Ocean. In reality, these Arab traders had an expansive range of activities, reaching the

coastlines of the Indian Ocean and Southeast Asia.

Huang Daopo learned advanced cotton spinning techniques in Hainan Island. Though some sources say she learned from the indigenous Li people, it's evident that she learned from workers involved in widespread commodity circulation, rather than from hunter-gatherer tribes. Recent archaeological discoveries in Hainan indicate the presence of medieval Muslim towns and burial sites. Cotton and cotton spinning technology originated in India and the Middle East. Huang Daopo likely learned these techniques from Muslim traders in Hainan's commercial towns. By the Tang Dynasty, Muslims were already active in Canton. By the Song and Yuan Dynasties, in major maritime trade cities like Quanzhou (or Cayton), the community leader was a Sunni Muslim named "Pu Shougeng(蒲寿庚)", whose original name can be speculated as Abu Sayyid Khan. Yuan army garrisons had 3,000 Shiite Muslims. Besides Muslims, there were also Jewish merchants and various Christian sects, including the Franciscans. Huang Daopo's story is essentially about a young woman from Shanghai who traveled south for work, acquired skills, and returned home to become wealthy. The narrative suggesting she learned from the Li mountain tribes is highly questionable.

Zheng He, too, is part of this tradition. As is well known, Zheng He was a Muslim, and his father had been to Mecca. His position as fleet commander was related to his background, language skills, and social resources. The places his fleet reached, like the Red Sea and Mombasa in East Africa, might have been unfamiliar to the Ming emperor but were well-traversed routes for Zheng He's original community.

All these were precursors to the Age of Exploration. The spread of technology due to maritime advancements began to outpace that of the continents. The phenomenon of Wokou (Japanese pirates) is a late manifestation of this trend.

The Age of Sails

The ultimate breakthrough was a new type of ship, the caravel, invented by the Portuguese. This sleek ship, along with its upgraded version, the carrack, was transformative.

The Portuguese were not accidental innovators. Portugal emerged from the Reconquista, the medieval Christian reconquest of the Iberian Peninsula from the Muslims. As the westernmost European nation, all its coastlines face the treacherous high seas of Atlantic. Deep-sea fishing was almost an inevitable

industry. Moreover, Portugal could assimilate both European and Arab maritime technologies from the Mediterranean region.

The new Portuguese long-distance ships had advantages over previous coastal trading vessels:

1. Their hulls were higher, better able to withstand waves, enhancing their reliability.
2. They could sail across oceans.
3. They relied solely on sails, eliminating the need for numerous rowers and reducing supply burdens.
4. They could sail against the wind, a critical ability on Africa's west coast, where winds blow consistently in one direction.

Skipping over a detailed exposition, let's summarize the results: With the advent of the Age of Sails, maritime technology dissemination outstripped that of the continents. According to my theory of resistance, oceanic resistance decreased by a factor of 100. Such low resistance led to electric currents flowing across oceans, reaching previously unexplored lands like the Americas and Australia. These currents grew stronger, interconnecting almost all coastal regions worldwide. As a result, inland currents, which previously flourished, began to diminish.

The matchlock, which Europeans had only recently adopted in 15th century, was sold by the Portuguese to Japan in 1543, just a century later, where it was massively replicated and named after the place of its introduction: "Tanegashima".

Nagasaki, Kobe, and Yokohama became some of Japan's earliest industrialized cities due to their early trade with the West. In India, the port cities of Mumbai and Kolkata economically overshadowed Delhi, the former imperial capital. In China, Guangzhou and Shanghai symbolize modern maritime-driven globalization. In contrast, cities like Samarkand, Dunhuang, and Chang'an epitomized the grandeur of the Middle Ages when places like Guangzhou and Shanghai were of lesser significance.

However, as the trade routes of the Eurasian steppes declined, people no longer viewed Central Asia as a source of precious goods or mysterious technologies. Their tales faded from popular memory, leaving behind enigmatic scrolls and caves.

Steamboats

As we peer into the latter half of the maritime age, the steamboat emergents. The advent of the steamboat boosted ship speeds by more than double, making them less susceptible to the influences of wind direction and ocean currents. This reduced the resistance faced on the seas once more.

However, it was the inland waterways that were truly revolutionized by steamboats. Before their invention, sailing against the current—battling gravity and water flow—required manual labor to tow, a highly challenging feat.

Chongqing offers a particularly notable example. The middle and lower reaches of the Yangtze River had always been convenient for navigation. Yet, sailing against the current from Yichang, passing through the Three Gorges to reach the Sichuan Basin, was an arduous journey. The emergence of steamboats, however, normalized this mode of transport. Chongqing, almost overnight in the late Qing Dynasty and early Republic of China period, exploded into prominence, becoming the "Hong Kong of Sichuan"—a transformation largely attributed to the steamboat.

Initially, sailing vessels journeyed against the Hudson River's current from New York, heading inland only as far as Albany. But with the rise of steamboats, upstream travel became easier. Powered by this innovation, Americans carved out modern canals—the Erie Canal and the Chicago Canal. This connected New York to the entirety of the Great Lakes and the Midwest, providing a cost-effective transportation network.

Consequently, docks, warehouses, and commodity stocks emerged along the Hudson, paving the way for futures trading, finance, insurance, and manufacturing sectors. While New York's history as a world capital can be linked to sailing vessels, it was decidedly shaped by steamboats.

The East Coast, the Great Lakes, the Mississippi Basin, and the Ohio River region were interconnected, forming a vast circular zone of equal potential, sparking an immense flow of activity. Within this zone emerged many pillars of modern industry: Pittsburgh's steel, Detroit's cars, and Cleveland's petrochemicals, to name a few. Some businesses, within a short time, boosted their labor productivity by a factor of 100, even up to 10,000. These feats weren't just their own making. The environment—characterized by low resistance and strong flows—facilitated the abundant supply and transportation of goods. More importantly, there was efficient matching of technology and capital.

Railway

The next world-changing, resistance-reducing mode of transport I'll discuss is the railway.

In the days before railroads, the most important port on the Liaodong Peninsula was Yingkou. Sea shipping was the most cost-effective, so one would prefer ships to cover longer distances, minimizing expensive land travel.

However, once railways were established, transport on land shifted to trains. For ships coming from overseas, it was inevitable to transfer goods to trains upon docking. Given this, it was more expedient to dock at the land's edge. As a result, the most significant port on the Liaodong Peninsula shifted to Dalian.

Yantai, once more crucial than Qingdao, lost its significance after the Qing Dynasty when the railway between Qingdao and Jinan was completed. Qingdao soon eclipsed Yantai.

In the USA, during the latter half of the 19th century, railways extended towards the western frontier. Before this, much of the vast North American West was largely excluded from the global economic map. In other words, it existed in a setting reminiscent of the Stone Age, marked by faint electric currents and high resistance. With the completion of the Transcontinental Railroad, this area was fully integrated into the global economic circuit.

What's even more evident is the rise of California's economy. In 2018, California boasted a GDP of \$3 trillion. If California were treated as a standalone country, its GDP would rank just below the top four – the US, China, Japan, and Germany; and surpassing the UK, France, and India, making it the fifth largest in the world. Washington State, where Seattle is located, has a GDP of \$500 billion, roughly equivalent to that of Argentina.

The Siberian Railway in Russia connected its European regions to the Far East. This development greatly amplified Russia's economic, political, and military presence on the Far Eastern coast. It also intensified tensions between Russia and Japan, leading to a power imbalance and culminating in the Russo-Japanese War.

Moreover, the Siberian Railway extended the USSR's influence over Central Asia and the Far East. During the subsequent Soviet-German War, the resources transported by this railway became vital for the Soviet Union's survival.

Compared to camel caravans and wagons, railways reduced transportation costs by about 50 times. Beijing transitioned from a medieval land port, where camels

lined up outside the city gates, to a central railway hub.

Roads and railways further slashed inland transportation costs to more acceptable levels. This rejuvenated cities around the world, while cities situated along canals saw a decline in their status. Numerous canals worldwide were abandoned or transformed into tourist attractions, akin to what we observe along the Potomac River in places like London or Washington, D.C.

Railways have been city creators. Harbin emerged from the intersection of the Siberian Railway's extensions in China – the East China Railway and the Harbin-Dalian Railway. Cities like Shijiazhuang and Zhengzhou rose from intersections of the Beijing-Hankou Railway with the Shijiazhuang-Taiyuan and Longhai railways respectively. Warren Buffett's hometown, Omaha, became a convergence point for railways in the eastern and western parts of the US. This is why these cities have developed into modern regional centers, and the origin of their cultural heritage.

Flatness and Disparity

Following railways, major technological leaps in infrastructure emerged, such as the telegraph, telephone, and airplanes. The internet can be perceived as an enhancement in bandwidth of telephone and telegraph technologies.

Thus, the speed and bandwidth of information transfer expanded infinitely, while costs plummeted to almost zero. The costs associated with the movement of goods decreased by thousands of times compared to the Stone Age. The entire planet moved closer to a state of technological equilibrium, where electric currents could virtually reach anywhere.

Today, the inland region of Guizhou has become a hub for big data. Advanced research projects, like the FAST radio telescope, are situated there.

Inland cities in the US like Nevada, Salt Lake City, Denver, and Phoenix have developed economically on par with coastal regions, even surpassing many areas worldwide. Transportation costs are no longer the primary or most sensitive expense.

However, despite these advancements, the world we observe today remains full of disparities. As transportation costs reduced, other transaction costs became more noticeable.

While new trends emerge, global business hubs are still primarily those cities that have long-standing commercial histories. The advantages they possess stem from their traditions – economic activities are path-dependent and continue along established trajectories. Traditional businesses and their practitioners have better reputations and stronger training capabilities, suggesting that traditional business networks likely hold cost advantages.

Other disparities exist in the world, like environmental differences. Some individuals might leave Beijing due to its air quality, retiring or vacationing in the South, which is a milder difference. However, more pronounced is the climate disparity – New York's film industry gradually shifted to Los Angeles, given the year-round filming conditions. Populations in the northeastern and northern parts of the US continue to decrease, while those in the south and west increase, climate plays a role as higher equipment efficiency and lower heating expenses. In warm Hainan Island, we see most of the immigrants from cold Heilongjiang.

Such disparities, capable of altering these traditional paths, give rise to new trends. However, the more potent disparities are those related to governance and politics.

Gulf nations like Qatar, Bahrain, and the UAE, when considering oil resources, geography, and population, don't differ significantly from other larger Middle Eastern nations. In ancient times, these smaller nations went unnoticed. Yet, the disparities in their political and judicial environments have led to their prosperity, in stark contrast to the difficulties of their neighbors.

North and South Korea share similar traditions and peoples, yet their vast disparities in political environments have set them on divergent paths. While their contrasting internet policies offer a glimpse into these differences, they are emblematic of the broader and profound policy disparities that define each nation.

15 the Patterns at Transportation Mode Change - from Ports and Warehouses to Metropolis

(Edited by the author on September 14, 2023)

The Costs of Mode Changes in Movement

Most listeners have probably experienced moving homes. The fees of a moving company are usually divided into several parts: Firstly, there's a base fee. Regardless of the distance, the minimum charge is 300 yuan. Then, they charge 8 yuan per kilometer for the vehicle's transport distance. For instance, if the distance is 20 kilometers, it would cost 160 yuan. Additionally, if the truck can't be parked right at the building's entrance and items need to be carried over a horizontal distance, there's an extra fee. If there's an elevator, the cost remains as described. However, if there isn't, they charge extra for carrying items up floors. I once used a moving service and spent a total of 880 yuan. Let me break down the costs:

The largest distance covered by heavy items is via the truck. Yet, out of the total cost, only 160 yuan is actually for the transport distance. The remaining 720 yuan can be broadly considered as loading and unloading fees.

This sentiment is shared by the movers. Their most relaxed and enjoyable moments are when they're sitting in the truck driving to the destination. On the other side, the processes of loading and unloading are very strenuous. Starting from Apartment A, they pack the items, and then, lift them onto their shoulders —that's one instance of loading. They place the items in the elevator, which is one unloading instance, then out of the elevator and onto a cart before loading onto the truck. Upon reaching the destination, the whole process is repeated in reverse. Throughout, besides human effort, three modes of transport are used: the truck, the cart, and the elevator. The most labor-intensive moments are the transitions between these modes, professionally termed as "mode-switching moments". Every mode switch is essentially a load or unload.

Another example:

I have two ways to commute to my office. The first method: I walk to the parking lot, which takes 5 minutes, then drive 10 kilometers to the office in 30

minutes, and finally walk from the office parking lot in 3 minutes. The whole journey takes 38 minutes, 30 of which are spent driving. The remaining 8 minutes are effectively the cost of using the car.

The second method: I walk 10 minutes to the subway station, spend another 5 minutes walking inside and waiting for the train, then ride the subway for 8 kilometers in 16 minutes. After that, I exit and catch a bus, which after waiting and walking takes 5 minutes, and ride it for 2 kilometers in 6 minutes. Lastly, I walk 5 minutes from the bus stop to the office. The entire journey $(10+5+16+5+6+5)$ takes 47 minutes. Even though my subway and bus rides total 22 minutes (faster than driving), the mode-switching time spent is 25 minutes, making the overall trip 9 minutes slower than driving. This 25-minute lag is what's referred to as "mode-switching time", which can occupy a significant portion of the entire commute.

Historically, it's always been like this. Moving a product from the producer's factory, to the wholesaler's warehouse, then to the retailer's store, and finally into the hands of the end-user, might involve numerous loadings and unloadings across various transport modes.

The labor consumed in loading and unloading can make up a large proportion of the total labor in the distribution process, sometimes even being the majority.

Moreover, at each stage, the products might not be immediately passed on. Often, there's a need for storage and oversight. Some goods are easy to store, while others require specialized care and handling.

In the last chapter, I mentioned many different forms of transportation, technically referred to as "transport modes". For instance, carrying by hand and carrying over the shoulder can be considered two distinct modes. Switching between these two positions can be exhausting. There are several transport modes such as mules, hand-pushed carts, horse-drawn carriages, canal boats, ships, trains, cars, airplanes, etc. Transitioning between these modes always involves loading and unloading activities.

So, last time, we discussed how advancements in transportation technology have reduced the resistance in movement. However, these improvements haven't substantially reduced the cost of loading and unloading goods. As transportation becomes faster and the costs of transit decrease, the proportion of loading and unloading costs in the entire transportation process becomes increasingly significant.

Optimizations - Port Phenomena in History

In movies and TV shows, we often see dockworkers portrayed.

There's a notable number of them. According to an article by Depalma in The New York Times, in 1950, there were 31,000 dockworkers in the New York port, far outnumbering the sailors.

Dockworkers mainly work manually, specializing in loading and unloading specific categories and packages of goods. Due to their repetitive tasks, they're highly efficient. Most of them are union members, earning more than the average white-collar worker.

Before modern times, dockworkers didn't exist. For instance, during Japan's Edo period, Nagasaki, the country's major port for foreign trade with the West, would see less than one Dutch merchant ship annually. Moreover, these ships typically stayed in the port for over a year, waiting for merchants to purchase and load Japanese goods for the return journey. With ample time on their hands, the sailors would often handle the loading and unloading themselves. Thus, dockworkers emerged as a specialized profession only when the volume of goods traded surged.

In ports, sailors had a lot of free time. Most weren't engaged in discussing Cartesian mathematics. In places like Dejima in Nagasaki, local Japanese women would entertain the sailors — this isn't just a tangent. Historically, entertainment industries thrived in traditional seaports, such as Amsterdam and Hamburg. The same was true for many ports along the Yangtze River.

Additionally, in ports, you'll find massive, ancient warehouses. In cities like Nagasaki, Otaru, and Baltimore, these warehouses have even become tourist attractions.

The space these warehouses occupy and the resources invested in them are also part of the loading and unloading costs.

Cities, with their ever-changing scenery, evolve to optimize and streamline the flow and handling of goods. This is a pivotal aspect of urban evolution.

The professional dockworker industry, specialized warehouses, and entertainment venues stand testament to the vast costs involved in transitioning between modes of transport. Yet, these establishments actually serve as efficient

means to manage and reduce such costs. With their help, the costs of transition are effectively controlled.

There are mainly three situations for loading, unloading, and storage:

1. At the point of modal switch - for instance, offloading from a truck and waiting for loading onto a ship.
2. When ownership changes - like selling goods from Person A to Person B, transferring from A's mode of transport to B's.
3. When raw materials need processing and enter a factory for that purpose.

A prominent way to streamline is to combine the trade and mode transition, optimizing two loading/unloading operations into one. Ideally, the production and processing stage is also completed during this transition.

Manufacturing industries often develop at docks. In Chicago, along the Chicago River, remnants of old factories, vast warehouses, and industrial facilities can be seen. When landing at Newark Airport, what strikes you isn't the city but the endless industrial ports, warehouses, and chemical companies along New Jersey's coastline.

Financial Activities from Mode Changes

Ports naturally foster trading hubs. Goods from Merchant A's ship sold to Merchant B can be transferred directly to B's warehouse, or even a neutral third-party warehouse. This minimizes physical movement, reducing trading to mere paperwork. Goods can seamlessly transfer ownership, keeping transaction costs low.

Imagine a scenario with negligible transaction costs and full transparency. For instance, Mr. A learns about a batch of generators in a New York warehouse priced at 1 million USD. He hears of an offer in Ohio for the same batch at 2 million USD. Transporting it costs 200,000 USD. While Mr. A only has 500,000 USD, he borrows the rest from a lender, Ms. Money. Upon sealing the deal, he repays her immediately. If, however, the deal doesn't go through, he could face a massive financial blow.

Financial jargon like "adding stock", "reducing stock", "opening a position", "closing a position", and "forced liquidation" often revolve around the central theme of warehouses.

Before the modern era, a country's largest warehouses were sometimes temples or treasuries. Banking was often a secondary industry. In the modern era, the most significant warehouses shifted to the docks, and modern banking took root there.

The financial hub in Shanxi's Pingyao during the Qing Dynasty might baffle many. But it's crucial to understand that Shanxi merchants had trade privileges with Mongolia and Russia due to collaborations during the Ming-Qing transition.

With credit comes insurance and various securities – bonds, stocks, and a plethora of intricate financial derivatives.

World financial centers, like London's East End, Downtown New York, Hong Kong, and Shanghai's Bund, all had docks, warehouses, industries, and financial districts, densely packed within a small area.

Surrounding the finance industry are legal firms, media, and policy organizations, typically managed by elites. Catering to these elites spurs the growth of high-end arts – symphonies, theater, museums, and luxury goods.

Transport, storage, processing, and basic services are the first integration level. Trade and finance represent the second level. High-end arts constitute the third level. Only London and New York have fully integrated these three levels, and such dominance isn't easily shifted by one generation.

Containerization and the Shrinking Dock Sites

Next, I'll discuss the impact of containerization technology on dock structures.

The term for a container in English is "intermodal container". Literally translated, it means a universally usable box between modes. Observe how the English term precisely captures its essence – whatever you need to transport, you simply put it in this container. Then, whether it's on the road, on rail, at sea, or any mode of transport, workers just move this box without peeking inside or handling its contents. When switching transport modes, a standardized semi-automatic machine transfers this multi-ton container from a ship onto a truck in just a minute. Notably, these containers are universally sized, identical to each other.

This technology, though sounding simple, took a long time to gain popularity. It was invented in the 1930s. But for its true potential to shine, associated ships,

vehicles, and dock equipment needed simultaneous modifications. It faced strong resistance and litigation from dockworkers' unions, especially from the International Longshoremen's Association (ILA). Only by 1980 did the U.S. Supreme Court reject the ILA's lawsuit.

The widespread adoption of this technology radically transformed the shipping industry. Compared to its peak, the number of dockworkers in New York has decreased by 90%. Overall transportation costs dropped even more significantly. Nowadays, enjoying imported goods has become commonplace. The word "Important" in English signifies significance, but it literally means "imported" (im-port), implying traditionally, imported items were crucial, irreplaceable, and worth any cost. Today, what's so special about imports? Often, they're just basic materials or primary industrial products like soybeans or textiles. These changes are largely attributed to the advent of containerization.

Containers have also significantly transformed cities, in tandem with the telecommunications industry. This has led to industrial docks departing from urban areas. Starting from the 1980s, docks worldwide have quieted, with warehouses and factories ceasing operations. Vast stretches of waterfront land, usually adjacent to city centers and financial districts, became vacant. These lands, often just a street away from prime urban real estate and overlooking scenic seas or rivers, became highly coveted. Consequently, global port authorities transitioned into major developers, with projects named "Waterfront Redevelopment", "Harbor City", "Port Future", and the like.

Cities such as Toronto, New York, Baltimore, Vancouver, London, Hamburg, Hong Kong, Yokohama, and many others have seen these transformations. Certainly, this is a topic worthy of a doctoral thesis. Every episode I produce could be turned into several theses. However, I've never written one myself, so we won't delve too deeply here.

In this segment, I focused on urban integration with the shift in cargo transport modes, primarily showcased through dock-centered cities. In the next episode, I'll discuss the phenomena of human transport mode-switching, now also termed as the TOD (Transit-Oriented Development) structural archetype.

16 the Patterns at Transportation Mode Change - Stations, Airports and Garages

(Edited by the author on September 21, 2023)

16 模式切换处结构——第三代CBD，或曰TOD

Passenger Time Spent in Mode Changes and the Concentration of Commerce

In the last segment, we discussed how goods often need to change owners and transportation modes during their journey. These switches require extensive loading and unloading activities, which consume a significant amount of labor and resources. Cities that have effectively minimized these costs while generating value during these transitional periods have naturally developed industries such as trade, finance, and services, largely around docks and warehouses. This is primarily targeted at the mode-switching of goods.

However, switching between different modes of transportation also requires humans to spend a considerable amount of time in transit. Seasoned travelers usually allocate a margin for uncertainty in their trips, arriving at the station 20 to 30 minutes before their train's departure. Layovers for flights often span several hours. Even waiting for a bus often takes up to ten or fifteen minutes. The time spent waiting for and transferring between modes of transportation can often exceed the actual ride time.

To pass the time during these waits for planes or trains, people will often eat or shop, making these high-demand activities at stations. Take the traditional Beijing area of Qianmen, where two major terminals lied together. It was also a bustling hub for dining and shopping during its era.

The world's busiest station is Tokyo's Shinjuku Station, where many of Tokyo's best cafés are also conveniently located.

In Osaka, the primary station is Umeda, where two major railway systems, JR and Hankyu, coexist side by side. Osaka's main shopping centers are concentrated in Umeda, a result of a long-standing tradition.

A fine grocery market of New York City is located within the 42nd Street Central Station. Occupying an elongated space, the market itself serves as a

pathway for commuters. It offers the utmost convenience for picking up groceries before or after work.

People living or working along the same rail line, or different lines, naturally choose a mutually accessible and familiar station for meetings. Inside New York's Central Station, the oyster restaurant is a popular spot for the city's upper class to discuss work.

Washington Union Station, situated between Pennsylvania Avenue, the White House, and Capitol Hill, is a prime location for the city's movers and shakers to meet for meals, even if they don't necessarily have a train to catch.

In Haruki Murakami's novels, writers often meet at some café in Shinjuku. In the TV show "Tokyo Tarareba Girls," women meet at the west exit of Ebisu Station after work to attend social events together.

Large stations are well-known locations, with their surrounding shops making excellent meeting points.

Office Locations Near Transit Hubs

If many people take the train to work, it makes sense to locate offices within walking distance of stations to maximize convenience for these commuters. Walking is a unique mode of transportation because it requires no technology and incurs no cost. If you exit a subway station and find that your destination is just beyond walking distance, necessitating a cab ride, your commuting expenses can increase significantly. The comfortable walking distance for most people is around a kilometer or within 15 minutes. Locating a company near a major interchange station significantly reduces employees' transportation costs and makes office development near stations an attractive option.

This leads to the phenomenon where office buildings are clustered around stations. Such clustering has inherent value. For example, in Hong Kong's Central and Admiralty districts, a banker may have meetings with various clients located within a few hundred meters. Walking 10 minutes could suffice for a highly efficient workday. These concentrations of office buildings also support a range of other services and facilities around the station.

Multi-Functional Spaces Over Transit Hubs: The Case of Madison Square Garden

Interestingly, New York's primary basketball and hockey venue, Madison Square Garden, also hosts numerous concerts. Its location is much more central than its

equivalents in cities like Shanghai or Beijing. Madison Square Garden is located directly above Penn Station, sharing the same footprint. This arrangement allows both team members and spectators to reach the venue via direct transit. One unique feature of such a venue is the lack of extensive parking facilities. On the one hand, space is at a premium, and on the other, Penn Station's parking can be used.

The Evolution of Multi-Functional Spaces Near Transit Hubs

Through these observations, we see that dining, shopping, working, social gatherings, and entertainment are all naturally clustered around significant transit stations. Urban spaces near these hubs evolve spontaneously to integrate these activities, almost inevitably becoming city centers in the absence of any disruptive human intervention. This phenomenon began with the advent of passenger transit routes. After over a century of development, it was formally named "Transit-Oriented Development" (TOD) by urban planner Peter Calthorpe in the 1970s. Only then did people seem to "wake up" to this reality, inspiring further theoretical exploration.

Understanding Stations as Fields of Influence

To clarify this topic, let's use an analogy that is easier to grasp for people with a scientific background. A station can be conceptualized as a field, much like a gravitational, electric, or magnetic field, where the intensity is inversely proportional to the square of the distance from the center.

The Dynamic Flow of People Around Stations

People disperse in all directions as they leave the station. Within a few dozen meters of the station's entrances, the human flow can be tens or even hundreds of times higher than on regular streets. Consequently, the efficiency of commercial facilities here is unparalleled. In reality, the highest rents are for these shops. The rents can be several tens or even hundreds of times higher than in residential areas.

Circles of Influence Around Stations

The true inner circle of influence is within 50 meters of the station exits. Though this area is small, its per-square-meter value is extremely high. The middle circle can extend up to 200 meters; the value here remains quite high. Once you go beyond to the outer circle, the value becomes average.

The Devil in the Details

In optimal station development, the inner and middle circles may be small, but they must be utilized to their full potential to capture value. For example, the best Hankyu department stores in Osaka are located within the inner circle. Properly capitalizing on this space isn't straightforward due to the need for bus stops and taxi stands, which take up a lot of space.

Ineffective designers might opt for large, empty plazas. These plazas can consume not only the inner circle but also the middle circle, leaving only the outer edges for office buildings and hotels, thereby wasting the value that could be generated from the flow of people.

Space Utilization in World-Class Station Designs

Excellent station area designs leave no room for waste. Every bit of space should be optimized, including that for transportation facilities. Kyoto Station, for instance, maximizes utility by having department stores, hotels, art galleries, and theaters within or above the station. In contrast, New York's Grand Central Station offers an even more brilliant case. Skyscrapers rise directly above it, with pillars filling the gaps between the railway tracks. Above these pillars is one of the most famous communities, Park Avenue, a luxurious residential and business district. Had previous generations not shown such foresight, what would Midtown Manhattan be like today?

Kyoto Station serves as an excellent example of station planning, while New York's Grand Central Station stands as a magnificent one. Both showcase the importance of understanding the dynamics of human flow around transit hubs and leveraging this to maximize value.

Three Generations of CBDs

Commercial districts throughout history have evolved through different phases. The first generation usually centered around temples or churches. In imperial cities, streets outside the royal castle were often the focal points for the residences of courtiers and shops catering to elites. The second generation was represented by port districts like Lower Manhattan in New York and the Bund in Shanghai. The third generation, which is the focus of our current discussion, revolves around transit hubs—active Transit-Oriented Developments (TODs).

Early Stations around the Peripheries of the Traditional City

When we speak of stations today, we often refer to subway stations. However, in the 19th century, the differentiation between subway and other urban railways

was not as clear. Early stations often served the dual role of both long-distance and commuter transit. These stations were usually built on the outskirts of cities. In many cities, this remains the case.

Early stations were generally constructed on the peripheries of traditional city centers. A helpful trick to understand the history of a city is to connect the locations of its multiple train stations, which usually outline the extent of the city's 19th-century core.

New Centers

Over time, these periphery stations often evolved into new city centers due to the high transportation capacity of railways. This phenomenon, known as 'latecomer advantage,' may sound paradoxical, but the key factor is the advent of transformative technologies.

Cities often have multiple stations that each develop their own commercial districts. By looking at the distribution of transit options and their respective influence, one can often make educated guesses about the relative importance of these commercial centers within the city.

Case Study: Osaka and New York

For instance, Osaka's Umeda station in the north connects major lines and is more significant than Namba station in the south, which connects less influential routes. In New York, Penn Station and Grand Central Station were built at the 19th-century outskirts but later became the epicenters of Midtown Manhattan, the world's most important financial district.

Midtown Manhattan developed around two main hubs, Penn Station and Grand Central Station, which can be likened to a binary star system. Each station has its own field of influence, but they also interact, creating a complex gravitational pull that shapes the commercial landscape between them.

Banking around Stations

Morgan Stanley and Bank of America are both situated within a kilometer of these two stations. They take advantage of the 'gravitational pull' of both stations, positioned strategically along major avenues leading uptown. Citigroup, on the other hand, is closer to Grand Central, becoming part of its sphere of influence.

In summary, the success of urban development often hinges on understanding and leveraging the dynamics of human flow around transit hubs. The complexities increase when multiple hubs are involved, as evident in cities like New York, which have successfully created world-leading commercial districts around their main stations.

T.O.D.

After discussing various urban stations, I'd like to touch briefly on suburban stations and their corresponding TOD (Transit-Oriented Development) implementations, which are not to be overlooked.

In many ways, suburban areas mimic the structures of urban settings, albeit with lower densities, less foot traffic, and consequently, reduced commercial value. Residential properties within walking distance of suburban stations often command higher prices compared to those requiring additional transit. For instance, in some suburbs near Washington, D.C., the price difference can be nearly twofold. In Japan, one of the most critical details in real estate listings, aside from the size of the property, is the walking distance to the nearest station. The value of residences around stations tends to decay slower than that of commercial districts, declining more uniformly within a kilometer radius. In other words, a subway station brings noticeable added value to residences within its one-kilometer radius.

Park and Ride

Commuters use various modes of transportation to reach these stations, including walking, buses, biking, or driving. Therefore, parking facilities can sometimes become very prominent features of suburban stations, particularly in American cities like Chicago and Washington, D.C. Parking lots are actually another form of modal transition points. While the number of people a large parking lot can accommodate is not comparable to a transit station, it could still be a significant congregation point within a city. The flow of people entering and exiting the parking areas can also take advantage of commercial facilities. In large outlet malls, stores near the parking entrances usually enjoy prime locations. Savvy developers might also place retail stores at strategic points within the parking infrastructure, such as on the first floor of a parking garage.

Aerotropolis

Airports share some structural similarities with stations but suffer a significant disadvantage: the large space taken up by tarmacs and runways dilutes urban density considerably. Thus, while airport business districts are also considered a typical form of commercial district, known as 'aerotropolis,' their scale and importance can't be equated with those surrounding stations.

17 the Evolution of Commercial Communities

(1) for Efficiency

(Edited by the author on September 22, 2023)

17 商业群落（上）演化



Next, I want to talk about commercial facilities in cities. To truly understand the nature of commercial facilities, it's essential to clarify some basic issues, as our most natural assumptions may not align with reality.

Let's start by considering a single unit of commerce, which can be likened to a cell. For example, let's think about a pancake stall.

What is the worst-case scenario for a pancake stall? Presumably, it's having no customers.

What's the next worst thing? Perhaps it would be another pancake stall selling the exact same pancakes setting up shop right next to it.

The following question is: what happens if a bun stall opens next to the pancake stall? What's the relationship between buns and pancakes?

On the surface, a bun stall might siphon off some customers who initially wanted pancakes. However, the opposite could also occur; customers who

intended to buy buns might end up choosing pancakes. Alternatively, some customers might decide to purchase both.

Despite the apparent competitive relationship, these stalls could also be attracting customers for one another. Some customers may have a straightforward idea: they just want breakfast. Knowing that they can find a variety of breakfast options at a particular location, they choose to go there. They might not have a specific preference in mind when setting off, only making a choice when they see the range of options available. In contrast, if only one type of breakfast is offered, they might decide not to go at all.

The increase in product variety enhances the destination's appeal, drawing more customers to the area. This dual role of competition and mutual attraction among businesses is crucial for understanding the intricate dynamics of commercial spaces in urban settings.

Adjacent stores can either harm or benefit each other. Both dynamics coexist, making it challenging to determine which is more prominent. But don't worry; if two shops severely undermine each other, one or both will likely shut down or pivot to a different business, thereby ending their symbiotic relationship. Conversely, if they create a mutually beneficial setting, their symbiosis could grow into a more complex and large-scale community.

In real life, a woman might initially intend to buy Chanel but then switch to the neighboring Louis Vuitton. This is common and reflects why these luxury brands often choose to locate near each other. The draw of a shopping area with multiple luxury brands like Chanel, LV, Dior, and Prada is much more significant than a standalone store. So even if Chanel has to share its customer base, it's beneficial to be part of such a community.

Interestingly, opening a pancake stand identical to one next door may seem like a spiteful move, but it's not necessarily disadvantageous. If the customer demand is high and one stand can't meet it, the second stand increases the supply and efficiency. If one vendor is absent, the other provides continuity, stabilizing the supply and increasing the number of customers who are willing to buy pancakes.

Moreover, two similar pancake stands can assist each other. For example, if one runs out of eggs, it can borrow from the other. This sharing extends to other supplies, optimizing the logistics and reducing costs. In doing so, they don't have to individually manage every supply channel and can divide labor, saving time.

Another interesting point is that when a person wants to buy a pancake but is hesitant because he finds it expensive at one stand, seeing the same price at another stand often convinces him to make the purchase. This increases market transparency, facilitating transactions and reducing transaction costs.

In reality, we see clusters of similar businesses, like a street in New York that's all flower shops. Years ago, I went to an electronics market in Zhongguancun, where every stall claimed to sell graphic cards. If you showed interest, they'd go and buy one from a neighboring stall to sell to you. This kind of homogenized business environment can be mutually beneficial. One way to think about it is as different departments within a single large-scale enterprise.

A hundred shops each selling one type of product and one shop selling a hundred types of products can, to a certain extent, be equivalent. It's just a matter of collaboration costs. Two very similar pancake stands may also differ in services; for example, one owner may be male, and the other female, attracting different customers. Over time, they might even specialize in different flavors. This kind of division of labor and collaboration could evolve from destructive competition to constructive competition, requiring a period of adjustment and repeated interactions between the operators and customers. Sometimes, given enough time, even low-end industries can gradually upgrade and develop more mature and complex business models.

The more patient the authorities are in giving these businesses time to evolve, the more likely these businesses will aim for long-term benefits and build reputations. Impatient authorities might instead force these businesses to seek quick profits or even engage in scams. The stronger a community of merchants is in developing collaborative models, the more likely they will evolve into more efficient and complex systems.

Geographically, markets can be linear, located along a busy thoroughfare, or centralized, like a plaza in front of a temple. Linear markets are efficient for passersby, but if stretched too long, they become inefficient for shoppers. Centralized markets are more efficient for people who are there to compare and buy specific goods. Generally, it's a combination of the two.

This kind of market clustering is common. Shops typically do not compete as single entities but as part of a larger community of shops. This community competes as a unit against other similar communities, not as individual stores. In ancient times, markets and stalls would cluster during religious festivals,

allowing merchants to follow these dates and serve multiple towns. This system was also observed in ancient Pompeii and continues to be observed in the cyclic appearance of markets in different towns in North China.

In summary, clusters of shops or goods are far more common than isolated shops like the lone "Mrs. Sun's Bun Shop." This collective approach to market competition tends to be the norm rather than the exception.

In ancient times, it was common for various shops and stalls to gather during markets or temple festivals. People would go to temples to worship on religious holidays, and merchants would gather outside the temples to sell goods, providing great convenience to worshippers. Each town had its own deities with specific worship days, enabling merchants to move from one town to another according to these dates.

Archaeological records from Pompeii indicate that markets took place on different days in various towns. The same happens in North China, where markets periodically appear in different towns based on specific dates.

Another type of market cycle is industry-specific, for example, selling used goods on the 5th, livestock on the 8th, and grains on the 10th of the month. This leads to higher transaction volumes. Markets can be geometrically distributed in two ways: linearly, along a busy thoroughfare, or centralized, typically in a square in front of a temple. Linear markets are efficient for passersby but become less so when stretched too long. Centralized markets are more efficient for those who are there to compare and purchase specific goods. In reality, markets often combine both types.

To operate in all weather conditions, markets might have permanent roofs, like in Istanbul's bazaars or in Athens, Rome, and Milan's arcaded markets. Whether built by city authorities or private entrepreneurs, the builders could charge stall fees. These markets often surrounded significant locations, usually temple entrances, and were called 'forums'. The term 'forum' originally referred to these arcades, which served as marketplaces but also facilitated discussions and had political functions.

Generally, markets are based on transient merchants who struggle to establish business credit and guarantee product quality. Fixed stalls or shops are excellent complements to markets. They have higher operational costs and require a stable customer base, appearing much later during the Hellenistic period of urban economic development. The shops in ancient Rome were called 'taberna,' and

they appeared on busy city streets. In Pompeii, courtyard houses along main roads had rooms used as shops. These shops sold a variety of goods, often including eateries, the English word 'tavern' deriving from the Roman term 'taberna'. Shops allowed for credit-based transactions and helped build a class of credible professional merchants.

In modern times, we have department stores or supermarkets that sell a wide range of products and services from hundreds of manufacturers. These stores guarantee quality, and while they may not lower prices, they reduce transaction costs. This appeals to customers who are less sensitive to price changes.

Such department stores or supermarkets have not fully replaced traditional market communities, as many price-sensitive customers still prefer them. Large malls often combine with smaller shops on adjacent streets to form a larger, more efficient system. Different types of stores exhibit different types of adaptability, and while small shops frequently change ownership, they seldom disappear entirely. Large malls, however, can usually weather economic downturns because the cost of brand failure is higher for them. Both contribute to the stability and adaptability of a shopping district.

Today, large malls, department stores, and supermarket chains occupy a significant market share. They represent superior organizational capabilities and credit accumulation. However, small shops and even street vendors, like those sometimes encountered selling turtles and car accessories on Beijing streets, continue to exist. These entities can emerge and evolve, with various businesses shifting between being large and small based on dynamic and intermittent equilibriums. Thus, the landscape of commerce is forever evolving, with competition focusing on efficiency and adaptability to changing environments.

Business organization is a complicated topic covering different types of commerce, from street vendors and farmers' markets to single-business shops, mixed-business stores, department stores, supermarkets, and commercial complexes. Each is a specialized subject that could warrant many academic papers and consultancy reports. The competition between them is similar to what we see in biological ecosystems, vying for efficiency and adaptability to changing environments.



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(2) Pedestrian Driven

Understanding Modes

The underlying logic of urban commercial systems was clarified in the last installment. Now, let's revisit chapter 91-92 (or 13-14 of this series), where we discussed how transportation modes profoundly affect our world.

Urban commercial systems are a product of past transportation habits, are currently influenced by existing modes, and will evolve according to future transportation trends. In analyzing commercial patterns, reports often provide metrics like population within a three-kilometer radius or within a five-kilometer radius. While these indicators have value, they're relatively coarse measures that don't capture the essence of transportation and population dynamics.

Economic activities are not bounded by distance in kilometers but are more appropriately classified by modes of transportation—whether people walk, bike, ride motorcycles, drive cars, take buses, or even fly. Transportation costs, encompassing both time and resources, constitute a significant and sensitive component of the overall production and transaction costs.

Any decision you make, regardless of its underlying motive, will gain a competitive edge if it reduces the system's transportation costs. On the other hand, if your design significantly elevates these costs, it risks punishment through market forces and may ultimately be phased out. That's how evolution works.

In the context of modern cities, it's crucial to understand the inherent traits of various primary transportation modes. By grasping these nuances, one can develop methods to make these transportation systems more efficient, cost-effective, user-friendly, and valuable in competitive markets, all while achieving intellectual aesthetic.

Walking: The Foundational Layer of Mobility

Let's first delve into the elementary stratum of mobility: walking. The significance of walking as a mode of transportation is twofold.

Firstly, the built environments where we spend our lives—homes, offices, and stores—are fundamentally architected around the walking experience. Except for those who rely on wheelchairs, walking is the default. This implicates that designers of commercial spaces, as well as those focusing on interior, residential, and industrial design, must cultivate an acute understanding of walking as a primary mode of human movement.

Secondly, regardless of the main mode of transportation—be it taking the bus or driving a car—the first and last stretches of any journey involve walking. From home to parking lot, from parking lot to station—these are spans traversed on foot. This is particularly true for mass transit systems like subways and buses, where pedestrian transit links the dots between various modes. Should the walking environment be inefficient or unpleasant, it undermines the overall effectiveness and desirability of the public transport system itself. Without a robust walking infrastructure, there can be no robust public transportation.

Thus, walking retains its crown as the most vital mode of urban transportation, even today. While its share in many cities may have diminished, it remains the most fundamental and economical option. In contrast to other forms of transit, walking costs not money, but time.

Strictly speaking, walking also consumes energy that must be replenished with food, entailing a cost. However, in societies replete with excess nutrition, this caloric expenditure often becomes a form of enjoyment rather than a burden.

Walking offers tangible economic benefits. Those who walk to work save on the purchase of a vehicle, on fuel costs, on parking spaces, on insurance premiums, on taxes, and on maintenance—potentially amounting to savings of thousands per month. Consequently, walking serves as a societal boon; it is equitable, benefiting the lower-income classes and those just entering the workforce by easing their financial burdens and accelerating their social upward mobility. It acts as both a social stabilizer and an incubator for innovation.

Furthermore, compared to other modes of transportation, walking's carbon footprint and environmental impact are virtually negligible. It neither requires large vehicles nor consumes significant resources, and it obviates the need for extensive parking facilities. Hence, as a component of an urban ecosystem, walking is the most sustainable form of transport. Cities like New York, where walking is most prevalent, are also those that generate the highest GDP for the

energy consumed. Of course, the challenge remains to improve walking speed for covering longer distances.

Walking: An Historical and Socio-Spatial Perspective

Walking, as a form of transit, has ancient roots. Before the advent of the industrial age, while there were modes like horse-drawn carriages, these were used by a minority. Walking was the dominant form of urban movement. All traditional cities—those that came into being before the era of automobiles—evolved around this form of mobility.

Consider ancient cities with populations under 7,000—a figure that would qualify only as a small town in the modern world. Yet, in antiquity, this was considered a medium-sized city primarily inhabited by tradespeople or professional soldiers. The businesses and professions found in these cities far outnumbered those in a modern small town of equivalent population. These traditional cities had an area proportionate to their population, usually extending to about a mile in diameter once the population reached around 7,000. Given this scale, all inhabitants were generally within 800 meters of the city center, reachable within 10 minutes by foot at an average pace of 80 meters per minute. Whether heading to a church, workplace, market, or entertainment venue, everything was close by.

Even in inclement weather, this commuting distance wasn't particularly burdensome—an indicator of a high quality of life. But as populations grew, individuals favored central locations over peripheral ones, sacrificing space to increase density. The expansion of the city slowed, with population density growing unevenly across the center. Network effects amplified the land value in main commercial zones, leading to a decline in courtyards and an increase in multi-story buildings.

The limitation in density was essentially a constraint set by architectural technology. In the absence of modern innovations like elevators and steel frameworks, buildings could not exceed six stories. Carthage mostly had six-story structures, whereas ancient Rome had apartments that reached up to 11 stories—quite an ascent without elevators. People were willing to climb because the alternative, residing further away, was less appealing.

Even if we haven't seen these ancient metropolises, contemporary "urban villages" in Shenzhen, Dongguan, or the now-demolished Kowloon Walled City in Hong Kong serve as analogous models of self-organized complexity. Most

significant ancient cities did not exceed diameters of two or three kilometers and could sustain populations between 100,000 to 200,000. The population density, therefore, would range between 20,000 to 60,000 individuals per square kilometer, making these cities far denser than most modern urban centers.

From a military standpoint, a defense force of a few thousand could effectively guard a wall a few kilometers long. Hence, many renowned cities were strategically placed near natural barriers to reduce the length of their defensive walls. Urban sprawl was anathema in an age when distance was measured in walking time.

The compact and walk-friendly character of traditional cities has been labeled as "Smart Growth" in the United States and more frequently as "Compact City" or "Urban Intensification" in the United Kingdom. These urban planning paradigms adhere to market and efficiency principles and are ecologically sustainable. The core idea hinges on a "triple bottom line accounting," balancing human well-being, environmental sustainability, and commercial viability.

However, resistance to urban density and compactness also has its advocates, the origins of which are complex. The anti-density narrative is sometimes tinged with elitism while also resonating with populist and anti-intellectual sentiments. Thus, the "Smart Growth" argument serves as a counter-narrative in this ideological struggle.

This wraps up our exploration of the role of walking in cities, both past and present. While modes of transport have evolved, the basic principles of urban design around walking hold valuable lessons for modern-day planners and residents alike. The parameters may change, but the essence remains—a well-designed city must prioritize the feet that tread its streets.

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(3) Transportation Mode of the Customers

Efficiency: Domestic and Urban

Before diving into the intricacies of street design, let's examine the spatial organization within our homes and offices. Typically, the master bedroom is closer to the bathroom, while the secondary bedroom is farther away. Similarly, conference rooms are usually situated near the offices of company leaders—a few meters can make all the difference, revealing a hierarchy of privileges.

Imagine asking your spouse or boyfriend to walk a few meters to turn off the light or fetch a remote control. These small conveniences are, in themselves, a form of cherished privilege. The allure of an efficient layout design in a home comes from having multiple access points—for instance, a bedroom door opening to the living room, another to the study, and another to a balcony. Such interconnected design provides various shortcuts, making navigation between rooms much more convenient.

However, a domestic space can't be all corridors; otherwise, there'd be no room for furniture or living. These passageways, too, occupy space. Designers meticulously consider every meter and centimeter when planning a layout, an attention to detail that should be equally applied in urban planning. In an efficiency-driven city, a web of interconnected streets and shortcuts not only saves time but also adds to the overall functionality. The principles at play are consistent between domestic layouts and city infrastructure.

As ordinary citizens, we often find ourselves wanting to go to Point A, which is visible right in front of us, yet have to circle around a barrier or fence, sometimes walking hundreds of extra meters. Take, for instance, crossing from the east gate to the west gate of Chaoyang Park. If the park is open, the direct walk is only about 1 kilometer. But if the park is closed, walking around its perimeter takes about 3 kilometers—an additional 2 kilometers simply because one direct route is unavailable. The convenience enjoyed at home a hundred times over may not necessarily offset this inconvenience. Therefore, having a web of streets within a not-so-large fenced area ensures we don't have to take circuitous routes.

However, there's a trade-off: more streets and shortcuts consume land, diluting the urban density and potentially lowering efficiency. We must balance the convenience of interconnected pathways with the need to maintain a compact, functional urban environment.

Street systems in pedestrian-dominated environments

Informal Occupation

In spontaneous settings, many individuals may seek to encroach upon public roads. If such occupation does not interfere with the public function of these spaces, it is generally tolerated and not dismantled. Alternatively, a lack of organized public resistance may allow such occupation to persist unchecked.

However, excessive road occupation is usually curbed—the saying goes that "even a good dog doesn't stand in the way."

Equilibrium

The need for a dense network of easily accessible roads is in tension with the desire to repurpose road space for other uses. These opposing forces are continually at play.

A street holds its value based on its width and its convenience for both pedestrian and vehicular movement, often outweighing its value as potential building land.

The equilibrium—or the state of optimal efficiency—between these conflicting needs often takes years to evolve.

The configuration of cities we observe today is the result of such evolution, and different cities exhibit different equilibrium states:

For instance, the labyrinthine streets of ancient Italian cities like Bologna and Florence are more interconnected than those in ancient Egyptian and Indian cities like Cairo and Ahmedabad, where dead-ends are far more common.

This is likely influenced by each community's approach to public management and could also be related to historical events like disasters or population fluctuations.

In some cities, the ruling authority commands such respect that no one dares to encroach upon the roads the ruler frequently uses. However, other roads may fall

into neglect and become blocked, effectively turning into dead-ends.

Or perhaps, the city underwent a crisis that led to depopulation and decay, turning once well-maintained infrastructures, including roads, into ownerless assets subject to random occupation. As a result, previously functional road systems may become fragmented, turning into dead-end alleys.

From a topological perspective, traversable roads and dead-ends represent two distinct types of pathways.

Moreover, external changes, such as technological advancements, can also shift this equilibrium state.

Demand for a dense network of easily accessible roads conflicts with the desire to use road space for other purposes. The equilibrium—or optimal efficiency—between these competing needs is a result of years of evolution.

What we see in the state of cities today is the outcome of this evolution.

Hierarchy

Stop for a moment and imagine what such a system would ultimately evolve into?

What usually emerges is a hierarchical system: major roads are few but carry the most traffic; smaller roads are numerous but don't experience as much traffic.

However, let's reverse the usual approach and start from the smallest roads.

The Minimal

The minimal width of a road is vital as it represents the most efficient use of space:

The shoulder width of an average adult ranges between 40-50 cm. When walking, a width of 80-90 cm is generally comfortable. This is sufficient for two people walking in opposite directions to pass each other rather tightly. The minimum effective width of a street is, therefore, around 80-90 cm. Such narrow alleys are common in Medieval Europe, Mumbai's slums, old Beijing, and commercial districts in Tokyo's Kichijoji. In fact, this width is often seen within our homes for doors and passageways. Such narrow roads certainly save a lot of space. In cities like Ahmedabad in Gujarat, India, or Cairo, Egypt, where

the sun is intense and there's no need for freight traffic in residential areas, many streets are indeed this narrow.

However, such lanes are not without their shortcomings.

When walking in the streets, we often do so with friends and family. Social interactions require more space. Such narrow roads can't accommodate wagons or make it easy to move goods. They're also inconvenient for construction work. Furthermore, houses without courtyards depend on windows facing the street for natural light, which isn't effective if the street is too narrow. So, while streets narrower than 1 meter are common, they aren't the dominant types of roads in cities.

The Intermediate

Good commercial streets should allow two pairs of pedestrians walking shoulder to shoulder to pass each other, with some room to spare. Also, shops need to accommodate customers coming in and out. This requires a width of at least 3 meters.

In Beijing, this would be a medium-small alley; in Shanghai, it would be one of the narrower lanes in a Shikumen complex.

Streets 3-4 meters wide are not as narrow as some professionals might imagine. They can accommodate horse-drawn carriages or pushcarts.

In terms of its effective width for the passage of pedestrians, it greatly surpasses that of the gateways at modern metro stations. Such streets can accommodate peak flows of several thousand to tens of thousands of people per hour, and tens of thousands of people daily. This is the width of the main commercial street in Venice, Merceria Orologio, as well as the corridors of Istanbul's Grand Bazaar and the typical indoor pathways in modern shopping malls.

However, 3-4 meter wide pedestrian streets have one issue: if a few people stand still in the middle of the road to discuss something—say, whether to go north for a meat sandwich or south for noodles—they can obstruct the flow of pedestrian traffic. This kind of standing around isn't very polite.

Conversely, people tend not to loiter on such roads to avoid blocking the way. Even beggars prefer not to be there. Panhandlers also try to avoid obstructing the path as it tends to invite public resentment, which could affect their panhandling effectiveness. So, while these 3-4 meter streets can handle

pedestrian traffic well, they're not conducive to social interaction or commercial activities. Nor can they accommodate large vehicles passing each other, making them less than ideal for frequent freight traffic.

The Grand

To address issues of crowding and transport, cities often have wider streets, especially in vital commercial zones where the main pedestrian pathways should exceed 5 meters in width.

Once a walkway reaches 5 meters in width, it can accommodate a massive pedestrian flow. The saturation capacity of a 5-meter wide pedestrian path is roughly 20,000 people per hour. This means that the number of pedestrians passing through a 5-meter wide pathway in an hour exceeds the number of cars that would pass through a 35-meter wide, 10-lane road in the same time frame.

In general, pedestrian pathways don't see such enormous numbers. Hence, these wide pathways can also accommodate social and commercial activities. Stalls can be set up, and businesses can occupy portions of the street for temporary operations, like setting up tables for outdoor dining. This leads to a more multi-functional street.

A 5-meter wide sidewalk is the width you'll find on New York's Fifth Avenue or in the pleasant downtown area of Portland. Students can gather around a professor at the side of the road for a lesson without causing any obstructions.

Beyond this width, the benefits of added width become marginal. In less populated areas, this width might even be excessive. Generally, sidewalks wider than 5 meters are unnecessary. Of course, some cities, like Moscow, are deliberately widening sidewalks beyond 5 meters to create a sense of grandeur.

Mixed Street

The above discussion focuses on sidewalks, but in main roads with lots of vehicular traffic, there must be separate lanes for different types of vehicles, distinct from pedestrian pathways. At intersections or crosswalks, people and vehicles will intersect. Sometimes crossing the street feels like a bothersome, stressful, and dangerous activity. A fundamental reason for this feeling is that the lanes for motorized vehicles are too wide.

From a pedestrian's perspective, crossing is not very difficult on roads with four or fewer lanes. Roads with more than four lanes make it challenging for

pedestrians to cross safely and conveniently.

Developed countries are now focusing on enhancing the walking environment by narrowing the width of lanes for motorized vehicles to less than 10 meters, to give a feeling of leisurely walking. Lanes wider than 15 meters are to be avoided. However, such wide lanes—even those as wide as 30 meters—are frequently encountered in real life (in China), reflecting a lag in the road design industry's understanding.

In traditional cities, the experience of walking is often free and relaxed; you traverse numerous neighborhoods with limited interference from motor vehicles. For example, in a typical Italian city like Ravenna, most buildings are about four stories high, and the streets are narrow, restricting the speed of cars. The roadways are so slim that they are easily crossed on foot. There are no large, enclosing walls—only individual courtyards for each household. The road network is intricate, with diagonally positioned streets ensuring that you never have to go out of your way to reach your destination. This is an environment sculpted by the dominant mode of pedestrian transport over a long history.

Considering a walking distance of 500 meters, there could be thousands of people within this radius, capable of supporting more than just a single convenience store. On streets with high foot traffic, restaurants, cafes, bars, tobacco shops, grocery stores, laundromats, and even furniture and clothing stores can form dense, bustling corners. These areas offer a variety of activities, epitomizing the concept of a 'Main Street.'

Away from the Main Street, on quieter roads, you'll find smaller corners with cafes, bars, and grocery shops all in one, serving a much smaller radius of perhaps only 50 meters. These small shops, ranging from a few tens to a couple of hundred square meters in size, often serve a relatively stable customer base, possibly over multiple generations. This is the condition of most traditional cities worldwide, be it in Ravenna, Munich, or Tokyo's Shinjuku Kabukicho district. Even modern metropolises like Chicago and New York offer a comfortable walking experience. This was one of my deepest impressions when I first stepped out to explore traditional cities around the world.

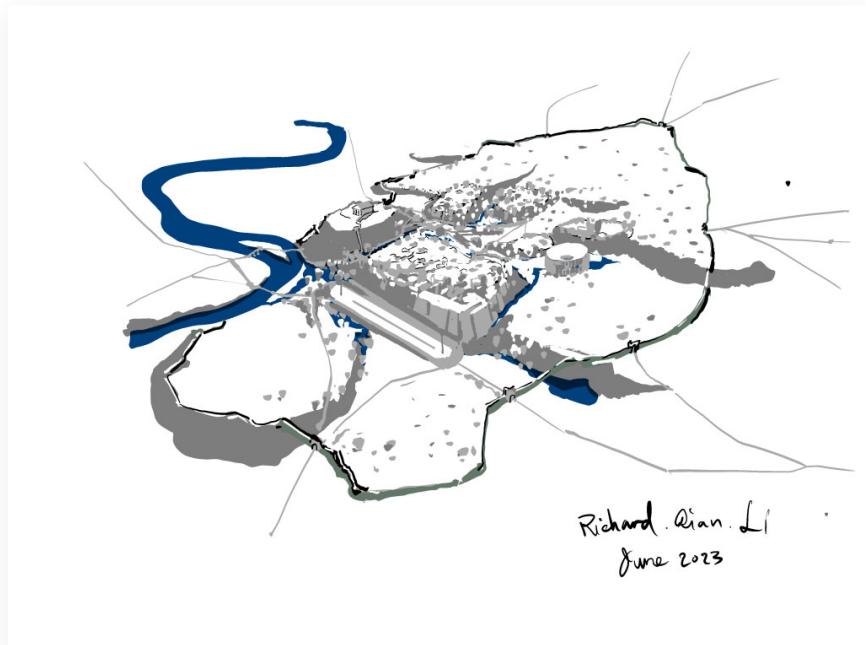
In China, such traditional walkable areas are not lacking either. The ancient town of Lijiang and Shanghai's old French Concession are also very pedestrian-friendly.

These areas nurture a lifestyle that doesn't depend on cars—environmentally friendly and cost-effective, offering people a valuable choice. This is the wealth bestowed upon them by the tradition of urban walking.

To preserve this wealth, it's essential to recognize and appreciate the vital knowledge it encapsulates—a type of wisdom that is universally admired yet astonishingly forgotten in some places.

20 How Walls Reflect the Social Structure

(Edited by the author on September 22, 2023)



(Figures above: early Rome and after the erection of the common wall)

This talk, which explores the relationship between city defense systems and social structures, follows Lecture 6 of the larger seminar series on Urban Evolution titled "The Game of Thrones—Castle Economics."

As I mentioned before, a human settlement, whether originating from a fortress of an armed group, a holy land or temple, or an oasis for water collection along a trade route, will eventually converge and integrate into a city with defenses, religion, and economics. These cities form spatial structures with distinct inner and outer layers.

In this context, defense structures like towers and city walls serve as the city's exoskeleton, revealing its form and reflecting its social structure. Understanding this offers a wealth of knowledge about the history of cities. If you look at ancient records with reactions like, "Ah, glory! Ah, greatness!" then you're merely a casual observer.

A typical city defense structure includes a central castle, inner city, and outer city. I won't go into the details here as I've discussed it before. These walls not only serve as defenses but also demarcate the community's security boundaries. Inside the inner city wall live the so-called "citizens" of the Zhou dynasty, the colonizers and rulers. Outside the outer city wall are the "barbarians," those who are colonized or ruled. The area between these walls is a gray zone, a space for people who are still in a probationary citizen phase.

How does an outer city develop? Citizens and "barbarians" frequently trade, and these "barbarians" who engage in trade and services gather near the city gates. Initially, they establish markets and residential areas in an ad-hoc manner, forming temporary occupations. These settlements eventually gain recognition and evolve into established communities, often with strong commercial characteristics. Examples include the East Gate in ancient Xi'an, Qianmen Street in Beijing, and commercial districts in Vienna and London during Roman times.

When it comes to the 'barbarians', they engage in economic collaborations with the 'citizens' through these communities, forming trade relationships. These collaborators hold a precarious status—somewhere between citizens and barbarians, similar to collaborators during wars.

These commercial areas outside the city gates lack protection from city walls and can be abandoned during enemy attacks. For example, during the Ming Dynasty, Beijing was never conquered by the Mongols or the Qing Dynasty, but the surrounding villages were looted several times.

The enemy could also use these external communities as hiding places and siege bases. For instance, in 1852, the Qing Dynasty destroyed Wuchang's external communities to prevent the Taiping army from having hiding places, resulting in a humanitarian disaster.

As integration deepens, these communities become more like citizens, economically and politically important. They are often enclosed by new walls, forming the lower or outer city. This concentric structure of cities becomes clearly visible in their physical exoskeleton.

Originally, the inner city housed first-class citizens, the lower city had second-class citizens, and now with the advent of an outer city, there are third-class citizens. This makes the second-class citizens feel closer to the first-class citizens, indicating successful integration.

Of course, these exoskeletons can both expand and shrink. For example, Yuan Dadu on the north side was not fully filled, so the Ming Dynasty shrunk it by three kilometers to the south for easier defense and better public safety management.

This concentric design, a typical mono-core defense structure, reflects a pyramid-like social structure.

Cities are not necessarily mono-centric; other structures exist, such as polycentric ones, which reflect federated social structures. The most famous example is ancient Rome. Initially, three tribes coexisted, forming several fortified settlements on Rome's seven hills and constituting a tribal federation. The Latin tribe was the primary tribe, while the Sabines and Etruscans were guest tribes. Over generations of integration, the federation stabilized, and the tribes completely assimilated. The flatlands between the forts developed into commercial areas, eventually unifying into a single defense system represented by the Servian Wall, which surrounded all seven hills. Once unified, the individual forts became irrelevant for defense, giving way to an open community structure. By then, the Roman city-state was undoubtedly established.

By the 3rd century AD, Rome expanded significantly beyond the walls. Due to its uncontested rule over the empire, and a period of peace, the walls became unnecessary. Rome during this era was essentially a wall-less open city. Similar open cities have appeared in ancient history, such as in ancient Egypt and Central America, but they were usually short-lived and did not form a lasting

trend. By the 4th century, during the reign of Aurelian and with the threat of barbarian invasions, Rome built an even larger new set of walls, which still stand today. This is a typical case of urban expansion.

Conversely, the disintegration of power and political fragmentation can lead to the decay of city defenses. The thousand years from the fall of the Roman Empire to the Renaissance saw a fragmented Europe, exemplified by tower-filled cities in Northern Italy like Siena, Bologna, and San Gimignano. These reflect a shift in defense from a unified public service to family-based units. Complex diplomatic and alliance relations existed among families within these cities, along with intermittent civil wars. This was, in essence, a reversal of the process through which Roman city-states and the empire formed.

Kyoto in Japan experienced a similar situation. Established in the 8th century, originally known as Heian-kyo, it was ambitiously planned but was never even half filled. The planning exceeded the actual needs and capabilities of the Heian regime. With the failure of the Ritsuryo state system, Heian-kyo devolved into disconnected, fortified islands representing various feudal lords. Each had its own walls, towers, and even moats. Essentially, the national capital's defense disintegrated, and lords, temples, and noble officials had to fend for themselves or seek protection from more capable lords.

For instance, Honnoji, where Oda Nobunaga met his end, was not a simple guest house; it was a fortress. The Kyoto Imperial Palace also had its own independent walls and moats. Moreover, there were large fortresses like Nijo Castle and Fushimi Castle, each with its own defense systems and even their commercial service systems in the lower cities.

Returning to the main point, are mono-centric cities truly mono-centric? The relationship between Constantinople and Galata, for example, reflected an alliance between the Byzantines, Varangians, and Genoese. The relationship between Westminster and London symbolized the alliance between the British monarch and the urban bourgeoisie.

To summarize:

Mono-centric forms reflect a more polarized governance structure, while alliance forms have more complex internal tensions. However, there is never an absolutely singular governance; elements of alliance always exist and manifest in the details of the city.

These forms are either in the process of integration or disintegration, depending on the success of the unification efforts.

Some cities expand, growing additional layers of city gates and outer walls.

Conversely, there are cities that contract, either due to the collapse of governance, resource depletion, or external pressures, resulting in a reduced scale of city defenses.

In the modern era, especially after the Franco-Prussian War, the advent of heavy artillery made walls and towers obsolete. Some cities have preserved these walls as historical landmarks or parks. Most cities entered a phase of dismantling their walls and moats.

Once these fortifications are removed, they often become wide, circular roads, usually lined with trees and green spaces. These roads are specifically termed "Boulevards," originally referring to bulwarks or protruding gun platforms on city walls. The term "Boulevard" has now been redefined to mean wide, tree-lined avenues. In Vienna, it's called the "Ring Strasse," and in Moscow, it's directly called the "Boulevard Ring." Beijing's Second Ring Road could well be named the "Boulevard Ring" as it was indeed built after the dismantling of city fortifications in the 1960s.

Modern city defenses adapted to contemporary warfare usually appear as inconspicuous bunkers, integrated with barbed-wire fences and trench systems. They are unobtrusive and do not take up much space.

The advent of the nation-state has significantly diminished the rural-urban divide. The equipment gap between regular army and militias widened, making a diverse armed force implausible and leading to flatter internal structures.

All of these have contributed to the disappearance of walls and the emergence of more open cities, leading to more sprawling urban expansion. We will discuss later the suburbanization and urban sprawl resulting from new means of transportation like trams, cars, and elevators.

However, that does not mean enclosed fortifications have disappeared. They still exist in the form of military installations, government buildings, institutions, corporations, and even schools. Sometimes, these are referred to as "compounds," featuring strict security measures. Prisons are universally enclosed fortifications. In China, even residential areas often have security gates. These fortifications honestly reflect the tension between them and the outside world. I

had discussed this in greater detail in my 2016 New Year's discussion on block zoning.

Up next, I will discuss the evolution of cities brought about by modes of transportation like trams, cars, and elevators.

21 Suburbanization - First Half - Train Induced Suburbanization

21 开始于电车的郊区化

(Edited by the author on September 22, 2023)

In this chapter we discuss the phenomenon of the suburbanization of cities.

In the field of urban studies, suburbanization is a significant topic, and for good reason. If we look at today's cities, suburban areas have far exceeded the size of the urban core. Taking the United States as an example, more than half of the population resides in the suburbs, surpassing both urban and rural areas combined. So, today, it's more accurate to say that we live in a suburban era. But what exactly is suburbanization?

the Definition of Suburbanization

Before the 19th century, cities were relatively small, typically with diameters of 1-2 kilometers. Even major capitals like Constantinople and Yuan Dynasty's Dadu (modern Beijing) had diameters of only 5-6 kilometers. The population and building density within the city were quite high, ranging from 5,000 to 50,000 people per square kilometer. Beyond the city limits lay rural areas with very low population and building density, often more than ten times lower. Visually, these two areas were distinct and easily separated.

However, in the 19th century and especially today, cities have grown significantly, often spanning 30-50 kilometers in diameter. Around the densely populated urban core, there are areas with intermediate density, falling somewhere between the urban core and the countryside. This is what we refer to as the suburbs. The term "suburb" comes from Latin, meaning "near the city" or "secondary urban area." Suburbanization is the rapid expansion of these secondary urban areas. To put it simply, there have been two major waves of transportation technology that have driven suburbanization.

Two Waves

The first wave began in the 19th century with public transport systems like trams/trains. These became widespread in developed countries around 1900 and continue to evolve today in the form of subways, light rail, and other systems.

The second wave, which came in the 20th century, brought the widespread adoption of automobiles and the construction of road networks. The peak of this adoption was after World War II, and it's still ongoing in developing countries today, meaning its peak is yet to come.

The first wave, driven by trams and subways, led to suburbs with relatively higher population densities compared to the second wave, driven by automobiles. In fact, today, trains are not even considered a major factor in suburbanization by urban planning professionals. Instead, they are seen as factors in urban renaissance. Trams and subways are viewed positively by professionals, while the image of car-centric suburbanization is often seen as negative, especially in the context of carbon neutrality and carbon reduction efforts. Most experts do not consider widespread car adoption in the developing world as an environmentally viable option. However, we need to face a fact: the second wave, driven by cars, has had a far more significant impact on suburbanization. The expansion of city limits has emphasized the advantages of automobiles, intensified the market's reliance on cars, created a positive feedback loop, and exacerbated the situation. Furthermore, in the future, I believe that cars are unlikely to yield their share to public transport systems but will give way to shared car systems, especially autonomous vehicle systems. I discussed this issue in Episode 37 (Podcast<陈腐粉碎机>).

Revisit into the History

We've previously discussed several concepts. Before the 19th century, most people traveled by foot, with an average speed of about 80 meters per minute. Traditional cities were built around this mode of transportation. Traditional cities generally fell into three size categories:

1. Small cities with diameters of 1-2 kilometers, housing a few thousand to tens of thousands of people. Most places in these cities were within a 15-minute walk. Many ancient and medieval cities fit into this category.
2. Larger cities with diameters of 2-3 kilometers, home to tens of thousands to over a hundred thousand people. Most places were within a half-hour walk. Examples include Uruk, Florence, and Venice.
3. Imperial cities with diameters of around 5 kilometers or more. These large cities, which were not common before modern times, could have populations ranging from hundreds of thousands to over a million people. Most places were within an hour's walk. Examples include 4th-century Rome, 7th-century Chang'an, Constantinople, 18th-century Edo (modern

Tokyo), 13th-century Hangzhou, and 14th-century Dadu (modern Beijing). Cities of this scale often had populations that far exceeded what the surrounding agricultural areas could provide for, relying on significant food imports and serving as central hubs for extensive regions.

These were the traditional cities before suburbanization. Their boundaries were clear, with a clear distinction between the urban core and the countryside. Just beyond the city gates, there might be small commercial communities, followed by relatively homogeneous rural areas with a few villas, farms, and extensive fields, pastures, and forests. Wealthy individuals could afford suburban villas. For example, Louis XIV regularly resided in the Palace of Versailles in the suburbs of Paris, essentially his villa, but he rarely visited the city itself. Nobles living in the suburbs was based on the premise that they didn't need to work in the city.

Streetcar Suburbs

Until the appearance of trains/trolleys, people could only live in the suburbs at night and commute to work in the city during the day. Then the boundaries between the suburbs and the urban core began to blur. This marked the beginning of suburbanization.

Here, the term "train" refers to a range of transportation modes, including earlier horse-drawn tramcars, often called "trams" or "trolleys," steam or internal combustion engine-driven cable cars, which were not self-propelled but were pulled along tracks by a cable, generally referred to as "cableways," and vehicles that resemble today's streetcars/subways, including various forms of buses, subways, and light rail, which are their successors. Although their efficiency improved over time, their fundamental function remained largely unchanged. Therefore, we can discuss them as a category. Their defining features were that they were significantly faster than walking, had greater carrying capacity than horse-drawn carriages, and cost less than carriage rides. They saved time and money. Unlike cars, trains were public transportation and didn't offer door-to-door service.

Three Driving Forces

The main drivers behind people's move to the suburbs can be summarized into three points. First, the pursuit of a more elegant environment and **larger houses**. Second, the **lower** cost of suburban **rents** or real estate prices. Third, **affordable** ticket prices for transportation. Let's discuss these in more detail.

Firstly, humans have a desire towards a more natural environment. Before the 19th century, the drinking water and public sanitation systems in large cities were relatively poor. Medical facilities were underdeveloped, and various epidemics were prevalent. Fire hazards were also a significant concern. The history of the Black Death is well known, but similar events occurred worldwide. In the late Eastern Han Dynasty, for instance, five of the famous Seven Scholars of Jian'an died in a plague in the city of Ye in that very year. Living in low-density suburbs still aligned with people's pursuit of health and safety, at least a hundred years ago.

Secondly, suburban land was more affordable. In the early 20th century, trains were approximately five times faster than walking, roughly expanding the diameter of cities by a factor of five. Around the same time, train lines in New York extended up to 15 kilometers from the city center. Even medium-sized cities like Washington saw train lines extending seven to eight kilometers. The area available for suburban development increased by over 20 times. Previously, these suburban lands consisted of villages and farmland, making them quite inexpensive. Even with some price increases, they remained much more affordable than city centers. People had a much broader range of choices for building houses and could afford larger plots of land. Dreams of low-density living with large gardens that were impossible in the city became achievable in the era of trains. In that period, an average-income family had residential land in the city of approximately 80-150 square meters with a building area of 80-150 square meters. In the suburbs, plots were roughly 300 square meters to 1000 square meters each, and house sizes often exceeded 200 square meters. Gardens and roads occupied a significant proportion of the surrounding area. Traditional urban areas had a gross floor area ratio of approximately 1.0, while new suburbs had a gross floor area ratio of approximately 0.2-0.5. In other words, the density of buildings in suburbs was equivalent to about one-fourth to one-half that of traditional urban areas.

Lastly, train ticket prices gradually became affordable. Currently, subway fares in China generally range from 3 to 10 yuan, which is relatively affordable. However, this is due to government subsidies. The actual cost of riding is two to three times higher than the ticket price. In the early 1900s, trains were generally operated as market-driven services. Around 1900, train tickets in major cities worldwide cost between 2 cents and 1 cent, relative to the silver currency commonly used at that time. Most countries used silver coins weighing around 24-27 grams, including the US dollar, Mexican peso, Chinese Republic's "Yuan

Datou," Canadian dollar, and Hong Kong dollar. This made price comparisons relatively straightforward. Monthly tickets ranged from 5 silver dollars to 8 silver dollars, equivalent to about \$85 to \$140 in today's US dollars. Currently, New York City's subway monthly pass costs \$110, equivalent to 7 US dollars in 1900 (adjusted for inflation). This shows that the ticket prices in developed countries have remained relatively stable. Clearly, this was not cheap for Third World countries. In the early years of the Republic of China, the average monthly salary for white-collar workers in Shanghai was around 30 to 50 yuan, which was on the edge of being able to afford train tickets. Most people earned less than this. It's well known that in 1918, our great leader earned only 7 silver dollars per month while working as a librarian in Beijing, making daily train rides a challenge. Therefore, in the early 20th century, trains were a phenomenon primarily associated with the middle class, especially in East Asia. Train-induced suburbanization was not particularly evident.

What were the monthly incomes of urban workers in the United States at that time? Around 1900, middle-class white-collar workers earned approximately \$60-80 per month. Ordinary laborers or female workers earned only about \$15 per month. So, even in the United Kingdom and the United States, train-induced suburbanization was primarily a middle-class phenomenon. That's why the suburbs were called "garden suburbs" at the time. In London, this was reflected in the western suburbs like Hempstead, while in New York, it was evident in areas like Forest Hills in Queens. These were all residential areas for the middle class and above. However, in the early 20th century, income levels increased rapidly in the United Kingdom and the United States. By 1918, even the monthly wages of ordinary blue-collar workers had reached \$100, meaning that trains had become accessible to the masses. Spending 10% of income on transportation was not too much, especially if housing expenses were reduced by moving to the suburbs. Therefore, the process of train-induced suburbanization, from being a phenomenon of the middle class to becoming accessible to the general population, was relatively short-lived.

Furthermore, once the train-induced suburbanization model became accessible to the general population, it addressed not only the issues of improvement and cost savings but also led to an overall reduction in the cost of living. Young people who had just started working in the city, where rents were high, could opt to live in the suburbs. Although they needed to buy train tickets, the money saved on suburban rents often resulted in a surplus. Therefore, the suburbs played a significant role in solving housing problems for migrant workers and

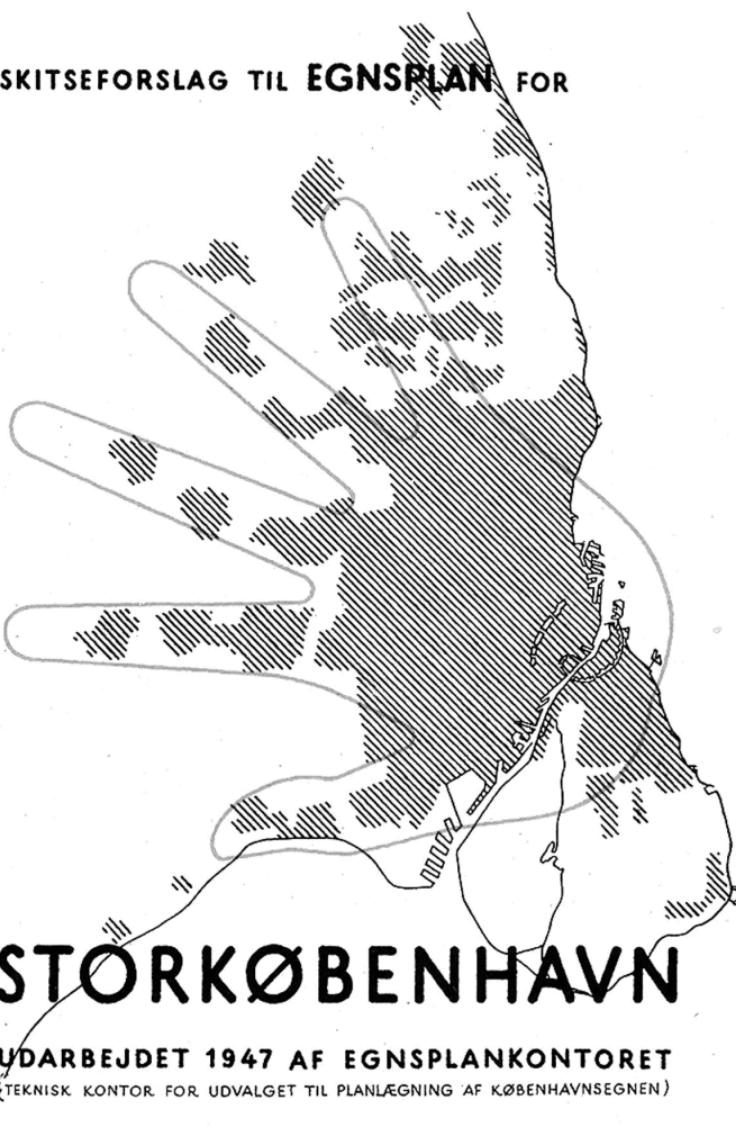
facilitating rapid urbanization. This phenomenon is evident in areas around New York, such as New Jersey, Queens, and the Bronx, in Tokyo with places like Nakano, Mitaka City, and Setagaya, in Beijing with areas like Tiantongyuan, Huilongguan, and Tongzhou, and in Hong Kong with districts like Sha Tin and Tsuen Wan. Of course, there are many nuances and interesting observations in the details of each of these suburban areas.

Suburban Patterns

It's important to emphasize that train-induced suburbanization is significantly less intense than car-induced suburbanization, and it's not the same as what we see in today's suburbs. Train stations and tracks occupy relatively small spaces. Therefore, the layout of train suburbs closely resembles a low-density extension of traditional urban areas, as I mentioned earlier. It can achieve a population density of 5,000 to 10,000 people per square kilometer. This mechanism easily increases density and creates a pattern that resembles traditional urban areas. Initially, it was the middle class building large houses in the suburbs.

As train efficiency improved and ticket prices decreased, the working-class joined the suburban dream. They chose less expensive locations or smaller houses, forming a mosaic of communities alongside the upper-middle class.

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These garden suburbs typically extended about one kilometer from the train stations. Small commercial areas developed around the train stations. Train lines typically radiated out from the edges of the old city centers, extending in a radial pattern. The garden suburbs wrapped around these train lines, shaping the city's development pattern into the form of a hand. The traditional urban area resembled the palm of the hand, while the garden suburbs extended like fingers, and the small commercial areas near the train stations were like the joints of the fingers.

These joints, which are what we now call TOD (Transit-Oriented Development), although they weren't referred to as such back then, harbored

many urban economic phenomena. Its most developed manifestation can be seen in Tokyo.

Culture

Trains or subway systems form vast and intricate machinery systems in cities. They are the arteries of the economy, yet they can be grand, even mysterious, and labyrinthine in appearance. They can be iconic and objects of admiration. The daily movement of millions of people within this group can even take on a ritualistic quality. Furthermore, this movement often appears highly organized.

It's remarkable that ancestors who were once innocent and carefree hunter-gatherers could collectively navigate a labyrinthine subway network with complex signaling systems. This seems to be a testament to the profound adaptability of human nature.

Trains have become significant symbols of urban culture, embodying certain lifestyles and attitudes. The train system was initially a phenomenon of urban mechanization, a step up in social constraints, and the individualization of personal space. It became a material carrier of urban collectivism and community worship. Participation in the public transportation system signified acceptance of a somewhat alienated lifestyle.

This can be seen as an ideology embracing the future, embracing more complex constraints.

It can even carry a sense of moral superiority, enough to differentiate between groups. The same route may be taken by an office worker who knows it like the back of their hand, and a stranger, but they may never form a societal bond. In other words, people who are face-to-face with you may not actually exert any real constraint on you. Is this not freedom under constraint?

In summary:

Firstly, train technology matured, expanding the commutable diameter of cities by about five times. This led to the emergence of mega-cities. Using a biological analogy, efficient circulation systems and enhanced oxygen transport capacity inevitably lead to the evolution of larger organisms, which also develop new characteristics.

These transportation systems significantly increased the amount of land available for development and lowered land prices. Initially, they addressed the

issues of improving housing environments and creating suburban gardens.

Then, when the monthly income of the average worker reached a certain level, around the time of World War I in the UK and the US, trains in the suburbs became a worker-friendly lifestyle choice. This helped fuel rapid population growth in major cities.

Trains drove suburban development in a finger-like pattern. Their density was not particularly low, resembling traditional downtown areas.

However, soon, while trains were still trying to expand their market share in some cities, in other places, they lost ground to cars. Cars became dominant in most economically developed regions. Nonetheless, trains demonstrated remarkable vitality in specific areas of very large cities.

Commuting and transportation, in a sense, represent the cellularization of humanity.

In traditional cities, people mainly walked, incurring almost no transportation costs.

Trams cost around 1000-2000 a month; cars are 2-3 times more expensive.

I boldly predict that with the proliferation of autonomous shared vehicles, transportation costs will continue to decrease, intensifying suburbanization. Subway systems will face significant challenges and may gradually become burdensome for cities, or even phased out. Private cars will continue to exist as luxury items.

This will lead to a widening gap between densely populated urban areas and sparsely populated suburbs.

In other words, transportation expenses will account for around 10% of workers' incomes, while in the same era...

Please pay attention to the proportion of transportation expenses relative to income and its trends.

Currently, in the United States, household transportation expenditures average 16% of total expenditures, housing accounts for 33%, and food only 14%.

22 Suburbanization - Second Half - Automobile Driven Sprawl (1)

Around World War II, the proliferation of automobiles intensified the process of suburbanization, becoming one of the most significant topics in contemporary urban planning. This subject has generated countless doctoral theses and remains an ever-evolving field of study.

I will outline the discussion as follows:

1. The unprecedented power of automobiles as a mode of transportation greatly enhanced the mobility of both people and goods. Unlike the earlier emergence of railway systems, automobiles possessed a unique characteristic - unparalleled freedom and the ability to reach virtually all corners of a city. Consequently, they offered higher efficiency and had a more profound impact. As a result, automobiles fundamentally altered the dynamic characteristics of cities. If we were to draw an analogy with the animal kingdom, it would be akin to a species having its blood oxygen concentration increased tenfold and its blood flow speed accelerated tenfold, leading to its evolution into an entirely new species. Such a leap in capability allows it to enter uncharted resource territory, resulting in significant resource redundancy, enabling it to engage in actions that may go against short-term interests without punishment. It can accommodate many inefficient and alternative strategies that would be unsustainable in normal circumstances. This is analogous to the human species, which can accommodate various types, including the lazy, homebodies, mad scientists, and thinkers. It has room for those with mental and physical disabilities, exhibiting significant tolerance for diverse lifestyles. In contrast, the lifestyle options for our closest relatives, such as gorillas, are far more limited. Therefore, suburbanization driven by automobiles is a realm vastly different from traditional urbanization.
2. The enormous resource consumption associated with suburbanization by automobiles is extremely costly. Initially, this model was confined to the United States and a few developed countries, considered an unsustainable development pattern. However, this pattern is now spreading to more economies, including China and India, both developing major nations.

Consequently, it poses challenges to these countries and the global economy and ecological environment.

3. The proliferation of automobiles can alter the form of business districts, siphoning vitality away from city centers. This phenomenon is currently unfolding in China, and many are still adjusting to it.
4. Although automobile-induced suburbanization has been criticized by mainstream Western academia, the underlying trend may not necessarily diminish. In a world characterized by peace and progress, suburbanization might even deepen in the future through technological advancements and become increasingly refined. Conversely, if we are facing a turbulent and declining world, the vulnerability of automobile-driven suburbs may become exposed, potentially leading to the collapse of urban economic ecosystems.

Let's delve further into this discussion.

Automobile's Early Proliferation in the United States

The automobile first gained widespread popularity in the United States, primarily because of the country's wealth and early production of relatively affordable cars. In 1924, Ford manufactured two million Model-T cars, each selling for \$260, equivalent to about two months' wages for American white-collar workers at the time. Consequently, suburbanization began in the United States earliest and reached its peak intensity there.

Changing Urban Dynamics with the Automobile

Before the advent of cars, cities were measured by foot. However, with the arrival and widespread use of automobiles, spatial distance became less relevant. What does this mean? It means that with automobiles, one could effectively participate in urban economic activities even if they were 30 kilometers away from the city center. The developable urban space expanded significantly, covering thousands of square kilometers. This resulted in a surplus of spatial resources. Building density typically remained below 0.3 and often fell below 0.1. This shift allowed for the development of new, batch-built suburbs where houses looked different but were essentially the same. They were often spaced far apart, leading to a self-centered appearance. Not only residential areas but also office buildings and super shopping centers followed this pattern. The granularity of various construction activities became coarser.

Our common perception is that European traditional city centers are very refined, while American suburbs appear monotonous. However, this difference is largely a matter of scale. The United States also has finely crafted traditional city centers, although they tend to be smaller. Conversely, European cities, despite their larger, well-preserved historical centers, often have peripheral areas connected by highways that can resemble American suburbs. (I'd like to interject that the phenomenon of rough urban construction is not solely caused by cars but is also related to the rise of the global working class and the decline of feudal organizations in the 20th century.)

Automobile Suburbanization around the World

Around the world, the automobile made cities more rugged and straightforward. Designing roads for motor traffic engineering became more critical than city design and landscaping skills. However, this does not imply that the world regressed. Quite the opposite, the tremendous leap in capabilities brought about by cars created a surplus of resources. This led to a phase of development imbalance.

To illustrate, think back to when you were in high school, and you received \$100 in pocket money each month. You carefully spent every cent and found joy in it. Suddenly, one day, your mother won the lottery, and your monthly allowance became \$10,000. Initially, like many overnight millionaires, you might spend extravagantly and irresponsibly. However, it doesn't mean your standard of living decreased. You would gradually learn to manage your expenses and become more sophisticated.

Suburbanization driven by automobiles is currently in a rough and rudimentary stage. In the future, it's highly likely to evolve into a more sophisticated form.

However, this period of ruggedness will likely last a long time, and its impact will be profound. My earlier discussion is primarily based on developed countries. Nevertheless, societies with fewer resource surpluses have also been influenced by the car-centric model of Western countries. This influence has penetrated deeply into their consciousness and led to some distortions in their development processes.

Challenges Posed by the Car-Centric Suburban Model

Let me explain some of the challenges brought to the world by the car-centric suburban model.

Firstly, let's consider that cars, in an absolute sense, are quite expensive. Taking data from the United States in 2017 as an example, the nation spent about \$1.1 trillion on cars, which equates to an average of over \$3,600 per person. This is roughly equivalent to the per capita GDP of Mongolia. This expenditure includes the cost of purchasing cars, maintenance, insurance, parking fees, fuel, and more. Interestingly, the cost of fuel was only around \$290 billion, which is less than one-third of the total expenditure. In contrast, Americans spent only about \$53 billion on all public transportation combined, excluding air travel. So, you can see the ratio here. The consumption related to private cars compared to public transportation is roughly 7:1.

In the United States, 26% of energy consumption occurs in the transportation sector. Furthermore, 40% of energy consumption is attributed to buildings. It's worth noting that a significant portion of this energy use comes from low-density buildings associated with the car-centric suburban model. Compared to traditional urban buildings, low-density structures have higher surface area heat loss and consume more energy in transporting utilities. (For instance, two single-story houses with 100 square meters each have a larger total roof area than a two-story house with 100 square meters on each floor. This results in higher energy consumption for heating and cooling, as well as increased demands on municipal utilities.)

Therefore, one might assert that if we were to compress all the existing low-density suburbs into a traditional urban format, we could potentially save roughly one-third of the energy consumed in transportation and construction, which amounts to about 66% of the total energy consumption.

Land Consumption

In terms of land consumption:

1. **Road Area:** The area occupied by a car while on the road depends on its speed and the following distance, typically ranging from 2 to 4 seconds of travel distance. In slow-moving areas like city centers, following distances can be as short as 20 meters, while in moderate-speed situations, it can be around 50 meters. The width of a lane is typically 3-4 meters. Consequently, the space occupied by each car on the road ranges from 70 to 200 square meters. During peak hours, a significant proportion of vehicles are on the road simultaneously.

2. Parking Space Area: Each household typically has one parking space, offices have dedicated parking spaces, and commercial areas also allocate parking. This means that the parking space required for each car is equivalent to several parking spots, approximately 60 square meters. When considering both road and parking space, the land area occupied by each car is conservatively estimated to be over 100 square meters. Thus, land consumption related to cars is comparable to residential land use.

Urban Form

Car-centric suburbs initially featured a very uniform spread of detached houses, much like those seen in American TV shows such as "The Wonder Years," "Desperate Housewives," or "Six Feet Under." These endless rows of houses could be found in places like New Jersey, Long Island, Northern Virginia, Maryland, and Southern California. This pattern could be considered the spread of the American dream's lifestyle. Of course, this pattern was not entirely without order. Typically, there were about 5 houses per acre, with each house having a floor area of just over 200 square meters. In areas closer to the city center, it might be slightly denser, approaching about 10 houses per acre, each with less than 200 square meters. In more remote areas, it could be very spacious, with only 1-2 houses per acre, each ranging from 400 to 500 square meters. However, the differences were not more than an order of magnitude; they were quite similar.

This uniformity, from the perspective of information theory, does not represent a higher level of order but rather a very low-level order, only slightly better than chaos. It represents the initial deployment of this pattern.

In terms of transportation structure, car-centric suburbs often had some roads that didn't connect to others, what's known as cul-de-sacs or dead ends. More commonly, there were ambiguous roads that seemed to be passable but often weren't. These are referred to as "connected but not efficient" roads. The road network in these areas is sometimes described as resembling spaghetti - a tangled mess of roads where you can't easily determine how many strands there are or which one leads where.

In other words, your house is typically situated on a road that leads only to your residential area. Unless someone intends to enter your neighborhood or has taken a wrong turn, they will never pass by your house. It's rare to see strangers in front of your house.

Some might argue, "Isn't this normal? Isn't this a good thing?"

It can be good, especially when viewed from a specific perspective and in particular circumstances. If you live in a stable middle-class world, there may not be much of a problem.

This raises the fundamental characteristic of car-centric suburbs: high cost.

I have firsthand experience of living in such communities. In these neighborhoods, you can barely walk to even a convenience store. To buy anything or meet anyone, you need a car. So, owning a car is essential. People without driver's licenses, like children, have incomplete human rights. Therefore, the barrier to entry in such communities is owning a car, as I mentioned earlier, costing around \$300 per month. This is enough to exclude the poorest classes.

Hence, car-centric suburbs form a series of middle-class enclaves that achieve class segregation. The homogeneity of these communities precisely reflects the middle class's desire to live among their class peers.

Even beggars would not venture into these suburbs because the population is too sparse to extract any substantial resources from.

So, those on the political left (referred to as "white left" here) who live in the suburbs might be seen as hypocritical or ill-suited. If you have the capability, you could choose to be neighbors with unmarried, teenage African American mothers and their children in the inner city after all.

Social Structure

This suburbanization has altered urban and social structures significantly. Prior to the 19th century, people lived in traditional city centers. Your neighbors were often your baker, your tailor who made your clothes, the carpenter who repaired your house, your child's teacher, and perhaps, your neighbor was your teacher, landlord, or someone you attended church with. Each person's home often served multiple purposes. The ground floor might be your shop, you lived on the second floor, and the attic might house your tenants, often young individuals or apprentices.

In contrast to traditional city centers, car-centric suburbs have created relatively homogenous communities. Perhaps dozens of adjacent houses are purely residential, devoid of shops or industrial facilities. These houses don't necessarily

serve as destinations for one another. You may share your faith with some of your neighbors or be the parents of your children's schoolmates, but forming a close-knit community with direct commercial or extensive social interactions becomes challenging. In theory, you could live next to your neighbors without ever visiting their homes or getting to know them.

These suburbs have contributed to the formation of modern nuclear families. I use the term "nuclear families" rather than "atomized individuals."

The organic nature of society has undergone changes, if not necessarily declines. People enter industry sectors when they go to work and residential sectors when they return home. These two sectors have become disconnected. Consequently, compared to traditional society, people's dependence on these two sectors has decreased. This has led to greater fluidity and a pursuit of universality in individual lives.

In the next segment, I will discuss the unique characteristics of suburbanization in China and some features of suburban commercial districts.

23 Suburbanization - Second Half - the Socio-Economy in Automobile Suburbs

In my previous analysis, I discussed the American-style car-centric suburbs. The materials and perspectives I used, aside from some personal insights, largely align with the consensus within the American urban planning education system, often referred to as the knowledge base of the political left. They tend to view car-centric suburbs as a societal problem, or even a severe one. Since I also come from this educational background, I have been systematically trained to think within this framework. Therefore, I rarely challenge this perspective.

However, I am aware that most people, not just in China but also a significant portion of Americans, especially the general population, find it hard to comprehend and resonate with this viewpoint. Many Americans would ask, "Why do we love our suburban homes and gardens so much while you seem to dislike them?" In China, for instance, when I was younger, I heard adults discussing American suburban homes with an air of envy.

Moreover, even among American "white left" intellectuals, many live in suburban homes with gardens and drive two SUVs. Only a minority genuinely embrace an urban lifestyle. So, I also have an inkling that the mainstream critique of car-centric suburbs, while containing profound elements, may also carry a bit of affluent people's complaints.

Hence, if we aim to pursue a higher level of truth and possess a more interdisciplinary approach, I must provide some counter-perspectives.

My core point in this perspective is, regardless of how you look at it, American-style suburbanization is primarily a result of market forces. What you see is the outcome of market choices, shaped by people using their hard-earned money and voting with their feet. So, even if there are flaws, how far-fetched can they be?

Let's explain some phenomena of American car-centric suburbs from a market perspective:

1) Why don't they build high-rises in these suburbs?

Because there's no cost advantage to doing so. Initially, the land was cheap. In the United States, in many cases, concrete houses are more expensive than

wooden ones. So, high-rises not only aren't easy to sell, but they also aren't more profitable. In fact, in some places, high-rises have emerged as a result of rising land prices. However, land prices are only sensitive in a few locations. In the backdrop of large, low-density residential areas, high-rises appear, like nuclei forming in invisible water vapor, creating clouds. This is an expression of an evolving order.

2) Why don't they build some stores and other amenities in low-density residential areas?

Because in places with low population density, stores don't make money, so no one invests in them. Schools and churches are exceptions.

3) Why are the building types often so uniform in low-density residential areas?

Because this homogeneity, which leads to class segregation, is what homebuyers want. One significant reason American suburbanization is so pronounced is due to the civil rights movement and racial conflicts. A primary motivation for white Americans moving to the suburbs was to escape to areas with relatively homogenous populations. Additionally, communities and school districts are closely linked. In purely middle-class neighborhoods, there is greater consistency in student behavior, enabling the isolation of non-mainstream youth. This is what parents desire. Class segregation is a critical, albeit hidden, selling point of real estate products. It helps maintain stable housing prices. If developers create a broad range of housing options that lead to class mixing, it might affect sales. The mosaic-like spatial structure, mixing high-density with low-density and different class levels, is a general feature of human societal spatial distribution, a result of the dual external conditions of security and efficiency. It's not easily eradicated by the simple notion of equality.

4) Why do some communities have policies that prohibit mixed-use housing and only allow single-family homes?

If the previous phenomena were market-driven, these community policies are clearly anti-market.

However, anti-market policies should not be seen as necessarily arbitrary. We can't be overly dogmatic, thinking that everything market-driven is good. For example, you can't sell nuclear bombs to enemies, no matter how much they're willing to pay. We must understand that these policies aren't nationwide

regulations, not even at the state or county level. They are specific to each community or municipality and reflect local sentiment. Communities themselves must understand that if investors believe their policies are unfavorable, they won't invest there. This is the litmus test for policies. A community that consistently adopts less inclusive policies may deter outside investment, but it at least indicates that residents believe these policies benefit them. You can't guarantee that less inclusive public sentiment is necessarily misguided or populist. The existence of a wide variety of local land policies, whether they are blind to certain factors or not, is an expression of the level of community organization and self-governance ability. They constitute a policy market characterized by diverse choices—a policy ecosystem conducive to evolution.

5) Why are most suburban plots single-use, either all residential, all office parks, or all commercial?

Single-use residential areas are maintained to keep the population structure homogeneous. Entirely office or commercial areas are created to achieve economies of scale with sufficient network effects.

Industries in the same sector need to be concentrated, facilitating communication and logistics. This is the rationale behind industrial parks. The same applies to commerce; businesses can bring traffic to one another and share resources like parking spaces. One consumer driving to shop at two separate stores, if they were not located together, would require two parking spaces. Combining them into one space saves resources.

We generally believe that mixed-use areas improve utilization efficiency, but this is conditional. In car-centric suburbs, where there are ample parking lots, the floor area ratio (FAR) is usually low, often below 0.5. In such low-density areas, combining low-density industrial parks and low-density commercial zones may not necessarily increase efficiency. It might dilute each other's efficiency during the interweaving process.

So, single-use, low-density industrial parks and commercial zones are, in fact, cost and efficiency-driven.

6) Why is land development often sporadic with gaps rather than continuous?

This is because cars are not sensitive to small distances; a kilometer more or less doesn't make much difference. The land's value is relatively homogeneous, but

the costs of municipal connections and clearing can vary widely. The fluctuation in land costs is more sensitive. These lands are held by different owners, regardless of the diverse real-world situations. The landowners' game is whether to develop and cash in first or wait for neighbors to develop and drive up land prices before cashing in. This reflects different judgments about land value trends. Land with proactive development and lower bidding prices is prioritized for development.

7) Does the United States have any policies that encourage car-centric suburbs?

Yes, the most significant one was the interstate highway system subsidized by the Eisenhower administration in the 1950s. This undoubtedly reinforced the dominance of cars and made suburban development more convenient. While this money came from the entire nation, suburban residents benefited the most. However, these highways also serve as the arteries of regional logistics, ultimately greatly enhancing national production efficiency. There are no losers in this situation. You can't imagine not building these highways today.

8) Is car-centric suburban living sustainable?

If the entire world were to live like Americans, there wouldn't be enough space or oil. However, we can already see that technologies for transitioning to renewable energy sources are gradually maturing. Additionally, autonomous driving technology could improve road efficiency. Vehicle sharing can reduce resource consumption and alleviate parking pressure. Currently, there are 300 million Americans with over 200 million cars, roughly one car per person, even accounting for children. In the future, 1.4 billion Indians might achieve a similar standard of living with only 200 million cars, mainly electric ones powered by renewable energy and used for sharing. So, I believe that as technology advances, the car-centric lifestyle still has a chance to continue and even spread to more of the world's population.

Let me summarize the points I've made above:

The American suburban ideal is rooted in a natural yearning for rural living. It's remarkably straightforward, lacking any grand planning. At its core, it's market-driven, prioritizing cost-efficiency. The class division resulting from suburbanization has both positive and negative aspects, reflecting the choices of a segment of consumers.

This phenomenon coincided with a period of rapid economic growth. The post-World War II era witnessed the widespread adoption of automobiles and the construction of extensive highway networks. This was driven, in part, by the pressures of racial conflict and created a tremendous demand for suburban housing. This model rapidly replicated and expanded across the nation, claiming vast swaths of land. It gave rise to the seemingly endless uniformity of low-density sprawl, fostering a lifestyle that is expensive, reliant on fossil fuels, and centered around the automobile. While this can be considered a societal issue, it's important to understand that expecting a society without problems is an idealistic notion. Societies inherently generate problems, and the societal issues brought about by automobiles may not be significant in the grand scope of human history or future.

Above and beyond the automobile suburbs, we can anticipate a differentiation in density and building types, leading to the emergence of more intricate social structures. This promises to be a stage for innovative architectural developments.

24 Suburban Shopping Center - the development of the Typology

Major cities in China are swiftly transitioning into the automotive suburban era. However, many professionals in the field have yet to grasp the intricacies of this transformation. In this edition, I invite you to explore the United States, with its century-long history of automotive evolution, specifically focusing on the landscape of shopping malls. Many patterns we observe are universally applicable, underscoring the global nature of certain phenomena. At the heart of my exploration lies the concept that shopping centers in the car era are fundamentally designed around automotive transport, distinguishing them from traditional urban commercial districts.

But, a brief digression first.

The term for shopping centers in English is "Shopping Mall" or "Shopping Center."

Originally, "Mall" referred to a grassy area where people would stroll and partake in games similar to croquet. It symbolized an open space for outdoor activities. For instance, the vast lawn situated between the White House and the Capitol in Washington D.C., where presidential inaugurations are held, is named the "National Mall" – essentially meaning "National Lawn" and certainly not implying a national shopping center. The green space in downtown Cleveland is also referred to as "the Mall," and humorously, in a particular source, it was mistakenly translated to "shopping center." A minor amusing note on the side.

Such "Mall" green spaces often hosted market fairs during holidays, bustling with stalls selling various items and entertainment activities, emanating a natural, cheerful, and lively ambiance.

Therefore, when Americans began using the term "mall" to denote suburban shopping centers, it was a clever and evocative choice of branding. The contemporary shopping mall encapsulates this essence—a vast sheltered space, perpetually spring-like, linking numerous stores, with people bustling about. This is the archetype embodied by shopping centers like Wanda Plaza.

However, let's not get entrenched in one view. We face three pertinent questions: Firstly, in the US, where most shoppers arrive by car, why compel them to walk through such communal spaces when they could drive directly to

their desired store? Secondly, wouldn't it be more effective to have store fronts visible directly from the highways, instead of tucked inside malls? And thirdly, wouldn't forgoing the construction and maintenance of this ever-spring communal space be a cost-saving measure without causing any harm?

In reality, while the classic Wanda Plaza-style shopping centers do exist in the US, a more prevalent version is the following:

Adjacent to highways is a rectangular parking lot, accommodating anywhere from dozens to thousands of vehicles. Lining the parking lot is a continuous strip of conspicuous stores, big and small, predominantly franchises—very grounded and relatable. In English, this type of shopping center is termed a "strip mall." Surprisingly, there's no direct Chinese translation for this term. A whimsical attempt using Google Translate amusingly rendered it as "strip dance shopping center." A word of caution: when in the US, don't let such translations mislead you into misguided explorations. "Strip mall" literally and figuratively means a "linear shopping center."

As reported by the New York Times' Kramer, Andrew E., in 2013, the US had a total of 65,840 strip malls.

One can only imagine the numerous developments and evolutions based on this archetype. It truly stands as the mother of shopping centers in the automotive age.

1) The fundamental components of suburban malls in the automobile era are the shopping center and parking spaces. The shopping center usually occupies about 40% of the land, while parking and driveways consume 60%.

Typically, these shopping centers are just one story tall. Why not build them with two stories? Because it's simply not worth the additional cost. Constructing two floors might have similar costs per square foot as one floor, but the revenue or rent from the second floor would be much lower. Furthermore, with a single-story design, you can achieve over 90% utilization of the floor space. Add another story, and you'll need elevators and staircases, dropping that utilization below 80%. Therefore, from a return on investment perspective, it's best to stick to a single story when working within a limited budget.

Then comes the parking lot. The area it occupies is usually slightly larger than the shopping center's built-up area. This may sound excessive, but for suburban malls, the key is to have convenient parking. Within the city, several similar

malls are just a short drive away, sometimes less than 10 minutes. If parking isn't easy at your mall, customers will simply go elsewhere. These vast parking spaces aren't only for everyday use; they're primarily designed for weekend peaks. On holidays, these lots might be 95% full. On weekdays, if 40% is occupied, that's a good day, with many spaces empty. Is that wasteful? Not at all. If you can't accommodate the rush on peak days, you'll eventually lose that rush altogether. During peak mall times, assume 10 customers per 100 square meters—a moderate density. With every two customers typically arriving in one car and each car occupying 28 square meters, every 100 square meters of retail space demands 140 square meters for parking. This is the reality of the automotive age.

Of course, a few malls can evolve into high-density formats, expanding to include new stores, adding floors, and even incorporating office or residential buildings. These malls will develop over their once expansive parking lots, turning some into multi-story parking garages, increasing the overall site density. Hence, these vast parking areas serve as potential development zones for suburban malls, even if most never undergo this transformation.

2) The location for automotive suburban shopping centers must be at major road intersections. These roads offer 1) Accessibility and 2) Visibility. Both are self-explanatory, so there's no need for further elaboration.

Typically, these malls are near exits where two or three highways intersect. Their value doesn't primarily depend on their proximity to the city center but on the volume of traffic on the main roads. Taking IKEA in Beijing as an example: the first location is at the intersection of the North Third Ring and the Beijing-Tibet Expressway. The second is near the intersection of the Northeast Fourth Ring and the Airport Expressway, not far from the Beijing-Chengde Expressway. As you can observe, each location is at the intersection of two major traffic arteries. Moreover, they are gradually moving outward because ring roads offer faster mobility than crossing the city, potentially attracting a larger, more dense population.

Washington D.C.'s Beltway 495 is roughly the size of Beijing's Fifth Ring. Most of D.C.'s large suburban businesses are scattered along it.

Using the Average Daily Traffic (ADT), I broadly categorize roads into three levels: major arterials with around 100,000 vehicles, primary roads with about 30,000, and secondary roads with roughly 10,000. These roads intersect in

various combinations, each corresponding to a type of suburban mall, with deviations within half an order of magnitude.

road crossing	10,000 main roads	30,000 Trunk Road	100,000 Arterial Trunks
10,000	<p>2500m²以下便利中心，小超市、加油站、洗衣房，一两家小餐厅，理发店的组合；比较随意。</p> <p>Combination of convenience center below 2500m², small supermarket, gas station, laundry room, one or two small restaurants, barber shop; relatively casual.</p>	<p>10000m²以下，；邻里商业中心；超市，药店，银行，五金店、餐厅之类的组合。有可能有车管所，车管所在美国算一个目的地。美国人去车管所比宜家频繁。Below 10,000 m²; Neighborhood commercial center; Combination of supermarkets, pharmacies, banks, hardware stores, restaurants and the like. There may be a vehicle management office, and the vehicle management office is considered a destination in the United States. Americans go to the DMV more often than IKEA. It doesn't make much sense in big cities and will be absorbed; it doesn't exist in small cities.</p>	<p>对大城市意义不大，会被吸收；在小城市不存在。</p>
30,000	-	<p>1万-4万之间次区域商业中心；社区购物中心；多主力店组</p>	<p>4-8万m²区域级；辐射力依然强；主力店</p>

合；类型组合，比如服装、家装。通用性较强。如果在小城市，可能是全城最大的mall，有可能更大更高。Sub-regional commercial centers between 10,000 and 40,000; community shopping centers; combinations of multiple anchor stores; types of combinations, such as clothing and home decoration. Strong versatility. If it is in a small city, it may be the largest mall in the city, and it may be bigger and taller. Regional level of 40,000-80,000 square meters; still strong radiation; combination of main stores; distinctive centers, discount stores, experiential

100,000

-

-

8万平米以上超区域级购物中心；多业态、多主题组合A super-regional shopping center of more than

80,000
square
meters; a
combination
of multiple
formats and
multiple
themes

The largest intersections, formed by two major arterial roads, can be found in first-tier cities with perhaps a dozen instances. In second-tier cities, there might be just a few, while in third-tier cities, there might be one or even none at all. Such intersections are prime locations for expansive shopping centers that span over 80,000 square meters and can be categorized as super-regional hubs.

- The second category is the intersection of a major arterial road and a standard main road. These types of intersections are particularly abundant in first-tier cities. In contrast, they're relatively rare and therefore more valuable in second-tier cities, which might use such locations to establish integrated regional shopping centers ranging between 40,000 and 80,000 square meters. In first-tier cities, these intersections may not have as distinct an advantage. Instead, they could serve niche markets with specialized shopping centers that house flagship stores of big brands like Walmart and Metro, or even power centers and factory outlets. These could also be thematic or industry-segregated commercial clusters.
- The third category is the confluence of a major arterial road with a secondary main road. In metropolises, these are quite common and thus might not be deemed as crucial, often overshadowed by larger intersections nearby, making their prominence relatively minor.
- Next, we have intersections of two standard main roads, both witnessing daily traffic around the 30,000 mark. In large cities, these locations typically host sub-regional commercial hubs, suitable for commercial spaces between 10,000 and 40,000 square meters that may offer a diverse mix of specialty shops. However, in cities below the third-tier, such intersections could be among the busiest, potentially serving as larger, city-wide shopping centers. I recall Ann Arbor in Michigan resonating with this scenario.
- Descending a level, we have intersections between a standard main road and a minor main road. These typically host neighborhood business

centers comprising supermarkets, pharmacies, banks, hardware stores, and restaurants. In the U.S., Department of Motor Vehicles (DMV) locations, which Americans visit more frequently than places like IKEA, can also be key anchors in such settings.

- At the smallest scale, intersections of two minor main roads in the U.S. generally give rise to convenience hubs under 2,500 square meters. These might include a mini-market, gas station, laundromat, a couple of small eateries, and a barbershop – arranged more casually.

Collaborative Corners

Since I've mentioned intersections, whether they are overpasses or at-grade intersections, there will always be four corners. In urban commercial districts, these corners often host several shopping malls, forming a symbiotic ensemble. However, in suburban areas dominated by cars, collaboration between these corners is typically weak. This is because the space is expansive with broad roads and often intricate cloverleaf interchanges. Walking from one corner to another can be tedious, especially when carrying a significant amount of shopping. Parking is also conveniently abundant. Thus, people would likely drive from Mall A on one corner to Mall B on another, even if it's a short distance. As I mentioned earlier, once you're behind the wheel, whether the destination is across the street or five kilometers away, the distinction diminishes. As a result, the four corners of a suburban intersection often sadly operate in isolation, with one corner potentially dominating the others.

3) Evolutionary Directions and Differentiation Strategies for Suburban Shopping Centers

The most fundamental and iconic is the symbiotic relationship between anchor stores and smaller retailers. An anchor store, typically drawing large crowds, can be a department store, a large supermarket, a big specialty shop, or a luxury outlet. A shopping center might have two to three of these. Nestled between them are many smaller shops. While anchor stores might occupy only 40% of the shopping center's total area, they could contribute to 60% of sales. Interestingly, their rent might only be 20% of the total. Essentially, anchor stores drive foot traffic for the smaller shops, while the smaller shops shoulder a greater rent burden. Anchor stores represent the dominant entities in this ecosystem, while the smaller shops play a nurturing role. This configuration can be considered a basic model.

Another format is the Power Center, characterized by a series of anchor stores lined up side by side. Shoppers can efficiently move from one store to another. This setup, a specialized form of the strip mall, emphasizes shopping efficiency and caters to non-personalized consumption, typically at mid to low-end price points. From another perspective, it showcases the diverse offerings and in-depth services within these chain anchor stores.

Furthermore, there's the upscale, refined direction. Given the gradual rise in Americans' living standards (excluding inflation, which doubles every 20 years), commercial entities need to keep pace with the evolving demands of this increasingly affluent populace. Enhancing spatial quality and emphasizing experience become paramount.

Within this direction, two phenomenal forms emerge: First, the Lifestyle Center emphasizes outdoor space experiences and elevates the proportion of dining options. Second, the City Center, while literally translating to "urban core", aims to recapture the charm of historical downtowns. It's larger in scale, more diverse in its offerings, and often features multi-tiered spatial configurations, including squares, lawns, urban parks, and outdoor recreational facilities. These centers, leaning into the "experience", are more prevalent in warmer regions, though they exist in the north as well.

Lastly, there's a trend towards high-density, urban-like redevelopment. Multi-storied malls incorporate high-rise offices, parking structures, and even apartments. They often leverage the connectivity of subways or trams to reduce reliance on parking and optimize space usage. The end result resembles traditional urban environments.

In 2013, *The New York Times* reported that the United States had 65,840 strip malls.

25 Suburbanization of China Characteristics - the Inherent Incongruity

In this discussion on China's suburbanization, placing it in the context of American suburbanization makes sense due to their parallels, allowing for a direct comparison. American suburbanization often lacks a coherent top-down design, and its conceptual approach tends to be somewhat dispersed.

In China, suburbanization typically has a top-down character. It is influenced by officials and experts. These experts, significantly influenced by Utopian modernist architectural theories, handle urban land through a mindset aligned with the management of state-owned assets. They essentially serve as the brains behind this process.

From the bottom-up perspective of China's suburbanization, the driving forces are developers and consumers. It's a blend of market-driven dynamics, traditional elements, and even ancient concepts. Influences from local folklore and feng shui theories can be discerned.

Such dichotomy between the top-down and bottom-up perspectives has inevitably led to a blending of the two, forming a unique discourse and following a distinctive logic. As a result, China's suburbanization manifests in ways that are quite unique and at times, internally inconsistent.

To grasp the intricacies of China's urban development, it's essential to understand these varying perspectives and their origins.

Chinese suburbanization has distinct features. Here are six key points:

One, The primary intention of China's suburban development was to construct new cities. However, many aspects adopted typical suburban methods. For instance, wide streets, vast city blocks, low-density road networks, and green belts on either side of roads all mirror the pre-WWII Athens Charter techniques. These are more suited for suburbs than for vibrant urban economies. Placing green belts along streets provides a seemingly natural aesthetic, catering to a simple, unrefined urban image perception. Without delving too deep, such setups are not pedestrian-friendly, diluting street vibrancy, and hindering the integration of commercial hubs and fostering a vibrant urban ecology. This results in a uniquely Chinese urban sprawl with suburban features.

Two, Areas like Pudong New District, Wangjing New Town, Hunnan New District, and many others represent the epitome of China's suburbanization. Not all these new districts are successful, but quite a few are. In some cases, property prices in these areas even surpass those in older districts, and vibrant new commercial centers emerge.

The outperformance of new districts over older ones is a phenomenon of late-mover advantage. Globally, success stories of new cities developed through intensive planning based on a single blueprint are rare, with more failures than successes. In China, while there are numerous unsuccessful examples, there are also commendable cases. As previously mentioned, good outcomes typically emerge from solutions aligning with both top-down and bottom-up perspectives.

From the top perspective, in China, developing new cities often encounters fewer challenges in terms of coordination and displacement compared to revitalizing old cities. Consequently, it's usually more cost-effective and more visually impressive, tapping into areas with lower resistance and clear outcomes.

From the bottom perspective, akin to the situation in the U.S., these new districts usually attract middle-class families, creating a "middle-class country within a country" meeting consumer demands. Furthermore, new areas often provide ample parking, a stark contrast to traditional districts. Thus, many middle-class populations migrate from the traditional centers to these new areas, leading to declining vibrancy in the old districts and sometimes even causing new commercial centers to overshadow traditional ones.

Developments in Chongqing's Jiangbei have diverted the buzz from traditional urban areas, and the population in Shenyang's Hunnan New District has similarly affected the city center.

However, the supposed cost-effectiveness of these new districts comes with caveats. While initial costs might be lower, the long-term costs tend to be higher. These include the establishment of new transportation, commercial, medical, and educational systems, all of which must be organized from scratch without leveraging existing urban infrastructures. This puts a greater financial strain on local governments and elevates the actual user costs.

Still, in the backdrop of China's rapid economic growth and with local governments benefiting from land sales, these burdens might seem manageable.

Yet, in economically stable developed countries, the success rate of such new city projects is much lower.

Three, The transportation improvements behind Chinese suburbanization is a blend of car and public transport usage, leading to an increased reliance on automobiles.

Following the construction of intercity highways, many second-tier cities have developed urban expressway systems over the past decade. This has significantly spurred the growth of suburbanization. While subway and bus systems have also expanded, the share and usage of private cars have surged at a much faster rate.

China's car ownership approximately doubles every seven to eight years. In 2021, the nationwide car ownership rate, including in rural areas, was roughly 0.2 cars per person. This is about half of Japan's rate and a third of that in the U.S. However, when accounting for urbanization levels, car ownership in Chinese cities is closer to Japan's and approximately half of the U.S. rate. Yet, it's important to recognize that with every 50% increase in car ownership, you'll observe a significantly different urban ecosystem. Therefore, China is currently undergoing a dramatic transformation in its urban environment, advancing at a pace of about one major shift every three years. I estimate that from 2013 up to now has been the period of the highest growth rate for car-driven suburbanization. Traffic congestion has notably worsened in most cities, and a decline in traditional city centers is evident in many areas. As previously discussed, this trend towards increased car usage appears nearly unstoppable.

Fourth, Chinese suburbanization is predominantly high-density, significantly denser than the car-centric suburbs in Western countries.

Viewed from a grassroots perspective, this is driven by cost and market demand. Chinese land prices have been relatively high for over a decade. As a result, achieving a high floor area ratio to dilute land costs is crucial.

From a top-down view, government officials, aiming to conserve land, have implemented policies that exclude developments with a density below 1.0.

Consequently, there's a set floor area ratio baseline for Chinese suburbs. Compared to the American-style car suburbs I discussed earlier, this ratio is many times higher.

Any urban planner would see this as an advantage. High-density promotes the incubation of commercial services and sustains efficient public transit routes.

This high-density suburban model also offers some inclusivity for those who don't drive.

High density means that local urban expressways face greater pressure, leading to rapid saturation of these roads. Secondary road networks must develop concurrently, resulting in an environment with more alternative routes. Given that high density can accommodate more people, the sprawl of Chinese suburbs covers a smaller area than its American counterparts, representing a more resource-efficient approach.

Fifth, Chinese-style suburbs, although high-rise, have a topological relationship similar to the low-density suburbs in the U.S.: they are terminally developed.

What does "terminally developed" mean? It refers to many pocket-like spaces, or what we might call cul-de-sacs. Each residential area, in its layout, is essentially a pocket-shaped cul-de-sac, devoid of through traffic. Furthermore, each high-rise building, topologically, is also a cul-de-sac as all residents enter and exit through a single entrance.

You might argue, "Isn't that obvious? Aren't all houses built this way?" Indeed, except for shopping malls, the vast majority of houses or rooms are designed this way. But in traditional cities, buildings have fewer floors, their cul-de-sacs are on a much smaller scale, and thus less pronounced.

Such areas represent terminal points. When these terminal developments are large in scale, they resemble a more specialized species. They are strongly environmentally dependent, with fewer opportunities for self-renewal. Such phenomena might not be immediately apparent, and the differences in urban developments often become distinguishable only after decades.

Comparing aerial photos of Yokohama from 1980 and 2010, we find that many old houses on traditional streets have undergone renovations and still stand, while a large number of public housing estates built in the 1970s have been demolished and replaced.

Sixth, Chinese-style suburbs are more homogenous, more standardized, with many barracks-like residential areas.

The prototype for Chinese suburbanization is Le Corbusier's "Towers in the Park" model, which inherently has a very uniform design. In China, this model has been implemented to an unprecedented scale in world history.

This uniformity correlates with large-scale developments chasing efficiency. But it's not just that.

Chinese societal thinking is more polarized. Imagine a marketplace of ideas: usually, 80% of people believe in 20% of ideas as mainstream knowledge, with 20% exploring the other 80%. In a more polarized idea market, 90% believe in just 10% of ideas, with the other 90% of ideas intriguing only 10% of the population.

Moreover, compared to other regions, Chinese real estate is less of a consumer good and more of an asset. I believe that Chinese residences have a strong monetary nature and serve as primary collateral for M2 (money supply). This means that both builders and buyers prioritize liquidity. Ideally, all houses should be similar, like banknotes, differing only in face value. This minimizes transaction costs. This trend is becoming increasingly evident.

From aerial views, older projects appear more complex in design. The newer the project, the more uniform its design. You can discern that within a given area, there may be only two types of apartment blocks. It might even look like a table laid out with different denominations of banknotes.

Certainly, there's a wealth of detail I could delve into. However, for the sake of brevity and ensuring a digestible read, I've distilled my thoughts into the above six points.

Allow me to offer a brief commentary:

When viewed through an evolutionary lens, the "Chinese-style suburbia" has undoubtedly matured into a significant ecological entity. It stands as a testament to the triumphs of China's economic reforms, showcasing immense financial and societal progress achieved through these transformative policies.

However, I must emphasize that this Chinese suburban model has a pronounced consumption-driven nature. Its intensity might even be on par with the American suburbanization model. Reliant on the production capabilities unleashed by the economic reforms, this model may eventually become a bottleneck for further growth. Consequently, there are numerous facets of this model that warrant refinement or amendment. Perhaps we may even need to await technological advancements to alleviate the burdens it imposes.

Parallel Models

Now, what parallel models exist in reality to this form of suburbanization?

I'd draw attention to the phenomenon of Dongguan.

Initially, consider that Shenzhen is relatively compact. Dongguan and Shenzhen are essentially merging into a unified urban entity, sharing the economic infrastructure of a first-tier metropolis. One might even conceptualize Dongguan as an extended suburban area for Guangzhou and Shenzhen. Notably, Dongguan boasts a thriving manufacturing sector. However, its urban concentration isn't particularly dense, instead presenting a pattern of juxtaposed towns. Property prices there are considerably more affordable, approximately a quarter of those in Shenzhen. What does this signify?

In Dongguan, a substantial proportion of urban development occurs on lands owned by residents. While most major cities witness a decline in such resident-owned land development, Dongguan maintains a more permissive stance toward spontaneous, grassroots developments.

This kind of grassroots construction in urban villages significantly amplifies housing supply and productive spaces without necessitating much external input, resulting in minimal consumption.

Thus, Dongguan offers a relatively abundant housing supply for those employed in manufacturing and services. This ensures a robust economic vibrancy while maintaining a logical property price point. This model, with higher inclusivity and a nurturing environment, continuously evolves and upgrades as long as there's sufficient property rights protection.

Many may overlook the potential for such urban villages to autonomously upgrade. Yet, prime examples are evident in places like Nakano, Mitaka, and Kichijoji in Tokyo. Post-World War II, to address Tokyo's housing crunch, land near the Chūō Main Line's western suburbs was allocated and segmented into smaller residential plots. Initially, these areas catered to urban newcomers and migrant workers. Yet, over a span of 70 years, encompassing three generations, these locales have metamorphosed into renowned livable communities and hubs of cultural industries. This stands as a palpable alternative strategy.

26 Vertical Development

The Value of Density

Cities generate value by fostering an environment for collaborative specialization. High population density amplifies the efficiency of this collaborative specialization. Delivery drivers, taxi operators, and restaurant owners can most intimately attest to how population density enhances their operational efficiency. While other industries might not have such a direct perception of the impact of population density, it doesn't necessarily mean they benefit any less from it.

In traditional urban centers, temples, assemblies, courts, marketplaces, commercial streets, and even public recreational spots served as hubs of collaboration. In ancient Rome, it was the bathhouses. In certain locales, it might have been brothels or taverns. These places were the pivot points where urban collaboration occurred.

Spatial Economics and Vertical Expansion

A typical day's wage for regular labor might amount to a couple of hundred yuan. In contrast, for entrepreneurs, lawyers, financiers, and top-tier technical experts, daily earnings could reach thousands or even tens of thousands of yuan. It's not uncommon for specialized agencies to charge fees amounting to thousands per hour. Businesspeople often handle transactions worth millions or even billions on a daily basis. Whether a financier can attend three meetings or four within a day makes a significant difference.

In most professions, spending thirty to fifty yuan per employee daily on office space is pretty standard. However, financial enterprises may spend several hundred yuan daily for each financier and their support staff. Hence, selecting a more convenient and centralized location becomes incredibly worthwhile. The variation in property prices and rents across different areas can be tenfold, sometimes even more, precisely because of these considerations.

This leads to a strong inclination towards consolidation. In spatial terms, there's a push to maximize land usage with buildings. Once the land is fully utilized, the only direction left is up, which prompts the addition of more floors, leading to vertical transportation. Each building can be thought of as a street stretching vertically to the sky. The entrance to the first floor serves as the entrance to this

vertical street. This 'street' culminates at the topmost floor, akin to a dead-end. To exit, one must descend back down and leave from the same first-floor entry point.

One can imagine that businesses would most likely thrive only at the beginning of such a dead-end, the first floor, which is part of the ground space and hence more accessible. The rent for the second floor is approximately 60% of the first floor's, while the third floor is around 40% of the first. Staircases and other transit spaces reduce the usability of the space; higher floors come with increased structural costs; and moving goods up and down is inconvenient. Therefore, in most cases, adding more floors yields diminishing returns. However, as long as the marginal benefit remains positive, adding more floors is viable.

Higher Rises in Antiquity and Medieval

In fact, two or three-story houses were common in the ancient world. As is well known, Wu Dalang lived in a multi-story building; otherwise, Pan Jinlian's clothesline wouldn't have hit Xi Menqing. (Footnote: Wu Dalang, Pan Jinlian, and Xi Menqing are characters from the classic Chinese novel "The Water Margin" (also known as "Outlaws of the Marsh"). In one of its episodes, Pan Jinlian, Wu Dalang's wife, drops an object from their multi-story building that accidentally hits Xi Menqing, sparking a series of events. This reference is used to highlight the existence of multi-story residences in ancient narratives.)

Treehouses and stilted buildings are among the foundational architectural types. In flood-prone areas, the ground floor is susceptible to flooding and tends to be damp. Venice, with its four daily tides, epitomizes this. Almost no Venetian building has only one story; otherwise, the constant flooding would be unbearable. A typical three-story structure had the ground floor for shops, studios, and servant rooms. The top floor was an attic, hot in summer and cold in winter, used mainly for storage or secondary purposes. The second floor was the most comfortable and housed the primary suite.

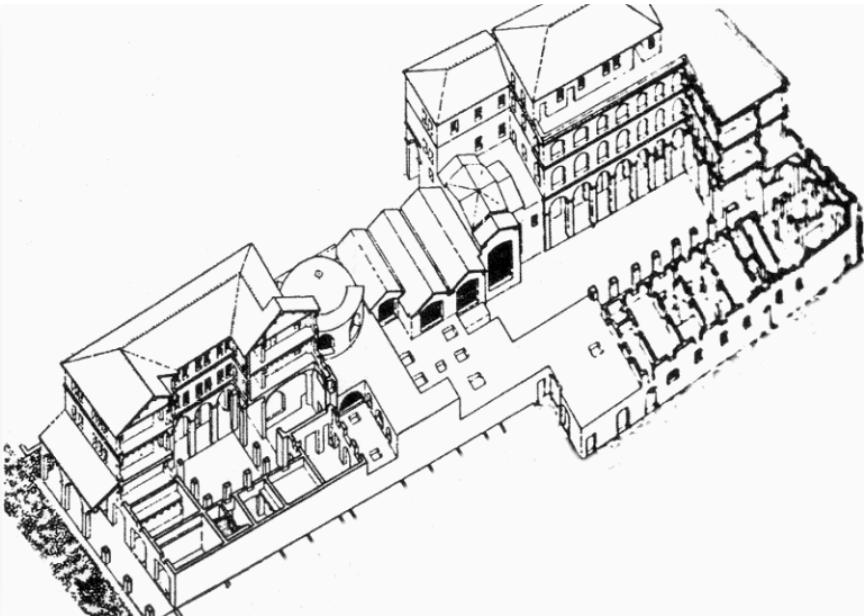
Having a two or three-story house generally indicated a financially stable family. Such homes weren't exceptionally small as they needed space for stairs, usually more than 150 square meters.

However, buildings exceeding three stories were rare in the ancient world. They were most likely multi-tenant apartments, representing advanced urban

economies. Carthage, Rome's rival and a major trading port, was predominantly comprised of six-story buildings—the approximate limit for human endurance.

Of course, there were exceptions. Some Roman apartment buildings reached nine stories. One can imagine how tiring climbing nine floors would be. These weren't luxurious dwellings. However, for their residents, living there was probably more convenient than residing several kilometers outside the city center. Notably, for safety reasons, during the Roman Empire, height restrictions were imposed on residential buildings, limiting most within the city to five stories.

Early Roman cityscape was dominated by courtyards with a few apartment buildings rising above, resembling islands in a sea. Hence, in Latin, apartments were termed "insula." Due to population and economic growth up to the fourth century, the number of apartment buildings surged while single units dwindled. Buildings of three to five stories became the norm, accounting for over 90% of the structures. This pattern matches ancient Italian cities we can observe today. In pre-industrial Florence, Siena, Venice, Pisa, Bologna, and even 1881 New York, buildings rarely exceeded six or seven stories. This reflects a quasi-equilibrium in architectural styles for that technological era. Such cities had high building coverages and dense populations. Buildings occupied 40%-80% of land in central and commercial areas, with sunnier cities having even higher coverages. The total volume-to-area ratio could locally reach 1.5-2.5. Outlying city areas, especially those away from gates and main roads or in low-lying areas, might have vast vegetable gardens. On average, the entire city would have a ratio close to 1, with population densities exceeding 20,000 people per square kilometer, sometimes even reaching over 40,000 in specific areas.



roman isola



Mid 19th New York

The Elevator Revolution and the Higher Rises in Modern Times

This balance was disrupted with the advent of the elevator in the 19th century. In 1852, the American Elisha Otis invented the safety elevator. By 1870, the

nine-story, 47-meter-tall Equitable Life Building was equipped with ten elevators, replacing stairs as the primary means of vertical transportation within the building.

When Li Hongzhang visited New York in 1896, he saw numerous buildings over 20 stories high. He stayed at the 13-story old Waldorf-Astoria Hotel located on Fifth Avenue, not the current one on Park Avenue, and rode its elevators, which left a profound impression on him.

By this time, elevator technology had matured considerably. Steel framing was becoming widespread, leading to the rise of skyscrapers. In 1913, the 38-story, 169-meter-tall Equitable Building was erected, boasting a plot ratio of 27.5.

This record was surpassed in 1931 with the construction of the 381-meter-tall, 102-story Empire State Building. Some city districts had a floor-area ratio (FAR) of over 10, underpinned by the advancements in elevator technology.

One could draw parallels between elevators and trams. Both emerged around the same time and share technological foundations. While one expanded the city horizontally, the other did so vertically, stretching urban dimensions by more than five times.

Despite this, New York introduced building setback and FAR regulations in 1916. However, setting these rules aside, technologically, there's no ceiling to increasing urban density. Economically, it's feasible too. Even if the construction cost of a super-tall building is 10,000 yuan more per square meter than a regular one, and the building cost per square meter can exceed 20,000 yuan, as long as the office space can be sold for 30,000 yuan per square meter, the value generated can cover the added costs and the cost of capital. Building more can reduce the cost of land.

High-Rises and Social Dynamics

Before elevators, higher floors were cheaper. After their advent, the higher you went, the more expensive it became. This shift led to the concept of penthouses as depicted in "The Devil's Advocate."

More importantly, elevators increased the density of traditional urban areas, relieving the pressure to expand into suburban areas and occupy more land. They also reduced the overall travel distances within cities, enhancing the efficiency of public transportation and decreasing the reliance on personal vehicles.

From a topological perspective, elevators and stairwells are analogous to cul-de-sacs in suburban areas or dead-end streets in cities. As a result, they share similar characteristics. Those who use elevators or staircases are typically residents of the building. No external traffic passes through, and there aren't any casual visitors. Hence, there's naturally less foot traffic, which in certain eras made these areas prime spots for crime.

With the emergence of property management and security systems, these problems have largely been addressed, albeit with increased maintenance costs.

Additionally, in residential buildings, much like suburban dead-ends, residents are homogeneous with little natural cooperation or interaction, unlike the organic collaborations found among village or town merchants. Consequently, homeowners' associations, made up of strangers, can be rigid and have weaker inherent organizational strength, making it harder to manage the shared building. Mismanagement and decline of mass housing, affordable housing, and collective housing are prevalent, jeopardizing the long-term interests of residents.

A notable case is the Pruitt-Igoe housing complex in St. Louis, built in the 1950s. Despite housing 2,800 units in 33 high-rises resembling many modern Chinese residential compounds, it faced increasing vacancy rates and became a hotspot for vandalism. Less than 20 years after its construction, the entire complex was demolished in 1972, marking one of the most significant failures of treating high-rises as social engineering projects.

However, the visionary Swiss architect Le Corbusier, often considered a pioneer in viewing high-rises as tools for social engineering, had long provided a solution to this issue. In his iconic Unité d'Habitation in Marseille, he designed a vertical mixed-use concept, brilliantly executed in the project.

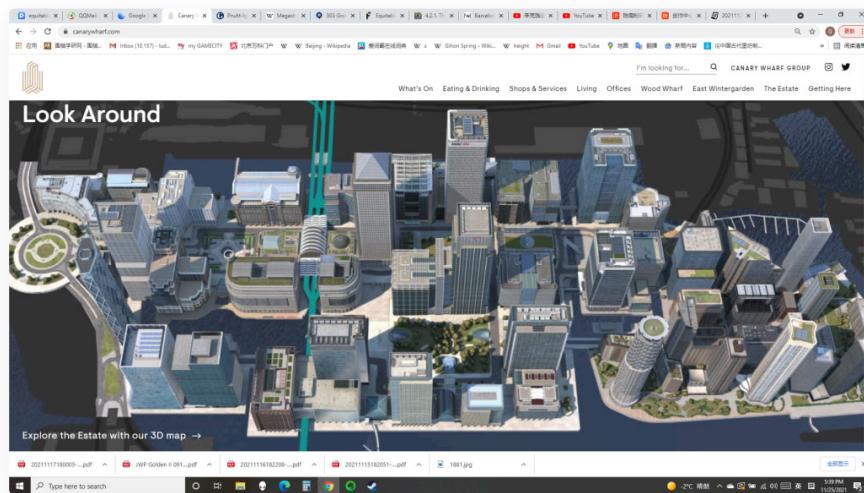
The ground floor, a heroic open space, features only one entrance. The second and third floors contain split-level apartments, which span the building's second to seventh floors due to their design. The fourth and fifth floors, which are effectively the eighth and ninth, house a two-story commercial street with cafes, architectural bookstores, other shops, studios, and a hotel. The roof offers a nursery and a multipurpose hall for exhibitions and performances.

While this design creates many opportunities for interaction within the building, its practical implementation has some challenges. For instance, if all

337 units were occupied, there would only be a few children of nursery age, insufficient to sustain a full-scale nursery.

The Vision of Mega Structures

The concept of designing massive integrated buildings—known as "Mega Structures"—that serve as mini-cities or communities is intriguing. These structures are part of the modernist utopian architectural experiments, reflecting the desire to design entire ecosystems or lifestyles in one go. However, real-world examples of such successful implementations are rare.



Canary Wharf - a Semi-Organic/Mega Structure

Projects like Potsdamer Platz in Berlin, Canary Wharf and King's Cross in London, Grand Central Terminal and Hudson Yards in New York, seem to be moving in this direction. Instead of adopting the unilateral and utopian approaches of mega-structures, these developments favor broader collaborations, complex stakeholder negotiations, and long-term cycles spanning decades. They manage to achieve a high FAR while ensuring a relatively comfortable environment that is human-centric, showcasing the pinnacle of human urban construction capability.

27 Organicity and Contextuality

Organicity in Organism

Every individual starts from a single fertilized egg cell. This one cell divides into two, then four, and after countless divisions, by the time we mature, we consist of approximately 37.2 trillion (3.72×10^{13}) cells. These cells form the four main types of tissues and 78 different organs within the human body. Each of these tissues and organs has a unique structure, and the cells vary among them:

- Muscle tissue cells are fibrous.
- Neuronal cells from the nervous tissue extend long axons.
- Cells in bone tissue present a stellate pattern.
- Lymphatic and blood cells float freely within their respective fluids.

Organs each have their intricate designs. For instance, a tooth, which is an organ, has a mineral-rich hard outer shell, with dentin in the middle and a cavity containing nerves and blood vessels. The trachea, another organ, looks like the drain hose of a washing machine, with a series of cartilage rings. It divides into branches leading to the lungs. The appearance and destinies of cells are immensely varied. A neuronal cell can be over 1.5 meters long, while a red blood cell is just 5 micrometers in length—a 300,000-fold difference. Neurons can live for over a century, but the cells lining the stomach live only a few days—a difference in lifespan by ten thousand times.

Yet, it's essential to remember that all these cells originated from that initial fertilized egg, undergoing mitosis and self-replication, all carrying identical chromosomes and genetic information. How does this differentiation process occur?

After the initial cell divides several times, producing a cluster of cells, these cells recognize their position by chemical signals from their neighboring cells. If a cell is surrounded on all sides by other cells, it's in the center; if it has neighbors only on one side, it's on the outer surface. These positional stresses alter the transcription factors inside them, switching on different genes. This leads to differentiation into various embryonic layers.

At this stage, the embryo is still amorphous, with no distinguishable head or tail. Any position could develop into the head or the buttocks of the individual. However, once it attaches to the uterine wall, signals from the uterus induce the

embryo to differentiate its head and tail. The upper and lower halves activate different genetic switches, producing different proteins and releasing varied chemical signals. Influenced by these signals of varying intensities and characteristics, the cells divide and differentiate into arms, chest, heart, liver, and various other organs. Each cell autonomously differentiates to harmonize with its surrounding cells. If a cell from the upper body, for example, develops out of sync with its surroundings into a type suited for the lower body, abnormalities result.

It's only through such intricate coordination that organs differentiate correctly. While a mature individual might seem ordinary, this "ordinary" development is, in fact, a genuine miracle.

Analogies to Morphogenesis

Cities are often likened to living organisms, complete with analogous mechanisms at work.

City walls function as the city's exoskeleton, with gates serving as its mouth; streets act as its circulatory system; markets are its lungs; barracks represent its fists; police and prisons function as its lymphatic system. Landmarks such as the Kremlin and the Tower of London stand as the city's skull, housing governing entities that act as its brain.

Cities around the world vary in appearance, yet on a macro level, they display striking similarities. Such shared characteristics arise from underlying human behaviors common across civilizations. Every building in a city, every drainage channel, stems from an individual decision-making process, mirroring the behavior of a dividing cell. But unlike cells, humans are swayed by a multitude of factors. Still, typically, every building's construction displays a heightened sensitivity to its environment.

Differentiation/Contextuality

Houses near city gates or main streets? They often become shops, leading to the formation of commercial streets. Areas around wells or temples? They attract bustling crowds, making way for markets. Land situated far from main roads and gates, especially if low-lying, is less suitable for shops or residences, and more fitting for stables or vegetable gardens. Steep slopes? They're often transformed into terraced platforms for development, utilizing the natural topography to minimize the need for extensive land grading.

If your neighbors' homes are built with stone and you're considering bricks, research might reveal that the local abundance of cheap stone makes brick-making unprofitable. Importing bricks from afar would be too costly.

Similarly, if neighboring buildings are five stories high and you're thinking of building only two, you might earn less. Erecting an eight-story building might be inconvenient for potential renters due to the climb, or might be met with resistance from neighbors due to its dominating presence. More often than not, your building will likely deviate only slightly in height from those surrounding it.

The architectural styles commonly adopted by your community often reflect accumulated experiences, cost-effective materials, local craftsmanship, and efficient design. Stubbornly choosing a non-standard design could lead to regrets.

Anyone who has studied a foreign language will be familiar with cloze tests, where words are omitted from a text and have to be filled in. The options to consider are usually limited. Similarly, in architecture, the feasible solutions offered by a given environment are finite.

Well-coordinated decisions respect various considerations and anticipate potential consequences. In urban studies, this concept is termed "contextual" or "contextuality"—meaning decisions that respect and consider surrounding environments.

Some translate it to "文脉" in Chinese, but this neologism can be hard to understand for some. At its core, it's a straightforward term meaning harmonious integration with the surroundings.

Traditional cities, as evolutionary victors, often feature buildings that, individually, might seem understated and blend into the background. Yet, collectively, they form vibrant, efficient landscapes.

For instance, during the Qing Dynasty, there were no laws dictating that only courtyard houses (四合院) should be built in Beijing. Yet, over 90% of houses followed this design. Similarly, the ruins of ancient Pompeii in Italy reveal that about 90% were courtyard houses. Despite the 8,000 kilometers and over a millennium separating the two locations, both arrived at nearly identical architectural typology, suggesting the courtyard design was particularly viable in those contexts.

Whales, descendants of a furry mammal resembling a weasel, after thousands of generations in the ocean, evolved to somewhat resemble sharks, distant relatives. Specific environments tend to steer evolution toward analogous outcomes.

I mentioned the concept of "organicity" in the first installment of "The Cliché Pulverizer." Organicity doesn't simply pertain to winding, intricate appearances; such a facade might represent pseudo-organicity. True organicity implies comprehensive coordination.

The antithesis of coordination and contextuality in decision-making is "arbitrariness." Being arbitrary means making decisions with limited external considerations, insufficient information, and impulsive behavior. History is rife with examples of arbitrariness. Urban planning, in particular, has a history marked by numerous failures. There are many books discussing these failed instances. For example, Kenneth Kolson's "Big Plans: The Allure and Folly of Urban Design" delves into instances of arbitrariness in American urban planning history. In the midst of economic growth, an arbitrary urban plan might appear successful and functional on the surface. However, its essence is consumptive, merely hitching a ride on the era's coattails and draining the vitality of society. Yet, arbitrariness is straightforward, while true coordination requires knowledge, patience, and, most importantly, intricate organizational efforts.

28 Informal Occupation - Reflets Better the Underlying Orders

In this chapter, we discuss the concept of "informal occupation". But what is informal occupation?

A Natural Process or Pareto Improvement

Let's consider a real-life example. A couple moves into a new home, which has a large wardrobe. They each hang their clothes in the wardrobe: the husband on the left half, and the wife on the right. Initially, they seem to have an unspoken agreement to split the space evenly. However, as time passes, the wife's collection of clothes grows, filling her half and slowly encroaching on the husband's space. The husband doesn't mind, as he doesn't have as many clothes. Eventually, when he buys new winter clothes and runs out of space, he spots some room on top of the wardrobe. He neatly folds some of his clothes, places them in boxes, and stacks them up there. Initially, they had an unspoken rule: half the space for each. Yet, this boundary was silently breached. The wife crossed the middle line, and the husband claimed the top. All of this happened without any formal agreement. This is a perfect example of informal occupation.

In the early days of human urbanization, there were no land certificates or clear boundaries of ownership. Land was abundant, and it was typically "first come, first served." Each household had just a small hut, and as long as they didn't block pathways or cause inconvenience, everything was fine. However, as population and wealth grew, households began to expand their possessions, building pens for sheep outside their homes or stacking grain and firewood. Those with a higher status in the community or those with more resources and larger families would have more say and would tend to occupy more land or better spots. All these occupations were informal. There were no set rules. But gradually, public spaces between huts began to feel the pressure, and ambiguous boundaries led to internal conflicts. At this point, establishing clear ownership became crucial.

The ancient text "Lüshi Chunqiu" mentions, "In a forest, a rabbit runs, a hundred men chase it, because this rabbit has no owner. In a marketplace filled with rabbits, passersby won't even give them a second glance, not because they don't want rabbits, but because these rabbits already have owners." Ambiguous ownership leads to competition, and competition consumes vast resources. Thus, structures like fences and walls began to appear. They might not offer

effective defense but served as markers of property claims. If these claims did not infringe on others' rights and went unchallenged, they eventually became more formalized. Informal occupation can thus be seen as the precursor to property rights, emerging from the interactions and contests of this phase.

Even the streets of traditional cities are a result of informal occupation. People would claim land alongside roads, building as close to the streets as possible to assert their boundaries. Yet, there's a limit – they couldn't obstruct traffic. Everyone tends to push this boundary as much as possible without infringing on the broader public interest. As a result, you get orderly, continuous rows of buildings right up against their plot boundaries, hugging the streets. Traditional cities didn't have gardens opening onto streets since it wasn't conducive for stable occupation.

While streets were left unoccupied to avoid public outrage, airspace above them was often fair game. Overhangs from second floors jutted out further than those on the first, creating additional space. This behavior was tolerated in many cities and is especially common in early commercial settlements like in Italy and the Netherlands.

In the rainy cities of Southeast Asia, these overhangs, which offer shelter from rain, are very beneficial for commercial streets. Some overhang so much that they require columns on the streets, becoming colonades. originating in India and Singapore. They're popular architectural features in cities like Guangzhou and Xiamen.

In terms of informal occupation, the game rules still apply. Whoever creates more value has a better chance to dominate. If the husband leaves his space in the wardrobe unused, not creating any value, the wife might stuff her clothes into it, putting the space to good use. By the time she occupies the wardrobe, she has established a status quo. If the husband protests, he would infringe on the wife's interests, resulting in her resistance. Regaining his original equal space in the wardrobe becomes a challenge. Therefore, changing an established fact often comes at a cost, sometimes quite high. A more cost-effective alternative might be to just occupy the top part of the wardrobe and make concessions.

In Nepal, there are instances where residents without homes occupy public green spaces, setting up prefabricated houses. In Beijing, "Da Zayuan" (** is a type of residential environment in Beijing, a representation of how historical urban areas adapted to accommodate increasing populations and changing social structures.*)

represents residents who informally occupy public courtyards to build private homes. These are cases of informal occupation. In such scenarios, the authorities have the right to dismantle these structures to restore the public land. However, evicting these residents might render them homeless. Should the authorities then provide temporary housing? If the husband evicts his wife's clothes from the wardrobe, doesn't he still need to buy a new one? Doesn't that come with its own costs?

If the authorities lack the resources to intervene, they might tolerate this informal occupation. The longer the wife occupies the wardrobe, the more justified it seems. Later, when their child grows up, having always seen the wardrobe predominantly filled with the mother's clothes, the child will naturally assume it's the mother's. If earlier generations don't challenge these occupations, the chance for subsequent generations to challenge diminishes. Informal occupation, when passed down generations, is more likely to become semi-formal, perhaps even officially recognized. From an economic standpoint, if such occupation doesn't infringe on (or seriously harm) others' rights and creates well-being for the occupier, isn't it a kind of Pareto improvement?

New Orders Rise from the Void

During the end of the Eastern Han dynasty, a population decline resulted in a large amount of unused land. Essentially, whoever cultivated it, owned it. As for the Roman Empire in its later stages, amidst upheaval, many properties and streets were abandoned. Roads that were once meticulously planned and broad became redundant. Residents expanded their homes onto these streets, leaving just enough width for passage. As a result, roads became winding and twisted. Some properties remained unclaimed, and buildings collapsed, allowing new paths to be formed across vacant plots. Streets unused by anyone could be completely occupied, or even merged with properties across the road. Public buildings managed by the government, such as the Baths of Nero, became dilapidated as their materials were stolen to construct private homes, leading to their gradual disappearance. Theaters and arenas with sturdy structures often saw their underground spaces divided and occupied by homeless families. Squatter houses began to appear in squares. After the fall of the Empire, with the collapse of administrative systems and authority, a state of anarchy prevailed, and informal occupation became rampant.

To formalize these occupations isn't a challenge. Cities and feudal lords need to collect taxes, and before doing so, they would organize property registration. As

long as no disputes arise during this process, these informal occupations can easily become official, much like children born out of the official population policy getting registered during a census. Once you have the deed, you can treat the property as inherited and develop it further. Over a prolonged period, a new order emerges from the chaos of the old empire. Nomads form guilds and free city-states, and descendants of refugees become bourgeoisie. Haphazardly built structures evolve into works of art over centuries. For example, theaters by the Tiber River in Rome, once divided among many families, now comprise luxurious residences, retaining their circular facade. Though, like the Ship of Theseus, most bricks aren't original anymore. These residences now even feature elevators. Observing this miraculous rebirth always leaves me profoundly moved. Informal occupation plays a significant role in human settlements, occasionally acting as a pivotal element. While informal occupations come with controversies and disputes, they aren't as dreadful as imagined. They are generally based on mutual respect and the broader public interest, ensuring the game isn't pushed too far.

The most intense and unequal occupations are conducted through force and authority – these are conquests. Both formal and informal occupations are highly vulnerable in the face of conquerors.

Now, a question for the readers: Will Elon Musk's colony on Mars also begin with informal occupation?

29 Top-level Design

This lecture series, from Session 9 to Session 26, revolves around the dynamics of urban evolution. From Session 27 onwards, I will dedicate several sessions to discuss issues related to the morphology of urban evolution. In this context, there's an excellent book titled "The City Shaped" by Spiro Kostof. This book has been a significant influence and inspiration to me. The book offers a comprehensive discussion on the conditions for top-down design, the origin of ideas, and approaches. In urban history, decisions made by various small entities based on their own perspectives have been the predominant way of building. For example, village farmers mainly decide the designs of their homes. Commercial complexes and residential areas are primarily developed by organizations based on market needs. Even institutions such as universities, churches, hospitals, and government buildings are usually constructed based on their individual needs.

However, occasionally, some decisions are made rapidly and may influence the course of events for centuries or even millennia. The most common hallmark of such top-down designs is the grid road network, though other designs do exist but are less prevalent.

Scenarios demanding top-down designs can generally be categorized into three situations:

- 1) Post-disaster reconstruction
- 2) Colonial development
- 3) Rapid urbanization due to economic and technological booms

Let's delve into each:

1) Post-Disaster Reconstruction:

Areas in the river civilizations often face floods. After floods, the deposited silt would often blur the boundaries of farmlands, making ownership delineations unclear. This requires someone knowledgeable in mathematics, typically a priest, to re-delineate these boundaries. Such geometric divisions usually result in rectangular plots, resembling a chessboard. If developed, houses built on these plots would inherit this grid pattern, and the original pathways between farmlands become roads. This grid isn't necessarily perpendicular and often adapts to the landscape. For instance, settlements along the Nile in Egypt have been built following this grid pattern, and Cairo still exhibits this layout today.

New York's West Village, with its distinctive street layout, also evolved from farmland grids, making it deviate from the general grid pattern of the city and bear a resemblance to Cairo.

Valletta in Malta, a medieval city with a strict grid layout, was rebuilt after a devastating four-month siege in 1565. After the city was bombarded with 130,000 cannonballs by the Turks, it was heavily funded by Europe to be reconstructed in a new location with better defenses.

London, with its intricate and winding streets formed over two millennia, once had a chance to be redesigned after the Great Fire of 1666 which destroyed two-thirds of the city. Plans were proposed to reorganize the streets into a more structured layout, but these plans met with fierce opposition from landowners as it would alter property boundaries extensively.

Both the cities built in the 6th century – Chang'an during the Sui and Tang Dynasties and Yuan Dadu in the 13th century – are classic examples of top-down design with a typical grid layout. Both cities were constructed adjacent to their older counterparts – Han Chang'an and Jin Zhongdu – due to the contamination of groundwater over time rendering the well water undrinkable. In a way, this can be viewed as reconstruction in response to an environmental disaster.

Case 2: Colonial Development.

The most developed grid network can be found in the United States, which is not surprising. When European colonizers arrived in North America, their military power easily overwhelmed the indigenous peoples. With little resistance, they gained control of vast tracts of land, treating it much like a blank slate upon which they could freely plan, without many constraints.

When dividing the land, what shape did the colonizers choose? Naturally, they divided the land into uniform squares, which made it easier to measure, value, sell, or resell. Moreover, the fundamental shape of a house is square, making it convenient to lay out on a square plot. This checkerboard layout resonated with the colonial community's ideals of equality.

As a result, we can observe grid cities like Philadelphia and Savannah that were designed top-down.

The epitome of this grid system was the Public Land Survey System (PLSS) proposed in 1785 by Thomas Jefferson, who was yet to become president. He suggested dividing the vast lands of the Midwest into enormous grids, each one

mile square. This grid spanned thousands of miles. However, since the Earth isn't flat, these square plots would become slightly trapezoidal over large distances, hence requiring periodic adjustments to the grid. As a result, many roads and property lines in the Midwest still adhere to this pattern. Major cities like Detroit, Cleveland, Cincinnati, and Minneapolis adjusted their grids according to natural features like rivers, but there are exceptions like Chicago, which followed the PLSS grid. In terms of visionary planning, few can rival Jefferson, who, aside from drafting the Declaration of Independence and becoming president, left a lasting mark on America's landscape.

Yet, colonialism isn't unique to Western civilization. Ancient civilizations also practiced it.

Around 4600 years ago, Mohenjo-Daro, an ancient city of the Indus Valley Civilization, was meticulously planned with a grid network. This reveals that the civilization was possibly established by a foreign entity, bringing with it unprecedented technologies and military prowess, aiming for rapid and uniform development.

In European cities like Florence, Vienna, and Lucca, we often notice a small, square area at the city's heart, juxtaposed with a radiating spiderweb pattern. These are remnants of Roman military camps. At the height of the Roman Empire, hundreds of such camps dotted Western Europe and the Mediterranean, housing 44 legions and 400 auxiliary units. These camps and connecting roads secured trade routes, ensured tax collection, and maintained order.

The Roman camps were standardized fortresses. Their benefits included standardized designs, construction procedures, and budgets. Troops moving between these camps could easily adopt standard defensive strategies. These fortified sites often became regional trade hubs and eventually evolved into cities.

In China, there are similar street patterns, like in Yantai's Zhifu district, which features a square layout with a cross-shaped main street. This is the remnant of a Ming Dynasty coastal fortress. Similar patterns can be seen in Tianjin, Xiamen, Shenyang, and Kowloon in Hong Kong. The Ming Dynasty left hundreds of such fortresses, called "Wei So," which bear an 80% resemblance to Roman camps, serving similar functions.

During its gradual domination, the Ming Dynasty built these fortresses to suppress remnants of the Mongol Empire and local armed groups. This

standardization in military architecture dates back to the Zhou Dynasty in China.

Every architecture student in China learns about the "Artisan State" from the "Zhou Rituals". The Zhou princes and the indigenous inhabitants had a unique relationship, akin to military colonization. These fortified states were constructed and managed by the Zhou aristocracy, serving as outposts for defense, diplomacy, and administration—similar to Roman camps but with a different administrative structure.

The description in the "Zhou Rituals" especially emphasizes the width of roads for chariot movement, suggesting its creation during the Spring and Autumn period. Like Roman camps, these Zhou fortresses contained temples, markets, and assembly areas, all organized in a grid. Over time, as settlers integrated, these fortified areas either expanded, blending with the organic layout of surrounding settlements, or disintegrated.

Taking Lucca as an example, it has preserved the Roman grid layout with minor disintegration. The Y-shaped streets on the east and north sides developed alongside old outer roads, later integrated into Renaissance-era walls. Beyond the walls, roads radiated outwards from the city gates.



Case 3: Rapid urbanization due to economic and technological booms

When there is a leap in economic and technological development, there is a sudden influx of new urban population and capital, flooding into previously low-valued land.

Such situations often stimulate the development of new cities and lead to land speculation.

This bears some similarities to colonial activities. Colonialism itself often coincided with the introduction of new technologies into areas that were technologically underdeveloped, resulting in rapid development and urbanization.

In historical contexts, there were specific periods, for example, in the late 19th century when the West entered the industrialization phase. Major European cities began to see the emergence of new districts in their peripheries.

During this era in Barcelona, the new district named Eixample was particularly representative and expansive, covering approximately 7.5 square kilometers.

The grid system in New York's Manhattan came slightly before Barcelona's expansion. It can also be considered a product of this era. It wasn't a remnant of the early Dutch colonization. In fact, early New York was centered around the Financial District downtown, where the road network was much more intricate. The large, consistent, and homogenous streets north of 14th Street were planned in the early 19th century by the committee formed by Morris, Rutherford, and DeWitt. This design was a reaction to the post-revolutionary influx of immigrants and active real estate speculation in the United States.

After World War II in the 20th century, there was another peak in top-down urban planning. The UK, France, Japan, Brazil, and India all experimented with new urban designs, primarily based on modernist design principles. However, these experiments resulted in a few less than successful cases. By the 1980s, in the US and UK, there was a resurgence of urban planning led by the New Urbanism movement. New Urbanism emphasizes a more coordinated approach. New York's Battery Park City and London's Canary Wharf are among the more influential and positively viewed examples.

Of course, none of these economic leaps compare to the intensity seen in China at the beginning of the 21st century. China's economic surge was massive, involving an enormous population. In 1850, the total population of Europe was only 120 million, and the US had just 23 million. By 2000, China's population was 1.3 billion. In China, new districts larger than Midtown Manhattan emerged by the hundreds, almost all of them adopting a very orderly road network structure. This marked a significant chapter in urban history.

In summary, we discussed three scenarios: post-disaster reconstruction, colonial activity, and rapid urbanization. These represent times when top-down urban planning is most prevalent, reflecting a society where power, resources, and knowledge are concentrated at the top.

In societies experiencing steady development, top-down designs are less common. However, in societies undergoing significant change, it becomes a necessity.

In modern times, the proportion of top-down designs is increasing. With advancements in technology and the accumulation of knowledge, the quality of these designs is improving, leading to more comprehensive information, better coordination, and less arbitrariness. However, in societies where power is highly concentrated, experts often become silent or inactive, leading to more arbitrary decisions and a decline in technical quality.

Top-down designs are typically temporary. Over a millennium, there might be just a few instances, each lasting only a few years or decades. For over 90% of the time, cities tend to revert to spontaneous construction activities, which are more sensitive to environmental changes. These spontaneous activities, especially in situations where existing authority wanes, continually and gradually modify and optimize the original top-down design, enhancing its efficiency.

However, the influence of top-down designs is profound. Their established trajectories create path dependencies that persist for generations. For example, modern Beijing still uses streets designed during the Yuan dynasty, and these roads show no signs of erosion or dissolution, retaining their vitality.

The techniques of top-down designs are diverse, not just limited to grid systems. Their inspirations and methodologies vary widely, which we can delve into further in subsequent discussions.

30 Mechanics: The City is the Hardware of the Three Organizational Forces - Security, Economy, Ideology

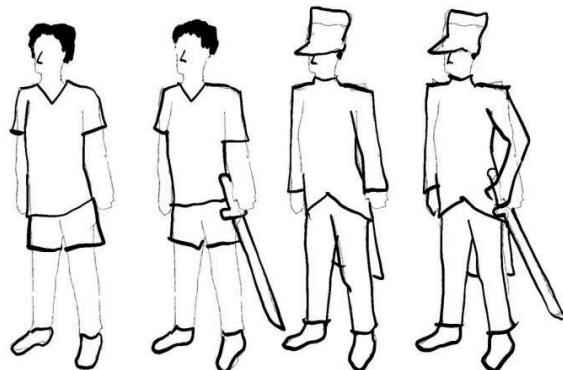
In this installment, I'd like to clarify a core concept that runs through my series: cities are the hardware of three types of human societal organization. Modern humans differ little from their counterparts tens of thousands of years ago in terms of individual innate attributes. However, today's collective human abilities are far more powerful. This discrepancy arises from the intricate organizational systems we possess. At their core and most profound level, cities serve as the hardware for organizing people. The form of a city also embodies organizational strength, which can be categorized into three main types:

Firstly, economic organization. This facilitates more efficient solutions to basic human needs, such as food and warmth, while generating wealth. Surplus wealth provides the cushion needed to spur varied advancements and innovations. More intricate organizations foster broader, large-scale trade and collaborative work. Those in charge of economic matters are often known as guild masters, bosses, or managers. In the physical realm of cities, this is manifested in factories, workshops, roads, warehouses, and trading venues.

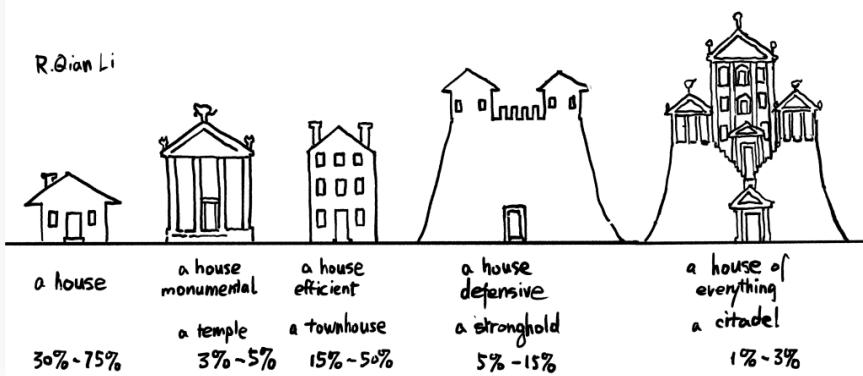
Secondly, defense organization. This ensures the safety of individuals, families, and larger groups in terms of both physical safety and property protection. The liberty that stems from such security is crucial for nurturing order. More often than not, security is not achieved individually but collectively. Historically, those in charge of security have typically been kings, nobles, or warriors. In terms of urban infrastructure, this is represented by walls, moats, gates, barracks, and towers. These structures elevate the costs for potential invaders, deterring aggression and fostering periods of peaceful development.

Thirdly, ideological organization. Using tools such as faith, worship, and identity, it is possible to establish a virtual community. This not only facilitates alliances both internally and externally, reducing the intensity of potential conflicts and destructions but also builds trust, lowering the transaction costs in economic organizations. Those at the helm of such organizations are often referred to as priests, shamans, historians, scholars, pastors, teachers, or political workers. The importance of ideological organization is a hallmark of advanced civilizations. Within the urban context, this is reflected in monuments, public

buildings, and various culturally and ceremonially significant constructions and spaces.



These three organizational powers are embodied in various artifacts in civilized societies. To illustrate, consider two cartoons. First, imagine a silhouette of an average person. We make three copies. To the first, we add a defensive weapon, a sword. He then appears somewhat aggressive, reminiscent of a bandit. To the second, we dress him in a suit and grant him a ceremonial top hat. Now, he seems to exude authority, much like an Orient Express conductor. To the final one, we give a full ensemble—a suit, a top hat, and a sword. Suddenly, he takes on the air of nobility, even resembling Emperor Franz Joseph of Austria.



For the next cartoon, envision a simple one-story house. Again, we produce three replicas. The first one is elevated to a three-story building. Although still plain, it suggests a prime location, much like an inn from the Chinese series "My Own Swordsman." To the second, we add ceremonial decorations, like ornate ridges on its roof, transforming it into something resembling a small temple, where one might expect devotees to visit. Lastly, upon the three-story building, we place the decorations, set it on a grand stone base, and it evolves into a majestic castle, reminiscent of the stronghold from where Oda Nobunaga once ruled.

Cities and architecture establish organizational strength and order through their various components. I've previously discussed the mechanisms of defense systems in my 99th issue, so I won't delve into it again. Let me expand a bit on the tangible representations of ideational organization:

A piece of clothing serves not only to maintain warmth and protect the body but can also signify one's social status or even political leanings. Whether Zuckerberg wears a hoodie or a suit and tie, both choices are laden with class distinctions and representational meanings. Furniture, ranging from the simplest to the ornately decorated or the sleekly modern, has consistent functional purposes. However, it reflects the owner's cultural preferences and

affiliations. A simplistic entrance to a residential community might disappoint potential buyers. There was a news story this year about a homebuyer who loudly protested in front of a developer's office, claiming that the main gate was an embarrassment and he sought to restore dignity for the residents. His point was valid. A gate is not just a physical security measure but also carries symbolic value. The doors of the courtyard homes during the Ming and Qing dynasties in Beijing strictly corresponded to the homeowner's status. Wealthy merchants, while commoners, differentiated themselves with lavish decorations. In the ancient city of Pompeii in Italy, the colorful mosaics in front of the houses showcased the owner's wealth and artistic taste. Reputation and face are crucial, influencing one's personal influence, the cost of transactions, and even mate selection. In other words, uniting people through shared concepts to transact or act collectively is significant. Investment in preserving and showcasing face, through commemorative or political constructions, is prioritized by everyone from emperors and nobles to merchants and commoners. Those with abundant resources invest more in maintaining face. The grandest buildings in cities are often banks and insurance companies, their solid granite façades symbolizing centuries of endurance. Urban roads are not merely transport infrastructures; magnificent boulevards are monuments themselves, representing the political prowess of rulers. All entities, throughout ages and classes, optimize their position in these organizational realms based on their circumstances and stances.

From prehistoric times, people adorned and carved their primitive huts to display wealth and status. The higher the status, the larger and more refined the carvings. These structures served as tools to imprint class order onto people's hearts. Even in egalitarian eras, some architects, driven by idealism, deliberately built undecorated, austere, and standardized houses to express an egalitarian ideology. Without a doubt, they were creating distinctions from the old order, with an equally strong intent of establishing a new order. However, such constructions by these 'progressive' architects didn't resonate with the masses; instead, they evoked admiration from a distance. Their detachment from the public and their impulse to erect monuments for themselves were no less than that of ancient monarchs.

the Overstated Security and Monumental Elements

The perspectives of rulers and the ruled both align and conflict. The difference is that when conflicts arise, the ruled usually lack the means to inflict significant harm on rulers. Rulers, with their power, have more chances to implement their intentions, and when they cause harm, it's more conspicuous. The Han and Tang

dynasties' capital, Chang'an, implemented curfews in every district, with residents effectively living in 'soft prisons', restricted from venturing out at night. This infringed on their freedoms and economic interests but efficiently curtailed possible revolts and reduced security costs. In Bucharest, Romania, during Ceaușescu's reign, vast areas of the historic city center were demolished to make way for grand avenues and monumental government buildings, like the Palace of the Parliament. The demolition's extent was likened to the destruction caused by the atomic bomb in Hiroshima. Locals coined the term "Ceaushima" – a fusion of "Ceaușescu" and "Hiroshima" – to refer to the devastated area.

While appropriate monument construction can foster organizational cohesion, overzealous monument building can be a risky gamble, sometimes backfiring on its creator.

The pattern of a city reflects its social structure and the balance of power among the various classes.

In Tokyo, the design of many areas is intricate and irregular, characterized by urban village bases, small-scale industries, and a maze of tiny streets and alleys. Main roads primarily serve as transportation routes, lacking monumental significance. However, individual buildings are generally clean and respectable; traffic congestion is not severe. Large real estates and capital are primarily evident in areas with special historical backgrounds and especially central commercial districts. This design mirrors a society primarily composed of commoners and a government that serves its citizens.

London's streets are winding and complex. The city has a significant proportion of medium-scale industries and old buildings, all of high architectural quality from various eras. There are no monumental avenues. The city's layout reveals a society that has remained stable for centuries and the accumulation of diverse traditional powers.

Paris, before the mid-19th century, had a layout similar to London's—filled with small streets and alleys. Under the reign of Napoleon III, Baron Haussmann supervised the construction of a radiating network of roads, amplifying the city's monumental aspect. This project gave Paris a distinct character, but it was also a source of significant controversy. Additionally, the Haussmann renovations seem to mark a watershed moment in French history. Paris, with its narrow lanes from the Valois dynasty to Napoleon I, did not hinder the French military from dominating Europe. Yet, by 1870, with its newly designed grand boulevards,

France quickly lost the Franco-Prussian War and thereafter relied repeatedly on allies to defend itself.

Of course, it wasn't Paris's urban renovation that led to France's martial decline. Such a project doesn't have that much influence. Instead, this project reflected the decay of French grassroots society and the zenith of its bureaucratic system. As the saying goes, "From a single twig, one can predict the coming of autumn." The character of a city often accurately mirrors the power structure of the society in which it exists.

Economics, defense, and ideas—the discussion about these three organizational forces will continue throughout my series.

31 Mechanics: Thermal Map

In this installment, I'll introduce a method of analysis, which serves as a supplement to the previous discussions on the dynamics of urban evolution.

Let's briefly review what was discussed before. In the 13th lecture of this series, I compared the flow of resources and technology to electrical potential differences and transportation factors to conductors. Potential difference arises when one region possesses resources and technology while another lacks them, leading to a need for exchange. Realizing this exchange creates value. It's important to note that this potential difference is not due to distance but rather heterogeneity. For instance, Papua New Guinea and Congo are 13,000 kilometers apart with little need for exchange, while Tsinghua University and Wudaokou, only a few hundred meters apart, have intense exchange needs.

Within human populations, there is inherent division of labor, leading to heterogeneity. Resources and technology are, to a significant extent, people themselves. Cities can generate substantial potential differences simply through the internal division of labor among its residents. In large cities, people frequently change where they dine—Italian today, Thai tomorrow. In villages, however, most meals are home-cooked. In the city, a person might ride in a car driven by a stranger, send dozens of emails, collaborate with hundreds, and patronize various venues for shopping and entertainment. In a village, daily entertainment might consistently be a game of mahjong with the same group of people. Human settlements adhere to the network effect: the more users, the greater the value. The potential difference created within a large city far surpasses that in a village. Greater potential difference and lower resistance mean a stronger flow of resources and technology, leading to greater wealth and complexity.

More complex orders lead to finer divisions of labor and greater potential differences. To establish a particular division of labor, a certain scale is required. Only at this scale can enough momentum be generated for the emergence of specific industries and order. This principle is similar to the critical mass needed for a nuclear explosion. Every American city has hairdressers, but not necessarily Japanese cuisine. Both are relatively general industries.

Certain specialized industries require accumulation at specific levels, and it's not just about comparing populations. Frankfurt is much smaller than New Delhi, but its financial sector is much more robust. Hengdian is tinier than Lagos, but

its film and television industry is much stronger. Princeton is much smaller than Buenos Aires, but its scientific output is significantly greater. Such flows within cities are short-ranged and multi-leveled.

In this lecture, I'll introduce another analogy used in urban research: the "thermal map." If you were to view someone with an infrared thermal imager, warmer areas would appear redder, while cooler areas would be greener. This is a thermal map. Urban researchers use similar tools, often mapping populations or specific geographic information. Red or certain markers indicate the "heat" or activity in urban areas. It's an intuitive method to observe structures. For instance, on public review platforms or property rental sites, map searches allow you to clearly sense the density of specific restaurants or properties in various districts, effectively presenting a "thermal map" of a particular aspect of a city.

I'll introduce several general patterns:

1) Inner Heat, Outer Cool: Every individual is warm inside and cool on the outside. Internally, adjacent particles or elements all generate heat. However, the skin or outer layer, which is exposed and has only one side neighboring the heat source, tends to cool down more rapidly. Cities follow a similar principle. Take New York's Manhattan for example: the borough is bounded by rivers on its east and west sides, and as you traverse from east to west, you cross avenues sequentially from First to Ninth. The First and Ninth Avenues are riverfronts, and while they offer beautiful views and certain areas, like near the western side of the World Financial Center (WFC), have been meticulously developed, none of these riverfront avenues is a major commercial hub. The bustling heart of Manhattan lies along the Fifth, Sixth, and Seventh Avenues – all situated centrally on the island.

The dynamics of urban activity demonstrate the 'Matthew effect' – areas with high activity or 'heat' tend to attract even more resources. As a result, central areas naturally have an advantage over the peripheries, an advantage that compounds over time. Hot areas get hotter, while cooler areas struggle to catch up.

2) Boundary Vacuum: This concept, introduced by Jane Jacobs six decades ago, suggests that it's challenging to conduct commercial activities on the edges of spaces like parks or along riverbanks. The wider the river, the broader the road, or the larger the park, the harder it gets. Numerous attempts have been made to establish commercial streets along riverbanks, but most have not been very

successful. For instance, while New York's Central Park is quite lively, the streets directly adjacent to it haven't developed into commercial zones. Fifth Avenue, which bustles with activity to the south, becomes subdued as it approaches the park, transitioning to a more residential ambiance. Main commercial districts in major world cities are typically not riverfronts. Overcoming the boundary vacuum to create bustling areas is a daunting task, with exceptions seen in places with traditional docks. Docks, being interfaces between water and city, attract resources and human traffic. Examples include Shanghai and Savannah.

3) "Armpit Effect": Observing the human body's surface temperature, you'll notice the armpits are warmer. This is because they are enclosed by the surrounding body, making them warmer than most external parts. Even though they are on the outside, they are surrounded by heat-generating points.

Drawing parallels in urban contexts, areas bordering internal and external spaces, due to their unique position, can become potential hubs of activity. The southeast and southwest corners of New York's Central Park serve as prime examples. Both points, with three sides surrounded by the city and one by the park, resemble the form of an armpit. Many people enter and exit the park through these locations, making them vital hubs of activity.

Locations resembling the "armpit" shape and situated next to water bodies are typically ideal spots for port cities, as they can draw from or radiate to vast land areas. The largest port city in the classical world, Corinth, was situated in such a semi-enclosed bay. Cities like Chicago, Genoa, Venice, Yingkou, and Trabzon in Turkey also occupy such 'armpit' positions. These locations witness a convergence of land-based traffic, akin to the concentration of major arteries and nerves in the human armpit region.

4) Squeezing Effect. In the Ming and Qing Dynasties, the Inner City of Beijing had a massive block known as the Imperial City in the middle, which was impassable. From north to south, from Shichahai to the Southern Lake, there was an expansive ancient riverbed with limited bridges crossing it. Traffic from the north to the west largely squeezed through Yinding Bridge and Yandai Xiejie, forming bustling commercial streets. This bridge was also an essential route for the Regent Prince in the late Qing Dynasty, making it a frequent target for assassination attempts. This squeezing effect is common on bridges.

Near Beijing University, Tsinghua University, the Summer Palace, and the Old Summer Palace are massive enclosed blocks. This configuration has resulted in

north-south traffic getting compressed between Zhongguancun North Street and Yuanmingyuan West Road, forming two roads with significant traffic.

In London's West End, traffic between Hyde Park and Buckingham Palace is also squeezed onto Knightsbridge Street. However, as previously mentioned, there's a boundary vacuum effect at the edge of large parks. Hence, commercial districts don't develop directly in these tight spots. Instead, they form on streets where the squeezing effect drives traffic into denser urban areas. For example, on Brompton Street, we find Harrods, the world's largest department store, and a bustling shopping district.

Traffic compression also occurs at city gates, station entrances, residential community entrances, school gates, and more.

5) **Nucleation Effect.** Pure supersaturated steam won't condense on its own. It requires other particles with higher electronegativity to promote condensation. Similarly, homogeneous backgrounds like a vast Midwestern grid in the U.S., which is an extremely uniform structure, need some variations for cities to nucleate and grow. These variations might be the confluence of two rivers or a bridge over a river. New York's grid system is very uniform, but Broadway's diagonal crossing increases local road density, making these areas more conducive to the development of commercial districts.

6) **Environmental Induction Effect.** On a colder day, when two people sit side by side, they can feel the side facing each other is warmer. Similarly, the warmth or conditions of the surrounding environment can influence a city's internal dynamics. The southern commercial area of Beijing during the Ming and Qing Dynasties was more significant than the north due to the more considerable population in the hinterland of the North China Plain. Similarly, the eastern commercial area of Xi'an was more significant than the west due to the larger population coming from the vast Guandong region.

A city isn't isolated in a vacuum; its external "thermal" environment also determines its internal thermodynamic distribution. Jersey City in New Jersey, although separated by a river from Manhattan, also has its own downtown area at Journal Square. However, its upscale residential and business districts have developed along the river facing Manhattan. The convenience of accessing Manhattan is a crucial factor in determining property value.

In conclusion, this analysis using heat maps provides a dynamic method for understanding urban thermodynamics and how cities evolve and interact with

their surroundings.

Mumford - Auguste Comte, W.M. Wheeler : accumulative activities

32 the Language of Urban Design (1) Circle, Grid

Cities began from spontaneous settlements, starting from vernacular architectural types. Their early development was very rustic and lacked theoretical underpinning, but it was orderly.

This order stemmed from the internal dynamics of society and the mechanical structure between society and nature. Just as water molecules don't understand theory and have no aesthetic preferences, due to their specific shape and intermolecular forces, they can crystallize into beautifully shaped snowflakes.



Similar crystallization phenomena exist in human settlements. Take, for instance, the circular fortresses common on flatlands. Since ancient times, tribes across the world have frequently adopted this shape. One of the main reasons people congregate is for efficient mutual defense.

There's nothing mysterious about the circular shape of these fortresses. Given the same perimeter and defense structures like walls and ditches, it can enclose the largest possible area, accommodating the most people and resources.

Therefore, it's the most cost-effective shape for a fortress. Nomadic tribes in Africa, indigenous Americans, and ancient tribes in Europe and Asia all widely used this shape. Today, the circular defenses of the 13th-century German city of Nordlingen are still clearly visible.

Thus, the circle is akin to a city's crystalline form like a snowflake. This shape arises from a singular mechanical structure focused on defense cost-efficiency. However, a circle lacks environmental sensitivity and generally suits smaller settlements. In a small settlement, resembling a point, its surrounding geographical environment is relatively consistent. For larger towns intersecting with trade routes, slopes, especially rivers, and other geographical features, retaining a simple circular shape may no longer retain its original defensive efficiency.

Much like a snowflake retains its form in a pure environment and remains small, a larger block of ice subjected to complex external factors can't maintain a snowflake's shape.

Yet, the circular shape, historically seen as representing cities, has embedded itself in human cognition, becoming a part of our understanding of cities.

In later eras, some major cities also adopted this circular layout. For instance, Ecbatana in the ancient Medes kingdom around 700 BCE, Baghdad during the Abbasid dynasty in the 8th century, and Shenyang, the Manchu metropolis in the 17th century, all derived their circular plans largely from this concept.

While these ancient cities' circular shapes might have still held some defensive value, in modern times without traditional defenses, some architects have explored the language of circular cities. Ebenezer Howard's envisioned Garden Cities of Tomorrow consisted of circular town combinations; Jacque Fresco's Venus Project in Florida was a conceptual circular city. More recently, the Apple headquarters in California, designed by Sir Norman Foster in 2017, adopted a massive circular form. Their ceremonial or futuristic nature often outweighs their practical efficiency, sometimes even seeming counterproductive.

Thus, we view the circle as a language of urban design. Originating from spontaneous order, it has evolved into a body of knowledge or a concept. Sometimes, divorced from its original mechanical foundation, it continues to exert influence, occasionally manifesting in urban practices.

Similarly, many urban design languages arise from spontaneous order, captured by the human mind, entering the realm of ideas, seemingly taking on a life of their own. They become the primary language used in top-level designs, influencing the history and current reality of cities.

Of course, they also participate in the evolution of cities, displaying varying degrees of vitality, representing new opportunities or threats for urban development. I will now discuss some phenomena related to this. Broadly speaking, I categorize the languages of urban design into four types:

- 1) Grids;
- 2) Radial road networks;
- 3) Special patterns;
- 4) Freeform curves.

I must note that Kostof also divided urban forms into four categories, which align closely with my classification. Let's discuss each one in detail.

1) Grids

The grid system is undoubtedly the most important language in urban design, occupying a significant share of cities throughout history.

Firstly, as I've mentioned previously, the square shape was often used in the design of the earliest huts. It evolved from practical applications, consolidating into a form due to its efficiency.

Moreover, ancient civilizations had limited knowledge in geometry and surveying. Without calculus, they couldn't efficiently calculate areas with curved shapes. Dividing land and streets into squares was thus a natural choice. Only elders or priests in ancient times had the mathematical and hydraulic knowledge to fairly and measurably allocate land. Thus, grid systems inherently implied top-down planning.

Uniformly divided land corresponds to uniform fiscal, labor, or military obligations. Ancient Egyptian priests allocated land to farmers in this manner. This type of grid represented standardized taxation. When the Roman Republic allocated land to veterans, it was often divided in this grid-like manner. For them, this land was essentially their retirement plan. The US 1785 Land Ordinance, which defined square mile sections, was a policy tool to privatize national land and set the basis for counties and townships. Hence, the grid system is a trace of administrative systems.

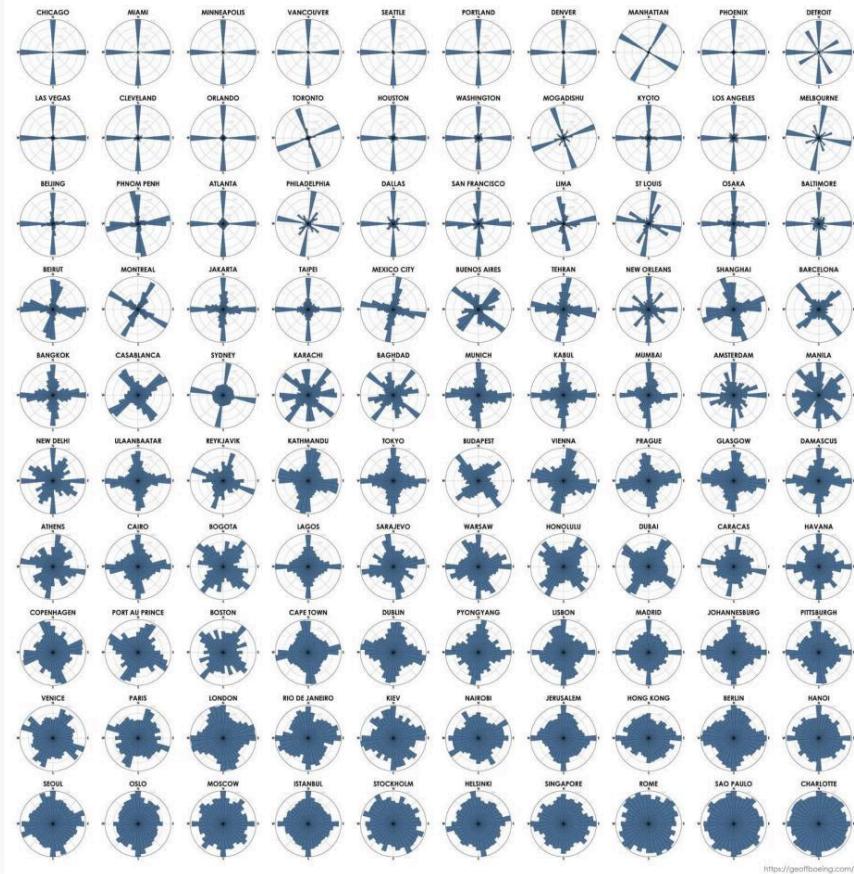
Furthermore, standardized grids reduce costs associated with land surveying and research, thereby lowering transaction costs. This fosters land trading. New York once simulated vast land areas into 25x100 feet parcels. These were labeled and sold on maps. In reality, there might be no buildings or roads on the actual site – just a featureless wilderness with a sign indicating where, for instance, 130th Street began. The parcel you intended to buy might have no markings. The transaction was often completed based on this imaginary grid system.

Modern Chinese real estate also often uses standardized unit types for pre-sale properties to minimize differences, simplify customer decisions, and reduce time spent on comparisons.

There are more advantages to grid cities. From a modern traffic engineering perspective, grid road networks simplify traffic calculations and make signal light control schemes easier to develop. However, this benefit is relatively minor.

Importantly, most educated modern city dwellers are familiar with Cartesian coordinate systems. A grid road network, labeled with street numbers, essentially provides a city coordinate system. It greatly aids in navigation. In the US capital, Washington, D.C., the Capitol Building serves as the origin, dividing the city into four quadrants. Street addresses, like "205 F Street N.E.", can be interpreted as coordinates.

City Street Network Orientation



Grids are enduring in urban design, emerging as high-quality knowledge within spontaneous orders. Yet, even if they're products of top-down planning, their inherent differences can be vast. For example, the large enclosed neighborhoods of Tang Dynasty Chang'an compared to the large blocks of Orange County, California, with side lengths between 800 to 900 meters. In contrast, Savannah, Georgia, has small grids about 25x50 meters. The scale of these grids can vary immensely even within the same century, as seen in the differences between Salt Lake City and Portland.

While Portland might be closer to the mainstream size, Salt Lake City's grid is unusually large because its founders envisioned each household having a garden. This misinterprets urban lifestyles, as people typically focus on their primary professions rather than diversifying tasks like farming. Thus, Salt Lake City's grid is inefficient and calls for renovation.

Interestingly, when Salt Lake City's large blocks are placed into contemporary Chinese urban planning, they seem small. I'll delve into the technical details another time, but those interested can refer to my earlier episodes, episodes 28-30, discussing Portland and Salt Lake City.

Even within the grid system, designs can differ vastly in intent, technical school, and resulting outcomes.

In some contexts, grids incorporate mystical elements. For example, roads may be strictly aligned with the Earth's meridians to ensure true North-South orientation. What's the significance?

Some believe that such houses are warmer in winter and cooler in summer. Real estate agents often emphasize whether a house faces true North or South.

However, from an architectural thermodynamics standpoint, such precision is insignificant. Still, statistics show that a considerable proportion of grid road networks are oriented true North-South. There are generally two situations regarding its origin:

Firstly, to locate the true meridian direction, neither a compass nor the North Star is entirely accurate. The Earth has a magnetic declination, and the position of the North Star drifts due to the precession of equinoxes. One must observe celestial phenomena to find the true north. In ancient times, observing the heavens was an advanced knowledge and a privilege. Among the tens of millions in the Han dynasty, only a handful of individuals truly observed these celestial events. How many people are genuinely observing the sky today?

Thus, in the ancient world, being able to find the true north and employing it in urban planning, and further promoting this knowledge, at least symbolized the rulers' intellectual superiority over the ruled. The common people would be impressed, believing the leaders had a grasp on the mysterious forces of the universe.

Humans fear uncertainty. To ease their minds, taboos were continually invented throughout history. Once you know where the north lies, a ruler might wonder, "What if the temple I worship in doesn't face true north? What if my head isn't directed towards the north? What if I incur divine punishment? But if I position myself with my head towards the true north and receive divine blessings, isn't that a gain?"

The most notable example of the pursuit of the true north-south direction is the pyramids of Egypt, shrouded in mysterious tales. This is followed by ancient East Asian capitals, like Tang's Chang'an, which sought a north-south layout. Other examples include Kyoto in Japan, Yuan Dadu designed by Liu Bingzhong, and certain provincial capitals in northern China. All these places, to varying extents, pursued a north-south orientation. In reality, whether streets strictly align to the north-south axis isn't as crucial once this orientation becomes part of the narrative. For instance, Beijing's Chang'an Avenue isn't perfectly east-west. Maintaining a strict north-south alignment isn't easy. Some roads began with errors, and over time, as governance waned, some might encroach upon the road, leading to deviations.

While the ancient world had many grid cities, a true north-south alignment wasn't predominant. However, in modern times, especially in North America, the proportion of cities with a true north-south grid is high. Examples include Washington D.C. and downtown Chicago. In other cities, particularly in the Midwest and the West, even if the city center doesn't strictly adhere to a north-south grid, the suburbs likely will. Detroit's downtown grid aligns with the river, while its suburbs follow a north-south direction. Minneapolis, Seattle, Los Angeles, and many other U.S. cities have a similar layout. This was a result of the Land Ordinance of 1791, under which professional teams divided the vast hinterland of America along longitudinal lines for calculation convenience.

Surveyors truly expanded the frontiers. For instance, the boundary between New York, Vermont, and Canada was intended to follow the 45th parallel north. However, a story goes that a tipsy surveyor made an error, shifting the intended fortress site a few hundred meters into Canadian territory. As a result, the U.S. border expanded northward beyond the 45th parallel.

Blindly drawing a north-south grid lacks environmental sensitivity. Most American city centers don't strictly follow a north-south grid, as urban geography – like bridges, docks, and rivers – must be considered.

It's only in vast, unpopulated regions that surveyors can boldly draw lines, crossing streams, rocks, and frontiers without concern. However, North America wasn't truly uninhabited; it was home to Indigenous peoples. Their numbers were small, and they were overwhelmed by the settlers. Their nomadic lifestyles and lack of stable land ownership made their presence easily ignored, treating their lands as blank slates. Hence, the grid, especially the north-south

grid, as an urban design language, reflects the authoritarian view of the cartographers over the depicted areas.

Northern China couldn't possibly be considered uninhabited, right? The prevalence of the grid system similarly highlights the stark power imbalance between rulers and the ruled. This concludes this segment. In our next segment, I will continue to introduce other urban design languages.

33 the Language of Urban Design (2) Radial, Grand Manner

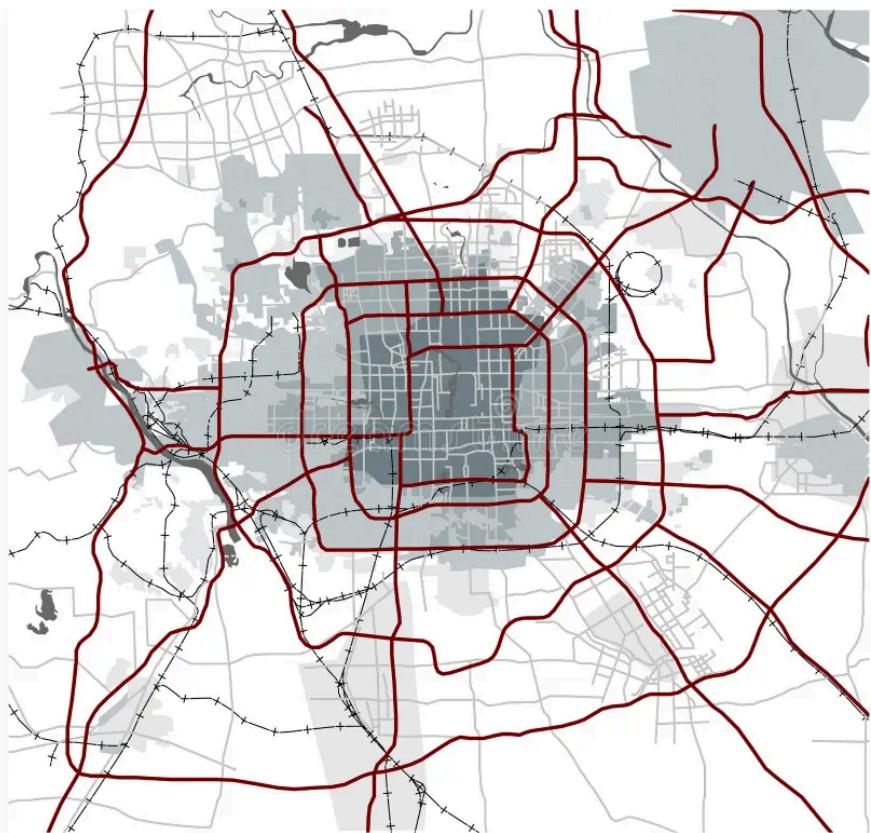
In this chapter, I continue with the discussion on the language of urban design.

Following the grid pattern, let's delve into another urban design lexicon: radial roads.

Perhaps the most iconic representation of radial roads is the roundabout centered on the Arc de Triomphe in Paris, from which 12 straight streets radiate. Another famous example is from Rome, where from the Piazza del Popolo at the northern end of the ancient city, roads radiate southward in a trident shape. Worth noting are Zhongshan Square in Dalian and Zhongshan Square in Shenyang, which share similar designs.

While grid patterns can be found almost everywhere, the design of radial roads isn't present in every city. It is quite an extraordinary design. Radial roads give a distinct sense of centrality. Often, this center is candidly highlighted by memorial structures like the Arc de Triomphe, grand statues of eminent personalities, or obelisks. This radial design often leaves a lasting impression on observers. Its tone is very artificial, deliberate, and ceremonious, evoking a sense of imperial grandeur.

However, if we observe from a broader scale on a map, and zoom out to a certain extent, you'll notice that large cities like Beijing exhibit this radial pattern in their highway network. Numerous highways radiate outward, connecting to satellite towns and further distant cities. Even if the inner city uses a grid pattern, once you leave the traditional urban areas, roads break free from the grid constraints and head directly towards their destinations.



(figure above: city grid and modern radial highways;

figure below: streets radiate from the city gate)

Every city operates this way, maintaining direct routes to their primary surrounding destinations. Numerous cities, regardless of their size, each serve as the center of a radial road system, together forming a spider web-like transportation network. Naturally occurring radial road patterns often appear outside city gates. For example, outside many gates of Lucca, you'll see roads leading to the front-left, front-center, and front-right. In Beijing's Qianmen area to the south, many diagonal streets form a radial pattern.

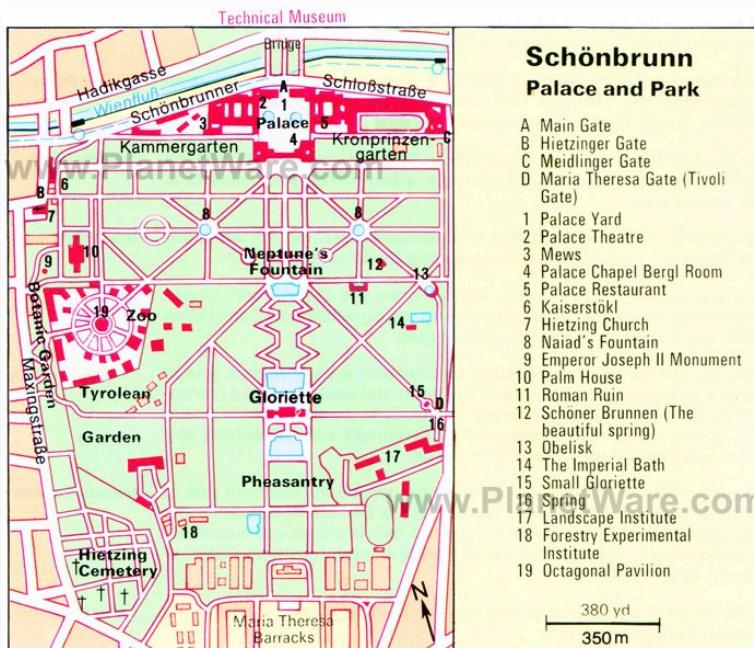
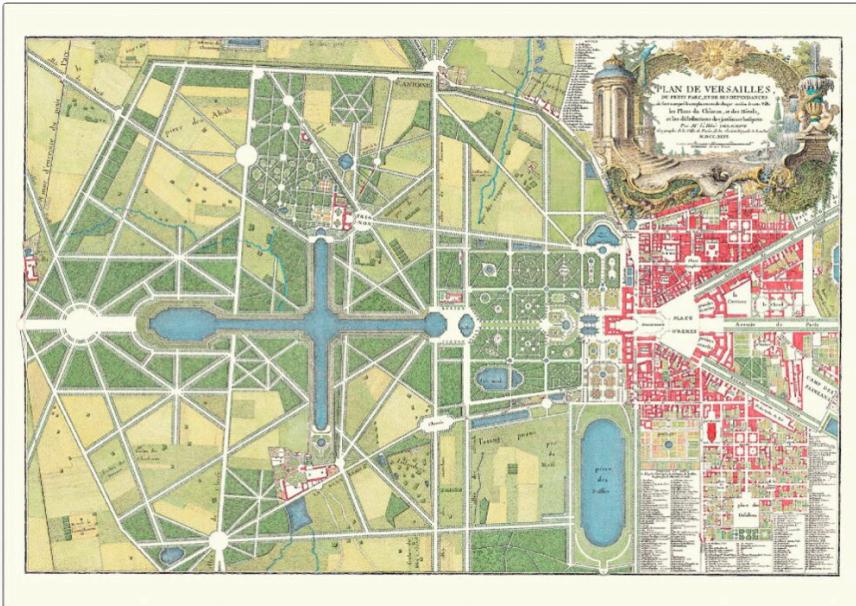
Direct Connections

Within a grid pattern, wherever you go, you're bound to make one or multiple right-angle turns; there are no diagonal shortcuts. In contrast, a radial road pattern is essentially a combination of direct routes to the center. As the saying goes, "All roads lead to Rome." Therefore, the design language of radial road networks largely draws inspiration from the inherent order where all places converge towards the center. Evidently, this trend is rooted in efficiency.

Radial road networks also produce other practical effects.

Vista and Hunting Gardens

Firstly, landmarks at the center facilitate navigation within the city. The 12 straight roads radiating from the roundabout of the Arc de Triomphe imply that from each of these roads, one can view the Arc. This greatly aids in orientation. This radial design can also be seen in European gardens, where several or perhaps dozens of straight paths converge onto a circular clearing. Often, a pavilion or another marker is placed there.

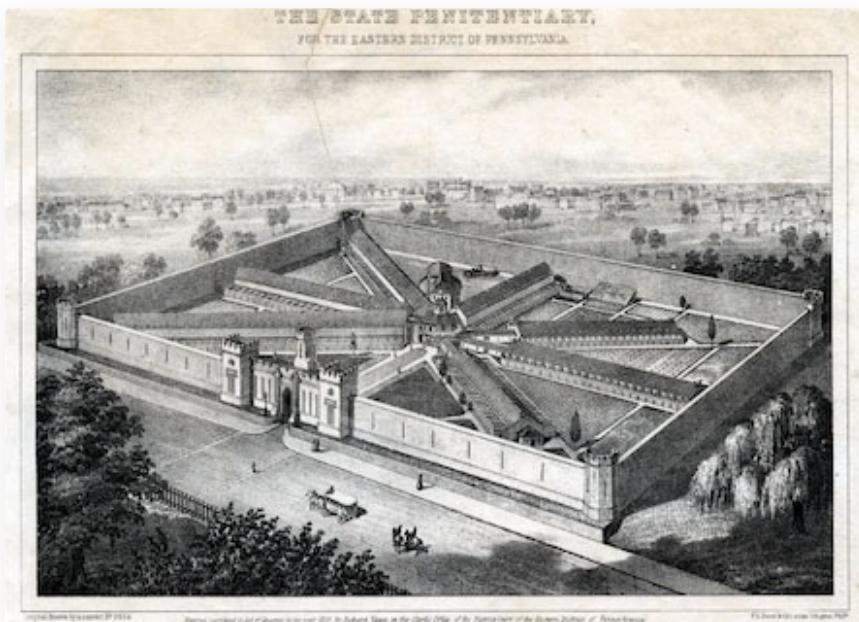


(figure left: Versailles plan, figure right: Schoenbrunn plan)

When hunters traverse the dark woods, it's easy to lose their sense of direction. However, as they cross these paths, they can spot distant markers, providing a sense of direction. This spatial sensation, where one can see a landmark at the end of a straight road from afar, is often utilized in urban design. This concept is termed "Vista."

Secondly, from such central convergence points, one can oversee all the radial paths. In hunting gardens, deer move randomly amongst the trees. When a leader chases prey, they shouldn't wander aimlessly. Instead, spotters positioned at these junctions can identify which sector the deer entered. Having multiple observation points in the woods makes it easier to locate prey and guide the leader towards the deer.

In cities, radial structures are rare, with prisons being the main example.



Prison Plan

Prison cellblocks often comprise several straight corridors converging at a point where a guard sits, able to monitor all the hallways simultaneously. This greatly economizes on manpower.

Paris, before the 19th century, was a city often marred by revolution. The Paris we see today underwent transformation during Napoleon's reign, resembling a hunting garden or prison in its layout. Its well-developed radial boulevards are conducive for barricading individual blocks, making it easier to isolate and encircle any uprising masses.

Palladian Vista

The functions described might be practical sources for the development of radial road networks. However, inspirations might also be drawn from stage set designs, like Palladio's work at the Olympic Theatre in Vicenza. Here, Palladio constructed a three-dimensional virtual city as a backdrop. The stage is positioned as if at the convergence of five streets, allowing audiences to view the mid and distant sceneries of the city. The concept of Vista is extensively explored on this stage. Stagecraft and other artistic works, in the past, played roles similar to today's photographs, comics, films, and television, and they've had influence on urban or architectural design.



The Grand Manner, Rome, Versaille, Washington

The urban design language of the radial road network is also referred to by an art historical term: "grand manner". The history of its formation as a design language isn't as ancient as we might imagine; it's primarily a modern phenomenon. It possibly began in 16th century Rome during the reign of Pope Sixtus V. He sought to reorganize the city quarters to restore governance and reaffirm the Church's authority. The renovation aimed to connect pilgrimage sites through direct avenues, intending Rome to be an imperial city. However, candidly speaking, the avenues initiated by the Church were merely over ten meters wide. In comparison, the endeavors of Mussolini, who expanded the road in front of St. Peter's Basilica in Rome to 30 meters, or Ceaușescu, who widened the boulevard in front of the Palace of the Parliament in Bucharest to 90 meters,

were far more aggressive, with each subsequent ruler exhibiting an exponential increase in autocracy.

After 16th century Rome, the grand manner approach didn't flourish immediately. It took another century until the late 17th century, during the era of Louis XIV and the Palace of Versailles, for it to gain clearer expression. Versailles symbolized the absolutism in France. French lords, akin to Japanese lords during the Edo period or the feudal families in post-Qin China, were centralized around the monarch, weakening their ties to their subjects and territories. Versailles served as a tool to diminish the feudal rights of these lords. From a development perspective, since Versailles was in the suburbs and required limited redevelopment, the overall cost was not particularly high.

Surprisingly, the next imperial city to employ the grand manner was in 1791 America. The French surveyor L'Enfant designed Washington, D.C., with a richly layered, well-ordered and radial road network. The radial avenues emanated primarily from the U.S. Capitol and the White House. These avenues were named after U.S. states: Pennsylvania Avenue, Massachusetts Avenue, Connecticut Avenue, and so on. These streets lead in all directions, symbolically connecting to various parts of the vast American states. Washington, D.C. can be described as a city filled with grandeur, symbolic meaning, and monuments that ooze patriotism.

It's hard to overlook the stark contrast between the urban temperament of Washington, D.C., and New York City. New York stands as the practical, compact capital of the capitalist world, entirely dissimilar from Washington. Moreover, both cities frequently appear in films and TV, etching contrasting impressions of America in the minds of viewers. Which one truly represents American culture?

New York symbolizes the amalgamation of immigrants from around the world, minority groups, subcultures, and intellectuals, providing the United States with economic vigor and innovative prowess. In contrast, Washington, D.C., stands as an affirmation of America's loyal warriors and patriots. It serves as a sacred site where the American spirit is revered almost religiously, advocating American exceptionalism and a martial ethos. These two cities epitomize the duality of America, and the nation couldn't thrive solely on one aspect.

The grand design of Washington, D.C., isn't necessarily linked to autocracy. After all, in 1791, the designated area for the capital was practically a blank slate,

with a population smaller than nearby villages. There wasn't significant concern about how its streets should be laid out. The original landowners willingly donated the lands needed for the roads to the federal government, subsequently profiting from the appreciation in value of their remaining parcels. For its initial 100 years, the capital area consisted of only a few residences of officials near the White House and Capitol, as well as a handful of newspaper offices. Most didn't pay much attention to it, nor were they certain it would develop according to L'Enfant's original design. Today, it's hard to imagine that where the vast lawn in front of the Capitol stands, there were once railway tracks, and where the National Gallery of Art is located today, there used to be a train station where people boarded trains to Baltimore.

It wasn't until 1902, with Congress's approval of the McMillan Plan, that the city's monumental nature, as envisioned in the original design, was not only preserved but also amplified. The Washington, D.C., we recognize today, as the ultimate embodiment of the "Grand Manner", emerged after another century had passed.

During the interval we've discussed, **Paris under Napoleon III** underwent a Grand Manner redevelopment in the mid-to-late 19th century.

From the perspective of emphasizing monumentality and nation-building, both Paris and Washington, D.C. stand out significantly. If not deemed outright successes, they are at least notable achievements that demand attention.

If you argue that Paris succeeded, consider this: France, under the reigns of Louis XIV and Napoleon, was powerful enough to challenge the entirety of Europe. Yet, after the heroic/romantic immersion of Paris's grand projects, France found itself defeated by Prussia, previously a secondary power in Europe.

Some Technical Discussions on the Grand Manner

Setting aside the aspect of monumentality and returning to the functional perspective of radiating road networks, a proper configuration can create shortcuts between urban destinations, potentially improving traffic efficiency. In the case of Paris, the grand boulevards functioned as the primary arteries of traffic, while the medieval street grid of Paris was largely relegated to serving as alleys or secondary roads, leading to a relatively clear traffic system.

In contrast, Washington, D.C.'s design superimposed radial roads onto a grid system similar to Chicago's. Each system would work efficiently on its own, but

when combined with comparable widths, it becomes challenging to differentiate the primary from the secondary. Ideally, the radial boulevards would serve as main roads while the grid would act as secondary or tertiary routes. However, the radial boulevards in D.C. are often interrupted by roundabouts and parks, making the continuous grid more dominant. Furthermore, the streets of the grid system are quite wide, averaging about 27 meters. Such streets, especially in commercial areas, inevitably carry substantial traffic volumes. For instance, M Street and L Street in Northwest D.C. might seem like secondary roads on a map, but they experience higher traffic than nearby Vermont Avenue and New Hampshire Avenue. This results in an **inversion** of the intended **hierarchy**.

This design has led to incredibly complex intersections and a plethora of one-way streets. Though the system might appear clear at first glance, numerous "patches" have been added over time to address practical issues, compromising its intuitiveness and introducing various traffic pitfalls. For drivers, especially those unfamiliar with the city, navigating Washington, D.C. can pose a significant challenge, showcasing the inherent problems with its road system.

Pattern of the Grand Manner's Diffusion

Returning to the historical narrative, in both Europe and the Americas, the late 19th century saw rapid urban development due to the Industrial Revolution, a situation akin to China around the turn of the 2000s. With world-class capitals like Paris and Washington, D.C. as exemplary models, various cities during their expansion phases eagerly adopted the Grand Manner style. Barcelona, Marseille, Milan, Florence, and many other rapidly developing cities during this period, to varying degrees, incorporated elements of this approach, leaving clear historical imprints. However, the complexity of most European cities' environments meant there was limited space for grand-scale planning, resulting in a more restrained application of the Grand Manner style.

From this, **several patterns** can be discerned:

Firstly, as mentioned earlier, new cities more easily embraced the Grand Manner style, while older ones found it challenging.

Secondly, areas that didn't experience much economic growth in the 19th century, such as Venice and Siena, missed out on this trend and didn't witness the emergence of the Grand Manner.

Thirdly, the prominence of this style was influenced by cultural and political environments. Throughout the 19th century, the UK, which was leading the global order, had only subtle expressions of this architectural language. In contrast, "second-tier" powers that were challengers, like France, Italy, and Spain, displayed it more conspicuously. In countries like the Netherlands, Germany, and Switzerland, it was less evident.

One could interpret these patterns from various angles. At a glance, regions where the Grand Manner was popular were predominantly Latin-speaking, while it seemed less favored in Germanic-speaking regions. It appeared more embraced in Catholic areas and less so in Protestant regions. A cursory observation might also suggest that areas with especially rapid economic growth in the late 19th century didn't favor it as much, while those with moderate growth did. The spread of architectural styles might be linked with language, cultural circles, and levels of economic development. However, some patterns don't entirely fit this mold.

Economical and Political Foundations for the Grand Manner

Logically, faster economic growth should provide more funds for large-scale urban construction. For instance, France's economy grew rapidly in the late 19th century. Napoleon III's grand redevelopment of Paris, a top-tier international city, was among the most audacious of its kind. I believe a key reason for its success was that mid-19th-century Paris was in a prolonged period of peace, marked by economic growth and soaring real estate values - somewhat resembling modern-day China. There was a golden window when property prices were rising annually. If the government decided to demolish and rebuild an area, offering to compensate homeowners with half of the newly constructed space (which was three times larger), everyone benefitted. Within three years, property values might double, increasing a homeowner's assets threefold, without the government incurring losses. However, it remains debatable whether the increase in property value was directly linked to the government's redevelopment. During such times, profits are easily generated, and these profits could offset the costs incurred by massive demolitions and constructions.

I hypothesize that rulers generally have an inclination towards the Grand Manner. However, in areas with well-preserved feudal traditions and freedoms, such as in the UK, Germany, the Netherlands, and Switzerland, the Grand Manner doesn't find much room to manifest. In contrast, in regions where feudal liberties are weaker or where the balance between rulers and the ruled is

more unequal—including colonies like North America—the Grand Manner finds its expression, given there's sufficient economic surplus. I believe this provides a more reliable historical explanation.

The Spread to the Other Worlds

Consider the 20th century. Western civilization continued its global spread. The radiating road networks and grand-scale planning, which couldn't fully manifest in the heartlands of Western civilization, shone brightly in its peripheries: New Delhi in India and Canberra in Australia became new bastions of the Grand Manner. Hence, I argue that the lack of popularity of the Grand Manner in mainland UK wasn't due to the British disliking it, nor was it strictly related to language or religion. It was simply harder to implement at home. In their colonies, where there were fewer restrictions, the British pursued it with gusto.

These two cases, unsurprisingly, can be categorized under my list of experimental, resource-draining projects. Unlike the self-sustaining redevelopment of Paris, the developments in New Delhi and Canberra were purely financially draining. Beyond their grand scale and radiating patterns, they also adopted an anti-urban utopian style characteristic of early automobile suburbs. Even in their respective countries, these projects didn't necessarily garner high praise.

Perhaps, when economic constraints are minimal, there's a risk of frivolity, leading to less thoughtful urban planning.

In the 20th century, Japan, as an ardent admirer of Western civilization, continued to embrace urban designs that the West was starting to outgrow. Frankly, the Grand Manner wasn't easily applicable in mainland Japan, given its careful resource allocation. However, during Japan's imperial ventures in Northeast China, Japanese architects, influenced by Western culture, fervently implemented grand urban designs in cities like Shenyang, Anshan, and Changchun, leaving a legacy of roundabouts and radiating avenues.

In the core area of civilization, ideas and technologies coexist in a diverse, mixed, and relatively balanced state. Yet, the more radical, non-mainstream, idealistic, and experimental concepts, which might not dominate in the center, often find their most extreme expression on the peripheries.

It's akin to how urban planning in modern China is currently influenced by the modernist ideals invented by the Western architects a century ago. This mirrors

what Confucius said about traditions being sought in the wilderness when they fade in the center. The most traditional elements might get overshadowed in the heart of civilization but linger on its edges. These are two patterns of dissemination—structurally similar but directionally opposite.

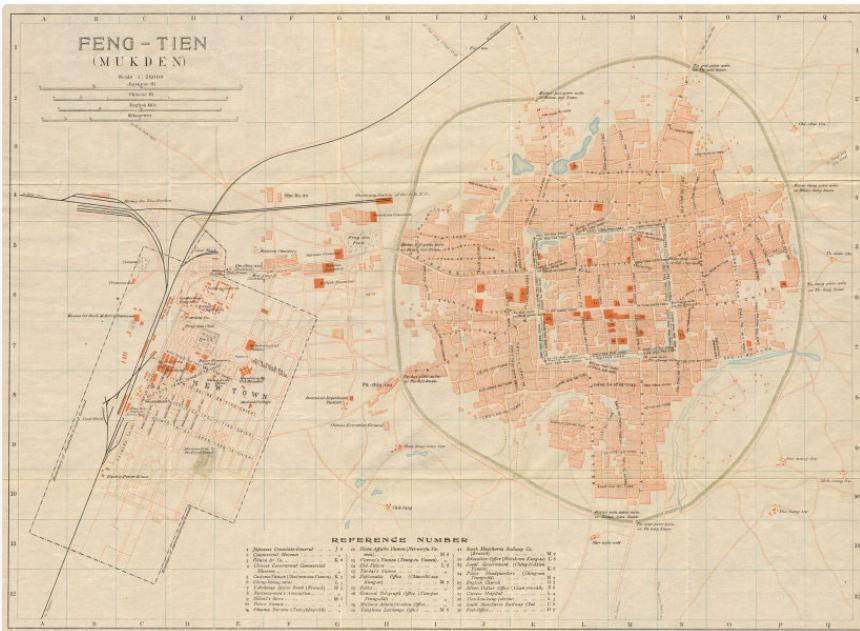
34 the Language of Designing the Plan (3) Special Diagrams, Freeform Curves

In the previous two chapters, I discussed two languages of urban design: one is the grid road network, and the second is the radial road network. In this article, we continue discussing the language of urban design. The third type involves city design using diagrammatic special patterns. If the first two types are mainstream or quite common, then this third type is relatively non-mainstream.

In my 32nd lecture I talked about circular cities. This can be considered as a special pattern, which actually should be the content of this chapter. It is an evolutionary product related to city defense efficiency. If you don't recall, you can review it. I won't repeat it here.

Diagrammatic Patterns - Mandala

After being symbolized and conceptualized, the circle sometimes gets referred to as the Mandala, which in Buddhism carries many mystical meanings. A city planned according to the Mandala that you might be familiar with is Shenyang (Feng-Tien or Mukden) during the Later Jin Dynasty. Shenyang, during the Ming Dynasty, was a small square fortress. After being occupied by the Jurchens, Tibetan Buddhist monks were brought in to redesign and expand it, wrapping a circle around the original square fortress. With a circle outside and a square inside, the main roads inside the city form a grid, dividing the Mandala into nine sections. The original square fortress became the imperial city, occupying the central section. This created a new, magical shape, akin to a Mandala. This shape is filled with mystical significance while preserving the original infrastructure. Emperor Qianlong praised it as a genius renovation.

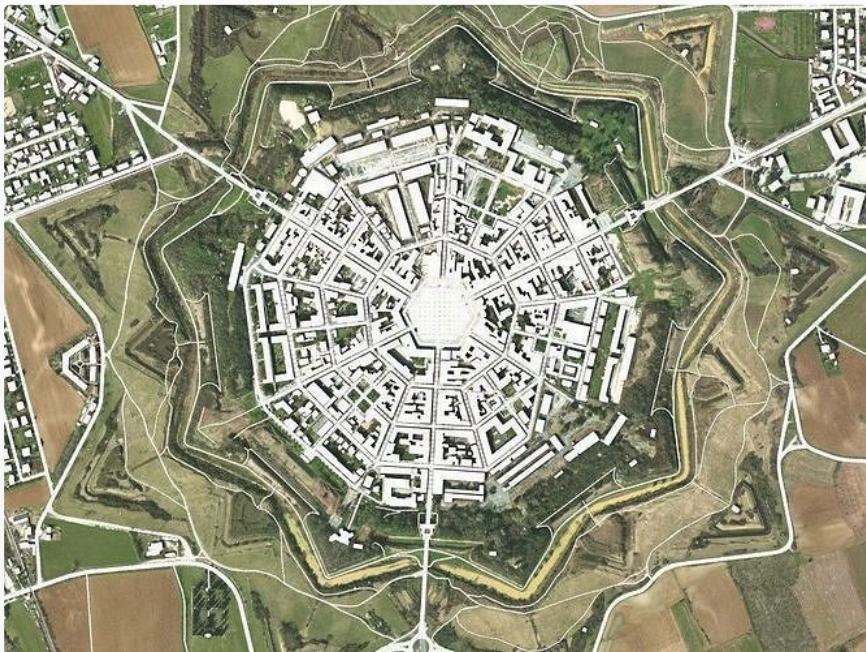


Even without considering its mystical layers, the two layers of city walls meet the general requirements of a defense system; the grid-patterned main streets, with eight city gates, are more suited for a large city compared to the Ming Dynasty's standardized fortress with a cross-shaped main street and four city gates. Having two roads in each direction forms what urban design calls "alternative roads", so if one is blocked, there's another route available. This enhances so-called traffic resilience.

Diagrammatic Patterns - Polygonal

Besides the circular or Mandala pattern, which is a relatively common special urban design, there are other unique patterns that manifest in triangles, squares, pentagons, hexagons and other regular polygons. They are typically fortresses or Renaissance-style strongholds, often adorned with intricate lotus petal or even snowflake-shaped multi-layered defensive structures. These designs have no relation to decorative art but are the creations of advanced military engineering. They are designed to protect their inhabitants while exposing invading enemies to gunfire or forcing them to navigate through deadly traps enveloped by firepower. Their geometric shapes correlate with the firing angles of cannons and the coverage of crossfire. Due to the standardized use of cannons, fortress shapes became symmetrical. The performance parameters of the cannons greatly influenced their designs, resulting in highly mechanized structures. For instance, the shape of an aircraft carrier deck is determined by the takeoff and landing

distances of its planes, just as the layout of an opera house is determined by the size of its stage and the distance from which the audience can see clearly.



Generally, the larger the fortress, the more turrets it has, and the more sides it possesses. The smallest is triangular, also called a trilateral fortress. Common ones include quadrilateral, pentagonal, and hexagonal fortresses. Larger examples, such as the Palmanova fortress built by the Venetian Republic in the 16th century, are nonagonal, which is very close to being circular.

These star-shaped bastions have left a significant imprint on urban history. Their distinct features include immense size; for comparison, the triple walls of Constantinople from the Roman era spanned only 50 meters in depth. In contrast, the depth of these star-shaped bastions often reached four to five hundred meters. Yet, the usable area within them, even in large bastions like Palmanova, was only around 400 meters in radius. As a result, military structures took up over 70% of the city's total area. These massive constructs, despite being sturdy and durable, demanded significant effort to dismantle. Hence, unless there was a compelling reason for urban development in recent times, these structures were often left untouched or repurposed for modern military use. Sometimes, they were even integrated with hills and became urban parks. For instance, Florence has two notable star-shaped bastions, with one situated atop the hill of the Pitti Palace. The Pentagon, the headquarters of the

United States Department of Defense, clearly pays homage to this classic military architecture.

Celestial Patterns

Additionally, there have been attempts throughout history to design palaces, buildings, and monuments that mimic celestial patterns. Xianyang, the capital city of the Qin Dynasty, was designed on a vast scale, spanning over 10 kilometers, with considerations mirroring celestial patterns. As I mentioned before, such designs signify the rulers' intellectual superiority and were sometimes related to magical practices. While this series won't delve into the details of these practices, it's essential to acknowledge their historical significance.

Political Placing

Aside from the aforementioned patterns, there's another intriguing urban design linked to the layouts of various Chinese local governmental complexes, which are constituted of the Communist headquarter, administration branch, the congress, the PCC, the court and the Procuratorate. While there's no fixed template for these designs, ongoing experimentation has suggested that spacing them apart might be optimal, helping avoid potential sensitivities.



the government complex of Beijing

For instance, the layout of Washington D.C. revolves around the large National Mall's cross axis. Four endpoints and one intersection define this space: The White House and the Capitol Building each occupy one endpoint, while the Jefferson and Lincoln Memorials sit at the other two. The Washington Monument is at the intersection. But where is the U.S. Supreme Court? It's tucked behind and to the side of the Capitol without even a face on the Mall. A critical observer (with CCP sensitivity) might ask, "Isn't the separation of powers essential? Why does the executive branch, represented by the president, have the most prominent spots?"

In conclusion, while grid and radial layouts primarily relate to transportation and efficiency, unique shapes reflect other sociocultural and natural dynamics. Though they might not dominate urban history, their influence cannot be overlooked.

Freeform Curves

Next, I'd like to introduce the final type of language in the four major categories of urban design that I've identified: the "Freeform Curve." It refers to a type of curve that does not have a clear mathematical expression and is influenced by various factors, making it winding and undulating.

Strictly speaking, "Freeform Curve" isn't a standard term. One might argue that the term overextends the use of the word "free." Is a curve truly free? If I take a pen and draw a line arbitrarily, is that line truly free? Can I freely draw any line? In reality, no. The lines I draw waver, varying in thickness and curvature, constrained by my hand-eye coordination. They're also influenced by my breathing, heartbeat, muscle strength, and more. The composite of all these factors results in the jitter of the line. Art historians can discern Vincent van Gogh's syphilis from his later paintings based on this.

From Topology

Such curves are unpredictable due to the complex forces behind them. For instance, consider a path taken by a person leading a donkey: it represents a weighted combination of the person's and donkey's will, with the weighting fluctuating based on the changing strengths of their intentions. Our urban and rural landscapes are filled with various curves, primarily stemming from topography. Landforms result from multilayered influences accumulating over vast historical periods. Factors like the actions of rivers, tectonic plate movements, volcanic and meteoric impacts, oceanic forces, air movements,

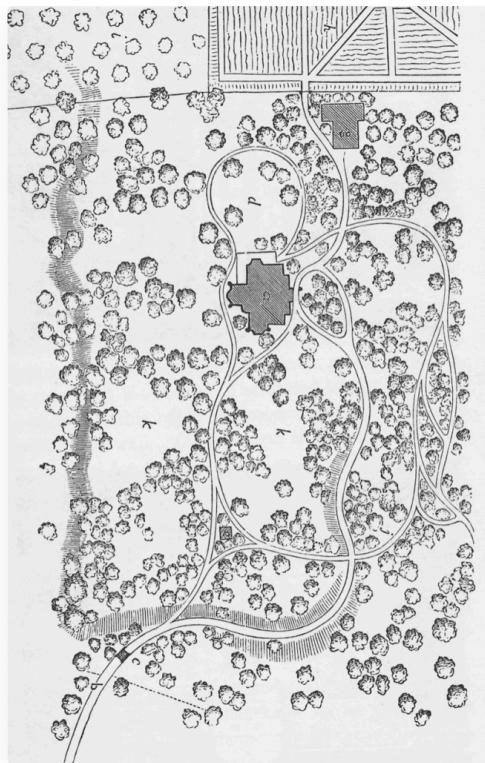
biological activities, glaciers, gravitational and tidal effects, and human activities each leave unique imprints on the land. Geomorphology is a fascinating field about evolution. While I am captivated by its insights, I'm not an expert, so I won't delve too deeply here.

Throughout most of history, human ability to alter landforms was limited. For instance, ancient civilizations in mountainous regions, without the means or rationale to engage in massive earthworks, built roads and houses that naturally followed the contours of the terrain. The Coriolis effect, due to Earth's rotation, also makes rivers tend to meander, continuously changing their course due to erosion and sediment deposition. This winding, unpredictable world is what humans have observed for millions of years. Although straight, man-made structures have emerged over the last 5,000 years, they didn't dominate the landscape for a significant period.

This winding nature has been preserved in many artistic works, such as ancient and modern landscape paintings, and the delicate patterns on Oriental porcelain and embroidery. This so-called "meandering" has become a conceptual entity, leaving a lasting impression and gradually evolving into a design language.

Into a Design Language

In modern designs, even in places without significant topographic changes or rivers, winding forms are intentionally incorporated. Examples include the Suzhou gardens, Japanese gardens, London's Regent's Park, Bath's Royal Crescent, and Beijing's Financial Street. All these designs showcase memorable curved compositions. Some might be influenced by local topography, existing streets, and buildings, while others are purely conceptual. They're abstracted into design languages, no longer grounded in specific contexts, but originate from ideas, becoming the so-called "Freeform Curve."



Montrose Park

In places like Riverside in Chicago and many suburban housing areas on flat terrains, winding designs are intentionally used. In many residential areas in modern China, pathways, which could be straight, often meander intentionally. Or houses are purposely shaped like crescents. This design language is termed "the picturesque" — which translates to "painting-like." It imitates the winding nature of landscape paintings, attempting to recreate the impression of nature. This design style, exemplified by Beijing's Olympic Forest Park and Chaoyang Park, has become a standard technique in many urban parks. Such designs may seem arbitrary or even inefficient, but they work as urban "magic" – even man-made nature can provide relaxing effects.

The above sums up the last of the four urban design languages I've discussed. There are others, like skylines, public spaces, and street systems, all evolving from spontaneous development to intentional design, which I'll discuss in the future.

Reflections:

There's a common misconception that all urban designs are visionary masterpieces. However, the reality is that urban design is not just about success stories, but more about failures. Drawing an analogy from an experiment on oral herpes virus, artificially induced genetic mutations were mostly harmful at 71%, ineffective at 27%, with only 2% being beneficial. Failure is a significant part of evolution. If failures didn't exist, dinosaurs might have reached Mars by now.

Most urban design languages emerge from the spontaneous order created by evolution. Yet, they are often used inappropriately due to a lack of complete understanding.

The ancient cities that have survived to this day appear to be intricately designed compared to many modern cities. This isn't necessarily because our ancestors were more insightful. They undoubtedly made numerous flawed designs. Most of these didn't stand the test of time, and what remains are the relatively harmonious and sensible designs. For instance, an animal that has evolved over millions of years is likely far more refined than a toy recently invented by a child.

Yet, when observed closely, machines invented by humans have surpassed the capabilities of organisms that have evolved over billions of years in certain areas, such as speed, strength, and computational power. Similarly, modern cities designed by humans, in terms of localized density and transportation capacity, far exceed that of traditional cities. This means that both effective and flawed designs are being produced simultaneously. Judging them requires profound insight.

From a futuristic perspective, humans may design even stronger cities, inventing new segments of cities and new languages of design. Eventually, some of these innovations will survive through evolution and become the classics of the future.

35 Skyline as an Evolutionary Phenomenon

The skyline of a city is an important part of a city's image and is therefore valued. In this chapter we discuss Skyline. It is first a natural phenomenon, then a phenomenon of urban evolution, and in modern times, it has sometimes become an object of design. Let me expand on the explanation below.

What is a Skyline? The skyline is that dividing line between sky and earth at the end of the line of sight. If you are blocked by something very close and tall in front of you, you won't be able to see the skyline. Therefore, it is often several kilometers or tens of kilometers of empty space in between allowing one to see the typical skyline. All that drive to the downtown of Chicago, New York or Lujiazui from afar for the first time are well impressed by their skylines .

The skyline of a city is valued by people because it can reveal a lot of information about the city. The power of a thing is often related to its volume. Tall things on the skyline are likely to reflect where the power is.

In history, the skyline, in many cases, for the longest time, was actually dominated by natural objects such as mountains and trees. Even today, natural objects still stand out on the skylines of some cities. The cities of Tokyo and Yokohama area, you can see Mount Fuji on a clear day. In downtown Portland, you can clearly see Mount Hood. In downtown Seattle, you can see Mount Rainier; in downtown Vancouver, you can see Mount Baker. Kagoshima City directly faces Sakurajima Volcano. These huge peaks protruding from the clouds can easily arouse residents' awe of nature and thinking about the way of heaven and earth.

Of course, the skyline we see today is more shaped by man-made buildings.

The layers of these artificial skylines have always been political and sensitive.

In rural China today, people are very concerned about whether other people's houses are taller than their own. When many people build a house, they will sneak over the roof of the neighbor next door. This is both explicit comparison and social witchcraft.

The so-called comparison can be regarded as a kind of political science. The height of the roof may indicate the status of his family in the community; a high roof may increase or decrease the social capital of his family; This means that it

is easier for his family to gain the trust of others when doing business and marrying their daughters.

The so-called social witchcraft means that if my house is lower than yours, then a series of bad things may happen to me. In order to avoid these misfortunes, I must be a little taller than you to be at ease.

Today's rural China can be said to be a very flat society. In traditional society, identity is more important. If the height of the houses of ordinary members exceeds the height of the houses of community leaders, chiefs, and priests, it is a violation of the rules. is unimaginable.

Some prominent vassals in the Warring States Period in Japan were honored as oyakata sama—宮屋形式; obviously, in Japanese society, the shape and height of your roof should be able to reflect your social rank.

In traditional villages, generally speaking, the skyline composed of houses is not high, not even as eye-catching as the forest tops, presenting a relatively soft and subtle level.

The prominent elements on the skyline are generally built on the hills and high points of the terrain in the urban area. That is to say, the Acropolis, a city within a city floating above the plain towns. It is often a complex of fortresses, temples, treasuries, granaries, and in the Middle Ages, often the castles of lords or monasteries. This type is known for its dominant expression in such large cities as Athens, Monaco, Edinburgh, Budapest, Salzburg, and Osaka.

Japanese princes, such as Oda Nobunaga's Gifu Castle and Azuchi Castle, built castle towers on the top of the mountain, no different from Salzburg and Edinburgh. This setting is not regional, but universal across cultures.

Living on the hills, on the one hand, is conducive to defense and can reduce risks; on the other hand, the transportation and transportation costs up and down the mountains are very high, and sometimes it is not easy to drink water and dig wells. If you are an agricultural or industrial or commercial person, you need to go in and out of roads or farmland frequently, and the cost of living in the mountains is too high. Therefore, it is the princes, princesses, temple elders and the like who are qualified to live in the hilltop castles as feudal lords and their subordinates. Living on top of a mountain is a privilege.

In flat cities, in some cases, walls, gates and watchtowers, these fortifications can form the most striking elements of the skyline.

The city wall, as the outer skin of the city, is a very suitable place for image engineering. A dilapidated city wall will appear weak. The tall city walls are enough to show the financial strength and military equipment of a city. Therefore, ancient cities with city walls as the main element of the skyline are very common.

It is a civilized phenomenon. The scheming ruler modified the city walls and towers far beyond the needs of the city defense itself. For example, in the ancient cities of Mesopotamia, Nineveh and Babylon, some disproportionately high towers were built, and the walls and gates decorated with extremely gorgeous glazed bricks can still be seen today. Their magnificence Beyond the needs of the walls themselves. The towers on the city wall have even become places for mysterious activities such as stargazing and performing rituals. Use these activities to express Wenzhiwugong to foreigners as well as to the ruled in the country. These are all hardware used to educate people and guide order.

Building tall and solid masonry buildings can permanently dominate the skyline and establish an order for generations to come. The Egyptian pyramid has stood for more than 4,600 years. Its owner and that civilization have passed away, but you have to say that even if it has not moved, it has at least shocked and inspired hundreds of generations of people, and it is still glorifying that land today. Similar buildings that permanently dominate the skyline can be seen in Mesopotamia, in the Wei River valley, in India, Sri Lanka or Mexico.

The trick of this kind of structure is to present a clear geometric shape. If it is not a pyramid, like many huge Buddhist pagodas in South Asia, it also needs to be hemispherical, or like the mausoleums of the Kofun era in Japan, the front is round and the back is round. Only in this way can it form an absolute contrast with the hills in nature. Not to be confused with natural objects.

Compared with these monumental buildings as big as mountains. The slender tower is a more mainstream monumental building that deliberately protrudes from the skyline. Such towers existed in the 9,000-year-old ancient city unearthed in Jordan. It is believed that it was used to call farmers to work. The towers of medieval churches and the bell and drum towers of Asia all strike the hour to tell the residents the time.

The temples at all levels in traditional Islamic cities are equipped with towers and minarets. They often stand around the temples and call community residents in all directions to worship five times a day.

Therefore, the tower is an object serving order, and the order it provides is initially very specific.

After the 12th century, in Europe, particularly tall churches appeared. The spire of Notre Dame de Paris is 91 meters high. The spire of Cologne Cathedral is 157 meters high. There are a large number of main churches in the height between the two. These ultra-high towers are beyond the scope of practicality.

Before elevators, the vast majority of houses in cities were no more than 20 meters high; in those days, of course, these cathedrals stood out and dominated the city skyline.

In addition to the main church, there are several community churches in a city. Sir Lane presided over the design of more than fifty churches in London. This includes St Paul's Cathedral, the main church in the East End, while most of the rest are community churches. The top of St. Paul's Cathedral is 110 meters high, while the spires of dozens of other community churches are generally between 30 and 70 meters high. Cooperating with many residential buildings with a height of more than ten meters as the background, they together form a typical European traditional city skyline. This skyline is an orderly expression of organization at both the city and community levels. A city's cathedral, apart from its original intention of glorifying God, also reflects the city's wealth, political reputation and artistic level. Like the church in every community, it also represented the wealth and prestige of that community, behind it were some guilds and bourgeois families. All people hope that the splendor of their communities and city churches will match their wealth and prestige, and even boast of it.

Therefore, the skyline of a traditional city is a system of multi-level competition. There is no unified arrangement, but it can quite accurately express the strength and ambition of civic associations.

In addition to religious groups building these skyline-altering landmarks, secular regimes also build tall landmark buildings.

Siena, a famous medieval city in Tuscany, is located on the top of a hill, and the main church is on the top of the highest hill. This position was already occupied by a church as early as the 9th century. The bell tower built in the 12th century is about 70 meters high. The Republic of Siena was established in the 12th century, 400 years later than the church, and did not occupy the top of the mountain. By the 14th century, the city hall was built on the mountainside. Its ground altitude

was 30 meters lower than that of the main church. In order to express the idea of equality of political power and religious power, its bell tower had to be built even higher, reaching 102 meters. meters so that its top is exactly level with the towers of the cathedral, and they form the two high points on the Siena skyline. It also became the second tallest secular building in the Middle Ages.

The height of this tower, on the one hand, does not overstep the authority of the church; on the other hand, it surpasses other towers in the city. Siena at that time had many more towers than it does now, not only in Siena, but also in Bologna, San Gimignano, and Lucca. There were many towers in the city, and these towers belonged to rich families. These towers are a special expression of the townhouse. We know that British landowners, apart from the manor in their hometown, often buy a townhouse in London at the same time.

Local tyrants in Italy are not different. Local tyrants generally own large farms in the countryside, and their main income comes from these farms. But at the same time, they also have a house in the city. The house in the city is relatively compact, which fits the concept of a townhouse. The city is the place where local tyrants participate in business activities and political activities. At that time, the state apparatus was weak, lacking the police and a comprehensive judicial system. Similar to Jin Yong's martial arts, a local tyrant needs to take care of his own safety. If a local tyrant is killed by another local tyrant, he can only rely on his own descendants to avenge. In the long intergenerational development of each local tyrant family, they have accumulated their own allies and enemies, and there are continuous low-intensity wars. Therefore, the expression form of their townhouse is very different from that of London, which is reflected in the form of a fortress tower. It protects the dignitaries of one's own family, stores gold and silver, and sometimes imprisons enemies. These towers generally range in height from twenty to thirty meters to eighty or ninety meters. After a certain height, the military benefits of this kind of tower are not great, but as long as the etiquette is not lost, every family hopes to be as high as possible, as a means of expressing their wealth and prestige. In other words, each family is designing its own presentation of the tower on the city skyline. In addition, the distribution of these towers is not random and loose. They are basically on the main roadside of the city, in locations with higher value and a higher sense of presence in the city. They are not dissimilar to the considerations in the location and design of the towers that President Trump gave him.

We can see that in the pre-industrial era, there were towers of these local tyrants, and they competed with church and government buildings on the

skyline of some cities. However, at that time, the skylines of most cities in the world were dominated by It consists of monuments such as city walls, towers, church bell towers, and government buildings.

However, after entering the industrial age, private commercial organizations and profit-making organizations have inherited the role of ancient local tyrants, and they have indeed overwhelmed churches and governments in many places, becoming the main builders of high-rise buildings, and indeed changing the city's skyline , subverting the original order.

The construction activities of these commercial high-rise buildings are not restricted, or are subject to few restrictions, and have been relatively freely expressed in some cities in the world. In emerging commercial cities, such as New York and Hong Kong; in traditional commercial cities, such as Frankfurt, such as parts of London. In these cities, what we see are mainly high-rise buildings built and occupied by commercial institutions.

The early meeting place of the U.S. Congress was at No. 26 Wall Street in Lower Manhattan, New York. Now, there is a building more than 20 meters high, with a majestic facade like the Parthenon, and a dome like the Roman Pantheon inside. It is currently a memorial to the old Federal Parliament. It was rebuilt on the original site in 1842. At that time, it was obviously a relatively tall and eye-catching building. However, today, it is surrounded by skyscrapers of many financial institutions, next to it is only a two or three meter wide construction joint, the 283-meter-high Manhattan Trust Bank Building. In contrast, it looks like a bungalow like a vegetable market. Tourists to Wall Street hardly notice it. This approach is equivalent to pasting the Shanghai Center on the site of a large conference. So what New York embodies is the so-called "barbaric expansion" of capital. Hong Kong is similar. The buildings of the Hong Kong British government are in a state of being invisible to the naked eye in the shadow of various skyscrapers in Central.

The government authorities in New York have also tried to change the skyline to highlight public power. That is the Manhattan Municipal Building, which started construction in 1909. It has 34 floors, the main body is 106 meters high, and the top of the tower is 170 meters high. It was one of the tallest buildings in Manhattan at the time. However, within thirty years, the building was overwhelmed by the taller buildings in lower Manhattan, only realizing a looming existence.

The Mormon Temple in Salt Lake City also strives to be tall and solemn, but it is also wrapped by adjacent commercial buildings, and its height is also surpassed by them.

The American-style CBD embodies the state of the city's skyline under a laissez-faire economic policy environment and a relatively free urban public policy environment.

But if the CBD of high-rise buildings will appear if laissez-faire, it would be too beautiful. One kilometer away from the center of Salt Lake City, it is difficult to find tall buildings on the city skyline, leaving only endless single-family houses. Queens and Manhattan are only separated by a river, but there are only so many high-rise buildings. Most of them are medium-density blocks with several or more than ten floors. The Tokyo metropolitan area has a large scale and high density. The high-rise buildings produced are only a few small pieces such as Marunouchi, Shinjuku West Exit, and Shiodome. A dozen-storey apartment buildings and some commercial streets.

That is to say, under the environment of laissez-faire economic policies, the resulting buildings are still 60% low-rise buildings, 30% medium-height buildings, and less than 10% high-rise buildings. Moreover, high-rise buildings will be very concentrated. Such a pattern. There are differences in different regions, but it roughly conforms to such a distribution.

In fact, the order under the laissez-faire economic policy is clearer and more resolute than the order of despotism. That is the value of land, including commercial value and residential value, which will directly determine the type of building on this land.

The so-called barbaric growth of the city skyline. It does not mean that there is no order, but that the order is not as good as some people wish.

When technological innovation has just started, such as railways or elevators, steel structures, they just appeared as a new thing.

The parameters of the wave function of urban land values change drastically. But people's cognitive ability has not kept up with it. People will only see the wave function collapsed at some scattered points and leave footprints. Since the 1900s, in New York, the Life Insurance Building, the Empire State Building, the Chrysler Building, and the Rockefeller Center, one in the east and the other in the west, it seems to be disorganized; but 100 years later, in New York, two large

high-rise buildings in the Midtown and the financial district have been clearly formed, and the skyline is quite clear. Moreover, this collapse is still in progress. Every 10 years, there will be several super high-rise buildings over 300 meters in New York. All of them are revealing the order of the global commercial society, and their emergence also affects the order.

Of course, the public doesn't always like such skylines, and so do public authorities sometimes. In the contemporary era, the conflict between the spontaneous order of the market and public perceptions and cultural customs is also manifested in the development and changes of the skyline, manifested in the attitude towards skyline management. I'll have a chance to discuss that later.

36 Skyline: as an Language of Modern Urban Design

In this issue, we extend the previous discussion on skylines, emphasizing their role in reflecting the internal structure of power and wealth within a city. A skyline shapes social prestige for certain groups and is often imbued with ideological significance. Given the chance, those in power might seek to influence or design the skyline to communicate specific narratives. In this context, the skyline becomes an integral aspect of urban design.

In early cities, towers and lofty buildings served as symbols of sovereignty for the lords, a means to deter enemies, and a mechanism to instill labor discipline among the populace. Religious groups built tall temples to deepen the reverence of their followers. This construction of towers, largely driven by religious entities, is in essence, an act of city design focused on erecting monuments symbolizing power and ideology. However, there was generally no concerted effort to intervene in architectural developments on a broader scale.

As mentioned before, New York City Hall was once built high to underscore its prominence. However, without suppressing the rise of other tall buildings, its prominence was short-lived and soon overshadowed. Yet, this is not to be construed as a failure of New York. The interpretation of success or failure hinges on perspective. For some advocates of small government, the inability to dominate the skyline might be seen as a testament to the city's restraint and indicative of a service-oriented governance model, not an overpowering entity eager to impose its will.

Now, let us briefly turn our attention to how the control of skylines varies across cities worldwide.

Tokyo - Skyline Reflecting Neighborhood Restrictions

In Japan, there exist legislations that limit building heights. However, these laws are primarily in place to maintain harmony within communities rather than to satisfy anyone's architectural ambitions. In Tokyo, it's common to find high-rise buildings interspersed within single-household urban villages. Yet, within these areas, high-rises are generally dispersed rather than clustered, with neighborhood coordination being a significant obstacle to their construction. In

areas where the cost of such coordination is too high, approvals for high-rise buildings are less likely.

In Tokyo, deliberate skyline design is scarcely evident. Contrary to common assertions in China that tall buildings should not be constructed near the Forbidden City to preserve the ancient capital's ambiance, Tokyo's Marunouchi area, which is most densely populated with skyscrapers, is directly adjacent to the Imperial Palace. "Marunouchi" literally translates to the core area within the city walls.

This clustering of skyscrapers in the area can be traced back to its history as the residential lands of lords during the Edo period. Numerous such large estates in Tokyo were nationalized during the Meiji Restoration and were typically designated for parks, universities, railways, military, and other large institutions. Due to the single ownership of these plots and the absence of neighboring restrictions, portions of these lands, like Shinjuku West, Shiodome, and parts of Roppongi, have transformed into high-rise districts.

Furthermore, in areas within Tokyo Bay, like Odaiba and Harumi, where land has been reclaimed from the sea, construction activities face fewer restrictions. This has given rise to numerous high-rise and more architecturally liberal buildings.

Thus, Tokyo operates on a principle of minimal restriction. Where it is possible to avoid imposing limits, none are enforced. There is no substantial design control exerted over the city's skyline. The cityscape evolves more organically, shaped by a mix of historical, communal, and practical considerations rather than by a grand, orchestrated design ethos.

Washington - Congress Controlled City

In contrast to New York and Tokyo, authorities in the U.S. capital, Washington D.C., have effectively and broadly controlled architectural endeavors, imposing height limitations on buildings erected on private lands. These caps, varying from 27 to 39 meters depending on the location, render the buildings in the district relatively low-rise. Such restrictions, while preserving a certain aesthetic, have also imposed constraints on the district's economic development. Nearly 20 global headquarters of Fortune 500 companies are located in the greater D.C. area, yet only two chose locations within the district; the rest sprawl across suburbs in Virginia and Maryland, resulting in a bustling business periphery surrounding a less vibrant capital center.

This anomaly isn't solely attributed to the height restrictions but is also intertwined with regional fiscal policies and demographic structures. Nevertheless, the height cap is a striking reflection of the district's unique political ecosystem. Unlike other U.S. states, D.C. does not practice full local autonomy and democratic governance. It sends no senators to the U.S. Senate and its single representative in the House has no voting rights.

The U.S. Congress has a dedicated committee overseeing the district's affairs, but its members aren't elected by D.C. residents. Prior to 1972, even the Mayor and governing body weren't elected but appointed by the President. D.C.'s legal and governance structure, therefore, is not inherently democratic; it is tailored to serve the federal government, not necessarily the local populace.

A popular notion suggests that D.C.'s height policy aims to accentuate the prominence of the Capitol's dome, though there's no concrete evidence to substantiate this claim. Credible sources propose that the restrictions originated in the late 19th century, concurrent with the advent of steel structures, borne out of concerns for fire safety and structural integrity. The reliability of steel was in question, and fire departments doubted their capability to manage blazes in buildings exceeding a certain height.

While these reasons are documented, it provokes curiosity - didn't other U.S. cities harbor similar apprehensions? Why didn't a uniform policy emerge nationally?

Two notable observations persist: 1) Objectively, D.C.'s height limitation facilitates the preservation of the visual prominence of the Capitol and other patriotic monuments; 2) D.C. is governed by Congress, not local autonomy. These factors contribute to the perpetuation of a European-style imperial city aesthetic, where federal monuments are accentuated. This unspoken motive underpins the enduring skyline control policy. Over time, this distinctive style has imbued D.C. with a unique urban environment that has garnered public affection and protection.

Hence, I categorize D.C.'s skyline as one sculpted by deliberate design. From a design perspective, it holds its merits. However, as this lecture isn't focused on methodologies, we'll not delve deeper into this aspect for now.

European Skylines - Diverse

Those familiar with Washington D.C. may easily draw parallels between its city skyline and those of European cities. Indeed, many cities on the European continent lack an abundance of towering skyscrapers, often attributed to strict height restrictions. However, this is an oversimplification. Europe's political structure is notably decentralized and diverse; there is no uniformity in urban management or architectural policies. Each city's policy is independent of the others.

The scarcity of ultra-tall buildings in Europe can primarily be examined from an economic perspective. From 1914 to 1945, Europe was engulfed in war and recession, with economies only beginning to recover in the 1950s. This period coincided with the first wave of skyscraper emergence globally. Europe, grappling with economic recovery, missed this architectural trend. When the European economy regained strength, the enthusiasm for skyscrapers had waned.

Furthermore, the economic marginal benefit of ultra-tall buildings is negative in most parts of the world. They are characterized by high structural costs, lower space efficiency, lengthy construction periods, and substantial financial burdens, making them economically unfeasible in many areas.

The aim of constructing tall buildings is often to achieve a high Floor Area Ratio (FAR) to optimize land use. However, achieving this doesn't necessitate towering skyscrapers. As previously noted, with buildings around nine stories high, Washington D.C. has managed a FAR greater than 6 in many of its plots.

Many European metropolises may have land prices exceeding a 1.5K USD per square meter, but the cost of building floor space remains relatively low, making the construction of skyscrapers economically unsound. It is estimated that a price of 7K USD per square meter (a very rough estimation) is a threshold for rational profit margins from skyscraper constructions—a scenario existing in hardly 1% of European cities, including London, Moscow, Paris, Milan, and Frankfurt, where ultra-tall business districts are evident.

In contrast, cities like Munich, Barcelona, and Marseille often feature one or two conspicuous tall buildings, challenging the notion of a uniform, conservative architectural ethos in Europe. These ventures into high-rise constructions, however, haven't established a commercially successful pattern or gained widespread cultural acceptance.

During the 1950s-70s, Europe saw the rise of residential high-rises akin to today's Chinese residential communities—scattered tall buildings amidst green spaces, mostly social housing projects. These exist not only in former socialist countries of Eastern Europe but also extensively in Western Europe, particularly in France. However, these are often associated with stronger dependence on motor vehicles, higher energy consumption, and extensive land use—generally considered less economically and sustainably efficient.

These constructions, embodying proactive urban design, significantly transformed the skylines of European suburban areas, reflecting ideological expressions. They epitomize a leftist European urban design, articulating an ideology of anti-authoritarianism and egalitarianism.

Europe's skylines sometimes retain a touch of nature's dominance. An iconic example is a prominent tree in Bath, UK, visible from kilometers away—a man-made landscape formed by an old and tall group of weeping willows on a 260-year-old roundabout, reminiscent of the mythical World Tree.

The diversity in the urban landscapes of European cities is undeniable. Their skylines, often expressive and orderly, encapsulate a conscious preservation of diversity akin to the preservation of ecological diversity. However, contrary to common perception, this isn't always a result of deliberate preservation. A balance between preservation and freedom, without a uniform standard, represents the genuine pluralistic nature. No one accuses Europe of having uniform cities. In regions lacking top-down designs, uniformity is implausible.

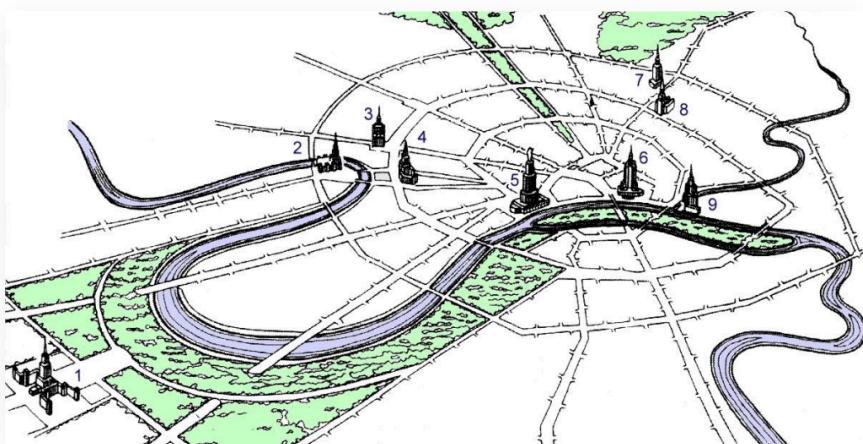
Moscow - from Stalinistic Sisters to Oligarchic Towers

Next, let's turn our attention to Moscow. In the era of the Tsars, the city's skyline was dominated by the towers of the Kremlin and the steeples of numerous churches, a characteristic it shared with other major European cities.

However, the Soviet era ushered in a new age and a demand for monuments emblematic of this period. Starting in 1922, the same year the Soviet Union was founded, a grand project began to take shape in Moscow. Originally intended as the headquarters for the Communist International, it was later envisioned as the main assembly hall for the Supreme Soviet, capable of accommodating twenty thousand representatives, and hence named the "Palace of the Soviets." The design competition for this project attracted left-leaning architects from around the globe, resulting in a plethora of avant-garde, modernist designs. However, due to prolonged development, by the time of Stalin in 1933, the selected design

leaned towards a neo-classical, art-deco style. With a planned height of 400 meters, it would have been the tallest building in the world at the time. The project was not just ambitious in height, but also in its vast width. To make space for the Palace of the Soviets, in 1931, the Moscow authorities demolished the Cathedral of Christ the Saviour, a primary cathedral for the Russian Orthodox Church, standing 103 meters tall - a decision rooted more in politics than architecture.

The war interrupted the construction of the palace. Resources, including the steel originally earmarked for the building, were reallocated for war efforts. After the war, despite an influx of resources, interest in the project waned, and it was eventually abandoned after Stalin's death in 1952, with its foundations transformed into the world's largest open-air swimming pool.



During Stalin's rule, however, seven skyscrapers famously known as the "Seven Sisters" were completed. These buildings, ranging in height from 134 to 240 meters, occupied the skyline and were for a long time, the tallest in Europe. These landmarks, reminiscent of structures like the Beijing Exhibition Center and Shanghai Exhibition Center, exhibit a Russian Baroque and Gothic style, with their sharp spires shaping Moscow's skyline. These structures drew mixed reactions from Muscovites; while they are essential parts of the city's architectural memory, they also represent an ideological and historical era that evokes complex emotions.

In post-Soviet times, Moscow's skyline underwent another transformation with the emergence of Moscow-City, a business district on the former industrial lands along the western ring road. This district, akin to Beijing's Guomao or

Shanghai's Lujiazui, reflects the shifting power dynamics in Russian society. Since 2000, this business hub has witnessed the construction of more contemporary skyscrapers than either London or Frankfurt. The owners are primarily wealthy oligarchs from the energy sector and state-owned enterprises who flourished in the era of globalization. This cluster of buildings, voluminous in their structure, indicate a change in regime.

The translation remains faithful to the detailed account of Moscow's evolving skyline over various historical epochs while enhancing readability and flow for an English-speaking audience.

Chinese Skylines - Planned Chaos

In this final section, I'd like to touch upon the evolution of China's skyline.

For a significant part of modern history, China lacked tall structures. Beijing, for example, largely retained its pre-modern skyline into the 20th century. The city's horizon was dominated by Buddhist pagodas dating back to the Liao, Jin, and Yuan dynasties, and structures like the White Pagoda at Beihai Park, the Dragon Pavilion on Jingshan, and the grand city walls and gates were prominent features. The silhouette of the Western Hills in the distance added a natural touch to the cityscape.

High-rise buildings were rare until 1971 when a series of tall residential buildings were erected on the space left vacant by the demolished city walls and moat at Qian San Men. Known as the "Qian San Men Tower Blocks", these 9-12 story buildings symbolized economic development and national prosperity at the time.

In 1986, the 130-meter tall CCTV Tower on Fuxing Road, a significant beacon in the skyline, marked Beijing's only skyscraper. Its magical presence foretold a new era, and having a few such buildings was considered an honor. In contrast, a provincial city or county without any tall structures was seen as dishonorable.

This scenario persisted until around 2008. Even in 2016, some property developers still viewed constructing skyscrapers as a contribution to the city that could earn them policy support. By then, the number of high-rises and skyscrapers in China had far exceeded those in the United States and the seven major Western industrialized nations combined.

As skyscrapers became more commonplace and the nation's poverty and inferiority complex alleviated, a backlash against tall buildings emerged. While

skepticism and controversy surrounding high-rises have always existed worldwide, China began to introduce policies restricting their construction. This wasn't solely due to aesthetic preferences, structural safety, or fire safety considerations.

At the core, the plethora of skyscrapers, backed by international economic entities and real estate and financial policy operating groups, represented the materialization of their financial and political ascent and carried a semblance of Western ideological influence. It became unsettling for many when these towering structures dominated the skyline.

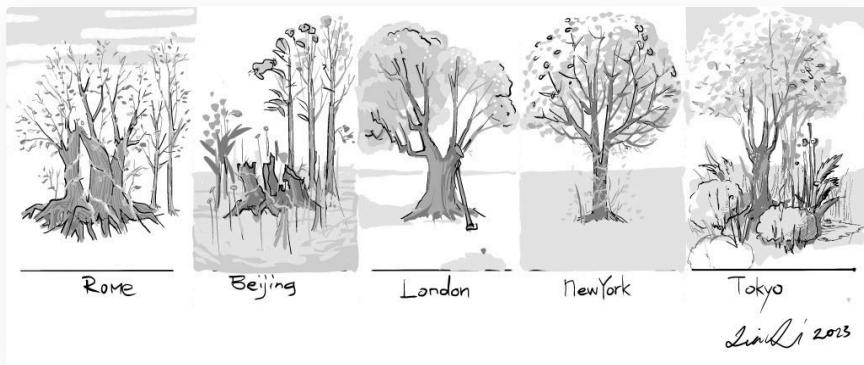
Height restrictions in architecture became a means for administrative authorities to exert control, often involving multi-departmental collaboration. The widespread urban planning rule that capped residential buildings at 100 meters was known to many. A sea of uniform 100-meter tall buildings, a byproduct of two decades of explosive economic growth and height restrictions, dotted many city skylines.

In the context of a robust economy and technology, a population boom, and high land values, these 100-meter buildings, initially symbols of modern urban life, became commonplace due to the enormous output of Chinese builders, making them the most affordable housing option—a phenomenon akin to a world miracle.

Recently, the 100-meter height cap has been reduced to 80 meters—a natural outcome of the growing disdain for high-rise residences. This specific number, a compromise between a too lenient 15% reduction and a too harsh 30% cut, is a testament to the art of policy-making in the administrative landscape.

That concludes my introduction to Skyline. Later, I will try to explain some urban phenomena from the perspective of morphology.

37 Morphology - the Manifest of the Layers from History, Root, Trunk, Branches and Leaves of the City



"Tones" of the Cities

Every city possesses a unique tone that distinguishes it from others. Major global cities like London and New York, top-tier Chinese metropolises like Beijing and Shanghai, historical European hubs like London and Rome, and renowned Tuscan cities like Florence and Siena – each has a distinctive resonance.

The term “tone” is an abstract and nebulous one. To facilitate comprehension, we can employ morphological observation methods and look at cities from various perspectives. In this installment, I will introduce the first perspective: cities as a sedimentation of time, embodying layers of diverse historical epochs. Each city is characterized by the richness of these layers, illustrating the varying speeds and levels of development they've undergone in different stages of their existence, which constitute essential morphological characteristics.

Much like some plants have notably large roots (e.g., radishes and taros), others have prominent stems (like cacti), and yet others boast sizable fruits (such as watermelons), cities too have distinguishing features born from their unique evolution.

London Type - Chronological

Consider London, with its remnants of ancient Roman walls and bridges – akin to the deep roots of a tree. The city's medieval landmarks like the Tower of

London and Westminster are like sturdy trunks supporting an organism that has sprouted abundant foliage from the architectural innovations of the 18th, 19th, and subsequent centuries. Even today, areas like the City of London, King's Cross, the South Bank, and Canary Wharf are vibrant with construction activities, akin to a tree continually sprouting new shoots. London embodies an elegant balance of historical layers, each contributing to the city's dynamic ecosystem.

Munich, on the other hand, is akin to a smaller, yet equally balanced tree, bearing marks of WWII destruction more prominently than London. Although adorned with exquisite "flowers and fruits," Munich lacks the iconic 21st-century architectural masterpieces that London boasts.

Rome Type - Archaeological

Rome's ancient ruins and grandeur in Baroque and medieval architecture liken the city to an exquisite, world-class root sculpture. It's a living, breathing entity, not preserved in formal but exposed to the elements and continuously functional. The newer constructions post the 19th century are modest, akin to saplings surrounding an ancient tree, honoring, not overshadowing, Rome's historic grandeur.

Florence, with a history spanning over two millennia, lacks the imperial posture of Rome but flaunts a robust medieval to Renaissance epoch, akin to Rome's morphological attributes. It enjoyed a brief yet transformative period as the capital of the Kingdom of Italy, embedding a segment of 19th-century grandeur into its ancient texture. In contrast, Siena, Florence's medieval competitor, lacks this modern flourish, appearing like an aged yet preserved tree.

Venice, living in the echoes of yesteryears and akin to Siena in the age of its architectural inventory, exudes an unusual vitality, fuelled by an exceedingly prosperous tourism industry, rendering it a lush yet anachronistic entity.

These analogies aim to illustrate the analytical approach of understanding cities as living organisms, each with a distinct morphology shaped by their historical, cultural, and architectural evolution. Each city, akin to a unique plant species, has morphed and adapted through time, bearing the scars of history, the flourish of golden ages, and the continuous sprouting of modern innovations. This perspective enables a nuanced appreciation of the cities' unique tones, breathing life and narrative into the bricks and mortar of urban landscapes.

Beijing Type - Nursery around the Dying Root

Beijing boasts temples and pagodas from the Liao, Jin, and Yuan dynasties, as well as the expansive old city from the Ming and Qing eras, epitomizing its deeply rooted history. Inside the ancient city, deteriorating residences and the hollowing of economic and social activities mirror the decay of an old tree's roots. Compared to major Western cities, and even Tianjin and Shanghai, Beijing has a paucity of modern architectural sediment. The city's assets from the explosive growth period of the 1870s to 1940s, akin to Shanghai, are minimal, manifesting an underdeveloped trunk.

However, the landscape changed in the 1970s with the emergence of social housing, sprouting branches of development. The 1990s heralded an era of unprecedented growth in international-style buildings and commercial housing. New districts, distinctly separated and not blended with the old, encircle the historical core. Thus, Beijing's appearance resembles a historic tree with flourishing secondary branches around its periphery, their grandeur and diversity echoing the majesty of the ancient roots.

In contrast, most second and third-tier cities in northern China lack Beijing's architectural symmetry. In their new districts, the view is dominated by buildings and streets from the past two decades, with even villages often razed. The landscape is characterized by uniformity, with standardized residential buildings occupying a significant proportion, supplemented mainly by international-style office buildings. This homogeneity, akin to beds of leeks and green onions in their uniformity and lack of historical layering, exemplifies the "thousand cities of one face" complaint. This phrase captures a widespread cityscape across China, where the ubiquity of similar urban forms engulfs a significant environmental share, marking a departure from the diverse historical and cultural expressions found in metropolises like Beijing.

North America Type - Young Trees

The phenomenon criticized as "every city looks the same" is not exclusive to China. North American cities have faced similar critiques. Minneapolis, Fort Worth, Cincinnati, Kansas City, Edmonton, Montreal – over a hundred large and medium-sized cities in North America exhibit a striking uniformity. Each typically features a high-rise business district of a few square kilometers near a river, surrounded by industrial areas, and beyond that, an expanse of detached houses hidden amidst trees. Distinguishing between them can be challenging

even for those who have visited them. The distinctive features of these cities are often not their architectures but their natural landscapes like mountains, rivers, and bays. Notable exceptions with distinct urban environments include Toronto, Miami, San Francisco, and Chicago.

Most North American cities have similar historical sedimentary layers. Apart from a few, buildings over 200 years old are a rarity, and a significant number of cities have a developmental history of approximately 150 years. Their architectural spectrum spans Victorian, Edwardian, and modern international styles, a continuity over just over a century.

Their economic cycles and developmental peaks are also strikingly similar. The oldest wave, the Gilded Age from 1860 to 1900, saw the emergence of sturdy, multi-storey red brick buildings and delicate brownstones, accompanied by ornate public buildings. These enduring structures still constitute 30-40% of many urban areas. Post-1900 brought the rise of elevator-equipped high-rise steel structures, now making up around 20% of the building stock in major US cities. The 1950s marked the beginning of suburbanization, with detached houses and suburban industrial parks dominating over 90% of the area beyond city centers. Urban renewal in the 1960s introduced low-standard social housing, followed by some revitalization of downtown areas from the 1980s, characterized by glass curtain wall skyscrapers – a trend persisting to the present.

This typifies the historical stratification of North American cities. The architectural similarity across the continent is undeniable. Despite the individuality of each building, the overall similarity is overwhelming.

This is the North American version of "every city looks the same."

However, it's not as extreme as the uniformity found in new Chinese cities. It's more akin to a nursery of young saplings rather than a field of identical scallions. Despite the monotony, there's a semblance of complex order within, and these cities seem healthier and more resilient to environmental fluctuations.

In the apparent monotony of North American "sapling cities," there are **internal variations**. Atlanta, for example, has a scarcity of brownstone assets, a consequence of the severe damage it sustained during the Civil War and the limited, lower-quality architectural resources available during the post-war recovery. In the nursery of North America, it's like a tree with charred roots, boasting vigorous secondary branches.

Cincinnati's zenith was around the Gilded Age. The city center's development has been limited since, with parts of the urban area frozen in the state of a century ago, evoking a sleeping, bygone world. Even in the city center, post-1980s developments are scarce, and many of the finest structures still hail from a hundred years ago.

Detroit's golden age was later and loftier, spanning from 1900 to 1970. It was a major industrial and inland shipping center in the U.S., the primary phase for the accumulation of its architectural wealth. Even today, it's surrounded by a metropolitan area of over 4 million people. However, the decline of its city center is stark. Despite considerable revitalization efforts, the downturn seems irreversible. We observe the decay of an advanced tree adorned with exotic blooms, surrounded by an extensive secondary forest.

Tokyo Type - Secondary Forest with Biodiversity

Japanese cities, while boasting historical richness in places like Kyoto, Kanazawa, and Kamakura as exceptions, generally exude a sensation of secondary forests, even more so than their American counterparts. The prevalence of this feeling can be attributed to the scarcity of architectural assets from the pre-industrial era in Japan, most of which were wooden constructions and have scarcely survived to the present day. Moreover, the devastation wrought upon traditional urban areas during the war was significant.

In the post-war era, Japanese cities experienced a confluence of rapid urbanization and reconstruction, technological advancement, and economic explosion. These factors led to a substantial accumulation of small buildings initiated in the 1950s and 1960s in major Japanese cities. Concentrated in age yet limited in quality, these structures resemble the "urban villages" familiar to the Chinese populace. Japan's urban villages have been undergoing constant integration and gentrification, resulting in a Tokyo where most houses are meticulously refined, albeit small in scale. This gradual, balanced approach between efficiency and decorum hints at a secondary forest evolving into a complex, diversified order.

To some extent, this reflects a relatively healthy developmental trajectory for cities in the developing world, with Japan slightly (maybe 60 years) ahead of the curve.

A Manifesto to Its Socio-Political Climate in History

From the examples outlined, the conceptual approach to observing historical stratification should be clearer. People are often drawn to cities enriched with historical sedimentation, layered history, and traditional spaces, as they emit signals of distinct character.

A city with a history spanning thousands of years and continuous habitation signifies geological and hydrological stability—an assuring testament to its excellent geological/geographical location.

The survival of exquisite architecture spanning centuries indicates a relatively continuous, stable society that hasn't suffered massive humanitarian catastrophes leading to the destruction of civilization. These delicate structures, vulnerable as they are, signify surplus generation or a bustling trade location, evidencing the nurturing and preservation of cultural traditions.

Conversely, the absence of historical structures signals dynastic changes and societal turbulence. In this light, the intact architectures become not just symbols of aesthetic or historical value, but indicators of societal stability, prosperity, and continuity. These structures and their associated urban environments serve as silent testimonials to the multifaceted narratives of their cities, weaving intricate tapestries of history, culture, and evolution that transcend the immediacy of contemporary urban landscapes.

38 Morphology - Vernacular, Classical Styles and Their Ingredient in the City



In this section, we will explore another perspective on urban morphology, one that doesn't hinge heavily on complex theories but is rather intuitive.

Classical and Venecular

We can broadly categorize the buildings within a city into two groups through a straightforward observation. The first category encompasses majestic, authoritative buildings adorned with cultural symbols; examples include the Tiananmen Gate Tower, the Hall of Prayer in the Temple of Heaven, and the People's Congress Building in Beijing, as well as St. Paul's Cathedral and the Westminster Palace in London.

The second category consists of more humble, pragmatic structures designed primarily for functionality. Examples of this type include the cave dwellings in Shaanxi, stilt houses in Hunan, fishing villages along the Ligurian coast, various courtyard houses worldwide, the industrial buildings in Beijing's 798 Art Zone, residential areas in Fangzhuang and the Asian Games Village, warehouses along

the Chicago River, and residential complexes in Hachioji, Tokyo. We can also extend this category to include more temporary structures, such as the tent stalls at festivals around the world.

I refer to the first, more grandiose category as "classical architecture" and the second, more practical type as "vernacular architecture." The method of observing a city that I'm introducing involves analyzing its history, social structure, and wealth level based on the proportion of these two types of architecture present.

It might be noted that my use of the terms "classical" and "vernacular" architecture may not align with their conventional definitions. Indeed, my discourse extends from the works of Luxembourg architect Leon Krier. I have adopted his terminology - 'Classical Architecture' and 'Vernacular Architecture' - and generalized their definitions to cover a broader timespan in the city's evolutionary history, making these concepts applicable to the analysis of contemporary architecture.

Through this lens, the proportion and presence of these two architectural styles within a city can offer profound insights into the city's historical progression, social stratification, and economic status. This dual-category perspective presents a simplified yet insightful lens for assessing urban development and the underlying forces that shape it.

Classical architecture in a narrower sense, denotes structures reminiscent of ancient temples, halls, and monuments. However, from a morphological perspective, the essence of classical architecture lies in its conceptual nature. It is crafted to flaunt the prestige of its owners and augment their authority. Thus, classical buildings are not confined to ancient times. Consequently, the opposite of classical architecture isn't modern or contemporary architecture but rather vernacular architecture.

Vernacular architecture in a narrower sense, refers to the indigenous and native building styles of a particular region. Think of wooden structured homes in Swiss villages or the cave dwellings on the Loess Plateau. These structures are characterized by their use of local materials and their adaptability to the regional climate – temperature, sunlight, precipitation – built by local craftsmen, exuding an air of practicality and simplicity. When we expand the definition of vernacular architecture, it transcends rural constructions and encapsulates straightforward, utility-driven urban structures like average homes, factories,

warehouses, and shops. These structures, unconcerned with prestige or authority and unaimed at promoting specific cultural or conceptual narratives, embody the spirit of vernacular architecture. (Indeed, vernacular buildings are a treasure trove in architectural studies.) Even the modern, technologically intensive, and refined high-rise residences at the mouth of the Sumida River in Tokyo are built on principles of cost-efficiency and functionality without attempting to convey conceptual significances. Thus, morphologically, they share a structural homology with pre-industrial vernacular architecture.

In this context, we have laid out the morphological definitions of classical and vernacular architectures.

This series has consistently explored the three primary forces shaping cities: defense, economy, and ideology. The defensive aspect, prioritizing the protection of life and property rights, is exemplified in structures like city walls, enclosures, fortresses, and security systems. We'll set aside this foundational element for now. The remaining two cornerstones, economy and ideology, are embodied in vernacular and classical architecture, respectively.

the Proportion in History

Looking back through history, vernacular architecture predates its classical counterpart, a testament to its pervasive presence since antiquity. In the initial stages of human civilization, when survival was a grueling task, economic surplus for architectural embellishment and ostentation was scarce.

Materials employed in construction were typically sourced from the immediate environment. Tree bark was processed into ropes and used for roofing to offer waterproofing, branches were crafted into beams, pillars, rafters, and purlins, and mud was used as filler or shaped into adobe bricks. The architectural sophistication at this stage was rudimentary, akin to the humble straw house of the first little pig in the classic tale.

In this scenario, architectural manifestations are primary, driven by the direct need for shelter and security, absent of elaborate aesthetic or symbolic concerns. The built environment emerges as a direct response to immediate, tangible needs, with no room for the luxury of conceptual or aesthetic embellishments.

The earliest human groups, or Bands, consisted of a dozen or at most, a few dozens who were related by blood. There were essentially no outsiders to whom wealth could be flaunted. However, as these small kin groups coalesced into

tribes, there emerged a need for leadership to unify actions and consolidate power, necessitating elements that signified order and hierarchy. In the midst of early settlements constructed of the first little pig's caliber of houses, order spontaneously manifested in the form of larger dwellings for elders and the emergence of shrines.

The chief's thatched home would often feature decorated roofs and eaves. Sometimes, it was intentionally built taller or placed on an elevated platform. The entrance gate would often be grand and imposing. Inside the chief's large house, mysterious or valuable items would be displayed. Shrines would receive similar treatment. The seer would often live in seclusion to minimize exposing his or her human facets. The seer's house would often be encased within a square courtyard, with strict restrictions on the entry of ordinary people.

Beyond the architecture of the living, there were structures for the deceased, or for divine beings; totem poles or cairns expressed a collective myth of a people. This marked the inception of what would evolve into classical architecture. Even much later, the golden tents of the Great Khan of Mongolia, or some wooden churches in Northern Europe, largely remained at this stage.

Monumental structures like the pyramids or the Karnak Temple constructed in ancient Egypt, despite enduring thousands of years of weathering, have stood the test of time.

Yet, the most enduring and widespread influence in classical architecture can be traced back to the forms left by the ancient Greeks and Romans from the 5th century BC to the 5th century AD.

Initially, the temples of ancient Greece resembled the second little pig's wooden structure – a phase that left behind no lasting structures. However, by the 5th century BC, the Greeks had entered the “third little pig” phase, constructing a plethora of temples primarily from stone, elevating the prestige and durability of this architectural form. This style of classical architecture, coupled with Greek knowledge and technology, was widely emulated throughout Western Europe and the Mediterranean and reached as far as Central Asia and Britain.

During its proliferation, constant innovations were introduced, especially by the ancient Romans, who incorporated the arch and dome techniques in brick and stone construction. Buildings grew taller, spans wider, and spaces more expansive. New materials like red brick, hollow bricks, and concrete were employed, giving rise to a plethora of classical architectural types. These

included, but were not limited to, temples, theaters, council halls, arenas, race tracks, palaces, tower structures, and bath centers - a comprehensive suite of public edifices that formed the archetype of classical architecture in the narrow sense.

These archetypes were widely replicated over an extensive period across a significant portion of the world.

This marked a global homage to, and identification with, the philosophical, scientific, and political ideals of the Greco-Roman classical world within the Western hemisphere and its influenced regions.

As Western civilization spread its influence through globalization, architectural practices worldwide felt its impact. In China, a phenomenon emerged, evidenced by the so-called "County Town White House" and similar structures in villages and towns. (**"County Town White House" refers to a phenomenon in China where local administrative buildings, often in smaller cities and towns, are constructed in a grand, Western classical architectural style reminiscent of the Capitol in Washington, D.C., as the public misidentify the Capitol with the White House.*)

Japan and South Korea, too, saw the rise of highly Western classical architectural examples, evident in structures like their national assembly buildings.

Yet, every culture steeped in robust traditions boasts its distinct classic architectural styles. The domes of mosques, the onion domes of Orthodox churches, and the grand roofs characteristic of traditional Chinese architecture, each echo the rich cultural heritage from which they arise.

Vernacular architecture, however, is less a reflection of cultural inclinations and more an adaptation to the available materials and climatic conditions of a particular location. The stone-walled residences of Taihang Mountains share more similarities with those atop Laoshan Mountains than with the adobe brick homes nestled at the foot of Taihang. In another hemisphere, the gassho-zukuri farmhouses of Japan's Shirakawa-go mirror the architectural essence of Swiss homes, yet diverge starkly from the residences sprawling across the Nobi Plain below.

the Mosaic

In the mosaic of a city's architecture, the pattern formed by the intertwining of classical and vernacular buildings unveils distinct identities.

1) All Vernacular

A common assumption often leads us to believe that rural areas are bastions of vernacular architecture, every structure a testament to simplicity and functionality. However, the reality of a 100% vernacular landscape is peculiar, if not uncanny.

Nature abhors a vacuum and also despises utter flatness in structure. A biological community devoid of a food chain is unfathomable. In the same vein, a universe composed solely of hydrogen atoms, due to gravity, will inevitably birth disparities in density. These higher density pockets trigger nuclear reactions, begetting a diversity of atoms and complex chemical structures.

Villages, products of evolutionary processes, are not homogenous entities. The anomaly of uniform villages is often the offspring of human planning. One might observe this in the military barracks of the Ming dynasty or in some of the newly constructed rural areas in Northern China, where each household is allocated an identical courtyard and house. This artificial, granular society is an aberration from the natural order, likened by philosophers to a basket of potatoes or a stretch of sandy soil.

Yet, even in this engineered uniformity, diversity seeks its expression. Absent the heavy hand of external enforcement, the building behaviours of individual households introduce an element of non-uniformity. Some expand their homes to two stories, others adorn their facades with ornately patterned ceramic tiles, and yet others crown their roofs with gourd-shaped spires. Hence, while the village retains a level of pronounced homogeneity, elements of conceptuality and endeavours towards classicism subtly permeate the landscape.

2) Predominantly Vernacular

A more commonplace scenario mirrors the villages in Shanxi, where the bulk of the architecture is modest and utilitarian, akin to the quadrangle dwellings typical of vernacular design. Yet, complexity emerges: the main houses of affluent families boast opulent decorations, and within the village's confines, ancestral halls or temples of classic design stand as silent sentinels, bearing testimonies and transmitting ideologies. Occasional stages, funded by the affluent, not only host entertaining performances but also serve as platforms for moral and ethical edification, embodying societal norms. In this milieu, classical architecture subtly weaves its narrative amid the vernacular, forging a harmonious, stable design fabric.

3) A Harmonious, Stable State

In several autonomous towns across Europe, classical architecture finds a more pronounced voice. Beyond churches, palaces, and theatres, edifices like schools, financial institutions, courthouses, and even cemeteries contribute to the city's classic architectural ensemble. Classical structures, commanding up to 10% or more of the cityscape, often overshadow the more numerous vernacular buildings. This dominance is a hallmark of developed societies, reflecting stages of evolution marked by stability and maturity.

4) Highly Classical: Imperial Capitals - London, Paris

There exist cities, like London and Paris, and once Rome, where classical architecture reigns supreme. The majority of structures are not just elegant but are imbued with a grandeur and commemorative essence. These cities are the products of enduring stability, economic affluence, and colossal wealth accumulation, often spanning two centuries or more. The maintenance of these classical edifices demands substantial resources, drawing from vast territories and populations.

Such cities of heightened classicism are typically the nuclei of imperial systems, sustained by the influx of resources from expansive hinterlands.

While London and Paris exhibit a semblance of balance, Rome, in the twilight years of the empire, was a city of extravagant grandeur, where palaces and temples proliferated.

However, this heightened classicism teeters on the edge of instability. Every city lures a influx of proletarians, prompting a demand for low-cost housing—vernacular architecture fills this gap. Absent the working class, a city cannot curtail its cost of living nor maintain long-term competitiveness. A city wholly gentrified is a transient illusion; a city maintained by bread and circuses, solely dedicated to consumption, can only exist in fragments.

