

## **Folding the World**

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**We are at the end of an age – the age of expansion – and we need a new narrative for the next step. The limitations of our physical Earth collide with the reality and necessity of rapid societal development. Accepting that both are harsh realities, we face a real dilemma. The desperate if understandable call for renunciation and slowing down is helpless and counterproductive, because it does not solve the dilemma. The mathematical principle of folding could provide this solution, because it allows infinite motion in a finite world – through growth into diversity. Not growth into more, but into different – and not theoretically or even esoterically but in a very practical manner.**

### **Collision of two necessities**

Many have now realized that unchecked resource consumption and the pollutants it produces, such as carbon dioxide and microplastic, will push our planet to the brink of inhabitability. It is evident that climate change must be stopped, and that this will only be the beginning of the solution of our sustainability problem. We live on a finite planet with finite resources. This is clear to most and not only the *Fridays for Future* but the vast majority in many countries is demanding solutions.

It is absolutely essential, though, that the solution must be committed to an important boundary condition. And that is that we must continue to develop further as a society. We must preserve and improve social achievements of the last centuries and decades, such as the rule of law, democracy, equal rights and the diminution of poverty. The argument that there are other social necessities besides limiting climate change is as correct as it is trivial. It has been used by deniers for decades and is therefore tainted with dishonesty. Unfortunately, it has a core that is as true as the threat of carbon dioxide itself: Our society must constantly evolve.

Ostensibly that is because we are far from having achieved everything that is necessary: there is still poverty and enormous injustice in the world, and the sustainability problem itself is forcing ever new innovations far beyond the climate problem. But the actual reason is even deeper: Society must move in

order to be stable. Motion and stability are not contradictory, but rather mutually dependent.

Teleological theories of society those aligned towards a final goal such as communism strive towards a stable state. This ultimately means a stagnant society. However, we cannot eliminate movement. It is a basic human need that is expressed in all parts of our lives in the form of fundamental emotions such as hope, faith, ambition, creativity and many other feelings directed towards the future. Development shapes human history. Dynamics are universal. This premise has repeatedly inspired the idea of a cyclic society. Aristotle described the necessary sequence of political systems from democracy to dictatorship and back again. Aldous Huxley described a “Brave New World” in which most of society happily stagnates but the few revolutionaries are being caught in a cycle of governance. Very similar to the “Matrix” trilogy in cinemas or the film “Snowpiercer” on Netflix. A cyclic image of society can generate the illusion of motion, but does not allow any real development and thus remains cynically incapacitating.

### **The folding principle**

The challenge to allow for infinite growth in finite space is the core of the mathematics of chaos theory and was studied intensively in physics about thirty years ago. Perhaps it is time that these ideas enter the public discourse in a similar fashion as have quantum physics and relativity.

Besides stagnation and cyclic motion, there is the “folding principle” in dynamical systems theory: a system is free to evolve but by having to operate in a finite space, it avoids exploding. By “knowing” that the space is finite, it bends before colliding with the boundaries of the given space and folds back into it while creatively finding an infinity of new paths. Like a flock of birds that does not simply fly into space or plunge into the sea, but freely explores the space in between. Or like the Amazon rainforest which does not just keep expanding, but grows and fiercely competes within its natural boundaries. What emerges is growth into diversity that occupies the given space but does not demolish it.

Not growth beyond the sky, but into diversity.

This might sound very abstract or even esoteric but it is indeed very practical and has been happening in the arts and culture for centuries if not millennia. Each

generation emancipates itself from the previous one by renewing its culture. The old generation may deem the new “beats” and “doodles” worthless and the new generation may consider the old stuff inferior. But history teaches us that this is a nonsensical classification. Miles Davis is not worse than Mozart, just different. And who today would deny Elvis Presley, the Beatles and the Rolling Stones or Metallica or Iron Maiden their importance for our culture – even if in their time they were classified by the old generation as “subcultures”.

Growth into diversity is a very hard principle. It stabilizes the internet and ecosystems. Biodiversity bears the ecosystems’ natural power to adapt to changes. The Internet was practically created to generate the most stable communication link between two points on Earth. Due to the variety of connections, it is much more stable than any single connection, no matter how well secured. And diversity is the ubiquitous solution in business, too: New things are constantly being invented to keep demand high, the business world in motion and businesses in the competition. It is a pervasive principle. It unleashes competition and innovation.

### **Sustainability through folding**

Only one component is currently still missing in our economy and that hinders both competition and sustainability and that is limits. Of course, we must allow the free-market economy and with it the full range of achievements of liberal democracy. What must be prevented is growth into infinity. We are already setting limits where we consider them ethically necessary: with regard to slavery, child labour and the trade of radioactive material, for example.

The European Emission Trading Scheme is exactly such a limit – a boundary – and it too will induce folding and thereby innovation as long as it is consistently enforced by politics – as long as the economy, in this case the dynamical system, can firmly assume that the boundaries are solid and persistent. Only then they become part of the dynamic system and the system can work with them – incorporate them into its strategies.

For a long time, the global economy developed quasi-synchronously with the oil price, and thus economic growth also meant carbon dioxide emissions. With the business community’s confidence that policymakers will enforce the finite nature of the atmosphere, and thus the need for zero emissions by 2050, a scarcity is generated that will lead to innovation. That is the folding principle.

If the warming limit of our planet becomes part of the economic system, as demanded for decades by economists such as Ottmar Edenhofer and many others, it will lead to more competition and innovation not despite but precisely because of the limits set. In mathematics, a dynamic system that is free without boundaries cannot generate diversity. It either dies or it explodes. Only the finiteness generates variety.

Or to say it economic terms: scarcity creates innovation. A plastic ban induces alternative packaging and alternative ways of consumption. The crucial issue is that the economic path is not prescribed but only the limits are set. This is the opposite of a planned command economy.

### **Limits create economic growth**

But why can the folding principle actually be more than just a nice mathematical description of existing ideas? It becomes interesting when we place it as a principle next to the other fundamentals of our society. If we accept the finiteness of our resources and of other limited entities as a basic principle. Then the folding principle can be the answer to a number of major problems of our time. One is that of sustainability. Another is divergence of income and wealth inequality between people and nations and yet another is the monopolization of our economy, especially our digital industry and thus the realm of information distribution.

A small group of corporations ranging from Google and Amazon to Facebook have extracted themselves from the competition through quasi-unlimited growth. At the same time their size threatens the primacy of politics over economics and influences our opinions to an uncontrollable degree.

This is due to their size. Currently, companies have an enormous monetary but also political incentive to become bigger and bigger. By contrast there is no relevant incentive for a company to split up.

Most countries have antitrust authorities that deal individually with corporations that have become too big. The antitrust agencies around the world are meant to keep companies from becoming too big in order to preserve competition in the market. It is fair to say that the mere existence of Google, Amazon and Facebook proof that this does not work. In addition to the limitations that national authorities have, a fundamental flaw of the current system is that it remains a

case-by-case decision. Therewith it is not part of the economic dynamics. It is an instrument that better suits a command economy than a market economy. That would change fundamentally if the folding principle would be applied, for example, by the fiscal introduction of a corporate gain cap. Just as in the Paris Climate Agreement 195 countries decided to impose a cap on global warming, society has to decide that a corporation cannot be more powerful than the state in which it operates. That is necessary in order to keep political power with the people in form of their political representatives. For most companies such a cap would have no direct effect since it basically tackles monopolies. De facto, we are already striving for that today, but through national cartel offices.

### **Generate economic attraction of competition**

A tax solution would be infinitely better, because it would become part of the dynamics. Decisive for the folding principle to work would be that it is an accountable part of the dynamics and not an individual case-by-case decision by the antitrust office. This can be achieved by a progressive corporate tax rate that rises asymptotically to one hundred percent. The mathematical formula for this is simple, but of course not the point. The point is that this introduces an upper limit for corporate profits of one individual company not of the economy as a whole. For most of the companies it would not mean a tax increase, but probably a reduction. The aim is not to collect more taxes, the aim is to incentivize the splitting of mega corporations into companies that are part of the market again and are in actual competition with other companies.

For the very few companies for which these taxes were relevant, it would not be an antitrust agency that would decide on the existence or absence of a monopoly. Instead, as profits of a corporation increase, the incentive for this company to split up would increase. It would be the stakeholders' decision which path is more profitable – one big heavily taxed or several mid-size companies with much lower taxes. These would be independent companies that can continue to cooperate, but also to compete with others. This effective cap on individual corporate gain would be very high and would be based on the size of a large government budget, for example, one percent of the annual German budget. That would place it around five billion Euros.

In the United States, there have been repeated splits of mega corporations in the past. Each one of these had been individually decided in one way or the other

by the US government. The reason for these decisions has in each case been a market failure in form of a monopoly formation. In each case the total value of the companies involved has subsequently increased, and so has the competition in the respective economic sector. The last one of such decisions concerned the telecommunications giant AT&T which took ten years to be completed.

The organization of such corporation splits via a transparent tax system is advantageous in a number of ways. The most important being that it is a calculable element of a company's strategy. Mega corporations would simply be inefficient. The system folds and generates more diversity and competition.

The exact implementation of the folding principle has, of course, to be debated. What is crucial is the stability of the boundaries and the simplicity and transparency of the rule, so that it can be supported by society and becomes part of the economic dynamics. We need a fundamentally new amendment to our current social system in order to prevent the tearing apart of our societies and the Earth we live on. An amendment, however, that does not unduly restrict our freedom and one that does not require manual regulation. Instead we need an amendment that keeps our societies together and accepts the finite nature of our planet.

Similar to the fundamental rules of equality before the law and in elections, we must accept the finite nature of our Earth and of other aspects of human existence as a fundamental truth and reconcile it with our basic need for development. Folding is the solution to this supposed dilemma. We need an economy that grows within limits, because only then can it generate the creativity and innovation that we need to face the challenges ahead

„I could be bounded in a nutshell and count myself a king of infinite space.,,  
Shakespeare in Hamlet (Act 2, scene 2)