

## Dinámica Macroeconómica | Selección de textos

“Progress. It’s, uh... seems that’s all ever talk about. But I never talk about what the word actually means... it means ‘to proceed,’ ‘to move forward,’ that’s all. Typically we interpret moving forward as better... better for us as a people, better for the planet, which is usually better for us as a people. And if we use it in that manner I agree. But when something benefits one group over another group you can’t use that word anymore. You must use another word. You must use ‘bias,’ you must use ‘favoritism.’ Running a pipeline beneath the drinking water of an already strained and impoverished community may be progress for the owners of the pipeline or owners of whatever runs through the pipeline or for those receiving it but it could lead to disastrous effects to the land and the people this pipeline runs beneath. Which is not progress at all.”

Yellowstone 5x08

<https://tvshowtranscripts.ourboard.org/viewtopic.php?f=1103&t=58988>

### 1. Emergencia de la agricultura

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“It is hard to overestimate the significance of events that took place some 10,000 years ago and more or less contemporaneously in different places across several continents (...) Whether out of necessity to increase their food security or as an opportunity, hunter-gatherers made a momentous change in the way they procured food: they started planting some of the plants that were well-known to them but which earlier they merely harvested (...) The initiation of planting represented (...) a major milestone in the evolution of the human lineage up to this day.”

“The transitions from hunting-gathering to agriculture took place independently and more or less simultaneously in multiple regions of the world. Not only were multiple new technologies introduced around that time such as domesticated plants and animals and pottery, giving rise to the term ‘Neolithic Revolution’, but the practice of agriculture was associated with major changes in human society around the time of the hunting-gathering to agriculture transitions, including a more sedentary lifestyle, the development of city-states and ultimately the appearance of ancient and more recent civilizations. While these new societal structures and civilizations were not involved in the transitions to agriculture, they were one of the most significant outcomes. Agriculture was a necessary condition for the development of civilizations such as Sumer, Assur, Akkad and Babylon in Mesopotamia and the Olmecs, Mayas and Mexicans in Mesoamerica.”

“Nevertheless, the specific causes and conditions of these transitions from hunting-gathering to agriculture remain difficult to ascertain, in part because the biological, climatic, economic and social circumstances that surrounded the transitions differed in the various regions of agricultural origins. The plant (or animal) characteristics (such as its genome attributes, life history and reproductive system), the environment (including its climate and biological interactions with pollinators, herbivores and microbes) and human factors (for example, cultural advancement such as plant and animal knowledge and tools) varied markedly. This is illustrated by the contrasting crops that were the founder domesticates in their respective regions. These included annual herbaceous crops such

as cereals (wheat, barley), grain legumes (chickpea, lentil, pea) and flax in the Fertile Crescent, as a consequence of the Mediterranean climate; perennial herbaceous plants such as bananas and sugarcane in south-east Asia; and perennial lignified plants such cacao, peach palm and cassava in the Amazon. It is, therefore, not a surprise that the transitions from hunting-gathering to agriculture followed different trajectories in different regions of the world.”

“The dispersed domestication origin across the Fertile Crescent (...) is part of the current paradigm of the origin of agriculture, which posits a slow progression from hunting-gathering to agriculture with limited human agency, in which crop domestication would have happened as (...) ‘an unguided, unintended and mostly unconscious development’, a sort of ‘immaculate domestication’ (...). Instead, Abbo and Gopher argue that this paradigm ignores the significant knowledge accumulated by hunter-gatherers about their environment, including the life history, uses and adaptation of plants that surrounded them. Such knowledge was essential for their thrift and is still present among hunter-gatherers today.”

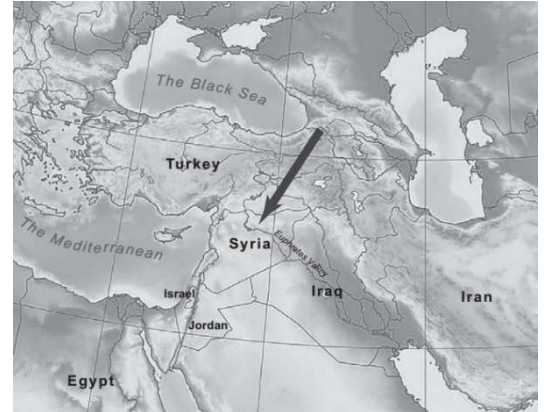
“Abbo and Gopher argue that the transition to agriculture resulted from the hunter-gatherers’ awareness of plant (and animal) characteristics, which drove their intentionality and conscious selection of domesticated plants (and animals). They further posit a significant change in attitude towards the natural world on the part of hunter-gatherers, immediately preceding the transition to agriculture: from one that used natural resources to one that – through the acts of planting and domestication – created and exploited resources, which perdures to this day although in a markedly intensified way, with all the health and environmental consequences thereof.”

“Plant domestication in the Near East occurred some 10,500 years ago, during the Neolithic period (...). The Near Eastern founder crops (...) were barley, two wheat species, pea, lentil, chickpea, bitter vetch and flax (...). These crops are still in use, providing a significant part of the agricultural produce used to feed both humans and livestock. Considering the animals that were domesticated at the same time – goats, sheep, cattle and pigs – it is easy to see that some of the prominent food products consumed worldwide to this very day were, in fact, singled out 10,500 years ago and adopted as part of the Agricultural Revolution.”

“... agricultural revolutions also occurred independently in other world regions, where other crop plants were adopted, including cereals (e.g., rice, maize), legumes (e.g., soy bean, common bean) and species from other plant families (Solanaceae, Cucurbitaceae, Compositae, Malvaceae), according to the wild species repertoire of each region (e.g., potato, pumpkin, sunflower, cotton respectively). We are in awe of the creativity and vision of Neolithic societies and their striking capability worldwide to find useful plant and animal species suitable for domestication as well as their adeptness in applying the delicate and sophisticated decision making that was required for domestication. Despite typical challenges in the early days of agriculture, this was a highly successful system, as attested by its global sweep, and to date it underlies the socio-economic organization of most human societies. In fact, it is rather difficult to find an inhabited region anywhere in the world today that is devoid of agriculture.”

“Any discussion of plant domestication is multifaceted and complex (...) The first question to ask (...) is whether or not there was a core area (within the Near East) in which plants were first domesticated and from which they spread, and if such an area did exist, where it was located. We respond positively to the first question, and determine, based on available data, that this area was located in south-eastern Turkey and northern Syria. Accordingly, we maintain:

- that founder crops were domesticated in a single episode;
- that this single episode was led by a specific set of considerations (e.g., cultural, economic, agronomic, nutritional);
- and that these considerations, in turn, affected other aspects of the process, such as pace (was it rapid or slow?); or consciousness (were the actions of the domesticators deliberate?); or knowledge (was the process knowledge-based and pre-planned, or was it an accidental by-product of human behaviour?).”



“We show the place of the Agricultural Revolution on a long continuum of revolutions (or transformations) from ancient to modern times, including ‘man the tool-maker’, the emergence of agriculture, the rise of city-states or urban centres, the Industrial Revolution and the Digital (computerized, virtual, information/communication technology) Revolution that is still unfolding around us. We introduce plant domestication in the broad context of domestications that build a picture of cultural change, through which humans from the very earliest times came to appropriate, dominate and regulate the world’s natural resources – a time, for example, when they came to control stone and fire, domesticate plants and animals (the Agricultural Revolution), manage water (dig wells and irrigate farm land with canals), manipulate clay (vessel making) and metal (copper and iron making) and possibly even domesticate and discipline themselves and their own species.”

“The establishment of farming communities was accompanied by massive changes in human culture and worldviews, marking the end of some three million years of Paleolithic human existence and perceptions. The new world, the Neolithic world, was distinguished by its large sedentary populations dwelling in permanent sites, a new economy that was based on food production, and a new, more complex and less egalitarian (ranked and later stratified) social organization, to name but a few of the characteristics of this new era.”

*Paul Gepts, preface to Shahal Abbo, Avi Gopher (2022): Plant Domestication and the Origins of Agriculture in the Ancient Near East, Cambridge University Press.*

“A ‘Push’ Model involves conditions that limited the predictability or availability of key food resources. This could be climate or social change, for examples. In the Push models, agriculture began as a sort of coping mechanism - a way to ensure food availability.”

A ‘Pull’ Model involves people becoming reliant on specific resources (like wheat in the Near East). People would use more and more of abundant resources until they became totally reliant on those

resources. The model is labelled 'pull' because the abundance of resources drew people (or 'pulled' them) towards using the resources more and more for subsistence.

Models can also be External or Internal. External models involve external factors outside the group (like climate) that forced a change. Internal models involve factors inside a group (like culture) that led to the transition to agriculture."

"In a 2010 paper by Dorian Fuller and others titled 'Domestication as innovation: the entanglement of techniques, technology and chance in the domestication of cereal crops,' we see the hybrid of a Push and a Pull Model. This paper proposes a nuanced interplay between human behavior and biology. Domestication proved to be a trap with unintended consequences to intensification of agriculture. The organization of labor 'trapped' labor and caused such technologies and practices as sedentism, tilling, and irrigation. Genetic changes (from domestication) became entangled with behavioral changes (associated with cultivation) and soon the two were inseparable. This theory is interesting as it does not put agriculture as a practice on a pedestal, a tenant of civilization."

<https://cultureandcereal.blogspot.com/2012/11/push-and-pull.html>

Plant exploitative activity	Ecological effects (selected examples)	Food-yielding system	Socio-economic trends	Time
Burning vegetation	Reduction of competition; accelerated recycling of mineral nutrients; stimulation of asexual reproduction; selection for annual or ephemeral habit; synchronization of fruiting	WILD PLANT-FOOD PROCUREMENT (foraging)	Increasing sedentism (settlement size, density, and duration of occupation)	↓
Gathering/collecting Protective tending	Casual dispersal of propagules Reduction of competition; local soil disturbance	WILD PLANT-FOOD PRODUCTION with minimal tillage		
Replacement planting/sowing Transplanting/sowing Weeding Harvesting	Maintenance of plant population in the wild Dispersal of propagules to new habitats Reduction of competition; soil modification Selection for dispersal mechanisms: positive and negative		CULTIVATION with systematic tillage	
Storage Draining/irrigation	Selection and redistribution of propagules Enhancement of productivity; soil modification	AGRICULTURE (farming)		
Land clearance	Transformation of vegetation composition and structure		Evolutionary differentiation of agricultural systems	
Systematic soil tillage	Modification of soil texture, structure, and fertility			
Propagation of genotypic and phenotypic variants: DOMESTICATION Cultivation of domesticated crops (cultivars)	Establishment of agro-ecosystems			

Fig. 1.11. (above) Evolutionary sequence describing the development of farming and domestication from foraging; each of the stages on the left represents a significant increase in energy investment (after Harris, 1989: fig. 1.1)

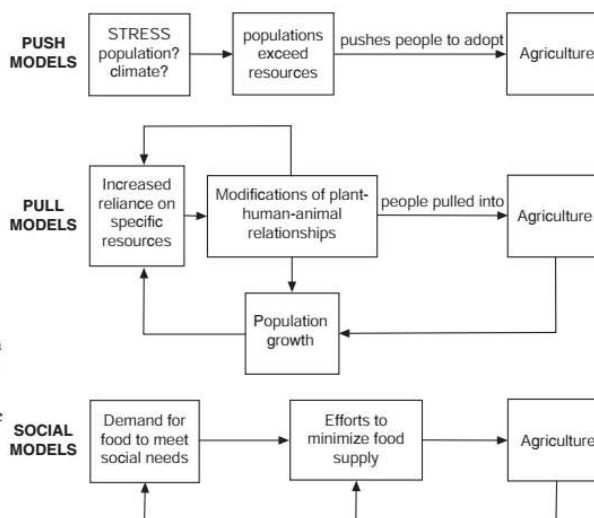


Fig. 1.12. (right) Schematic representation of the general arguments underlying 'push', 'pull', and 'social' models of the transition to agriculture (after Bogucki, 1999a: fig. 21.4, adapted from Stark, 1986)

Graeme Barker (2006): *The Agricultural Revolution in Prehistory. Why did Foragers become Farmers?*, Oxford University Press.

“Why Didn’t Agriculture Develop in Japan? (...) The Jomon era represents more than 12,000 years of the Japanese past. It opened in the waning days of the Pleistocene and persisted as a continuous cultural entity until after 400B.C (...) The common archaeological perception in Japan and elsewhere has been that although Jomon cultures had some remarkable complexities—notably large sedentary communities and very early ceramic tradition—they rested on a foraging base that persisted until wet rice agriculture spread from continental Asia into the Japanese archipelago during the Yayoi period after about 2500 B.P. The very long persistence of foraging lifestyles has made Jomon cultures seem irrelevant to one of the most important points of discussion in modern archaeology, the processes that gave rise to agriculture (...) Evidence that Jomon communities possessed intellectual and practical skills of food production raises the question of why agricultural lifestyles did not originate in Japan and only became dominant there after mature rice farming spread into the archipelago.”

“Virtually all attempts to explain the origins of agriculture start with an assumption that it is a human achievement. Grand theories have cast agriculture as a cognitive breakthrough (...), as a cultural revolution (...), or as the realization of human potential (...). Even recent discussions of how and why agriculture began emphasize human motivation (...) Human cultural and cognitive ability certainly supported the development of agriculture, but they cannot explain how domestication began.

Niche constriction theory offers an approach to explaining how and why agriculture began without dependence on human volition. Niche construction refers to the active, complex, and formative interactions organisms maintain with their surroundings (...) Recognition that organisms change their environments is an established part of ecological thinking (...), but niche construction goes a step farther. It focuses on adaptations organisms make to environmental modifications they have caused. In essence, it considers how organisms influence their own fitness. By focusing on underappreciated consequences of these activities, niche construction theorists have extended the well-established dual-inheritance model of cultural evolution (Boyd and Richerson 1985) to a ‘triple-inheritance’ approach. That is, in addition to cultural and genetic inheritance, ecological modifications that species cause and pass on contribute to their own biosocial evolution (...) Simply put, niche construction posits that organisms that actively, regularly, and specifically alter their environment in ways that enhance their short-term fitness will influence their own evolutionary future.”

“Jomon Japan is not counted among the areas where agriculture developed, although the richness of the Jomon record and the complexity of Jomon ecological adjustment casts that simple assertion into question (...) Still, the evidence of dogs and pigs indicates that Jomon people understood the benefits and mechanics of animal domestication (...) In fact, the evidence of active and expert Jomon involvement in plant and animal communities is so clear that it neatly frames the basic question of agricultural origins. Why did some cultures become agriculturally based while others did not?

The niche construction perspective is easily applied to the Jomon era since there is ample evidence that Jomon folks changed their environment in ways that impacted their own fitness—or at least supported their subsistence activities (...) They altered the growth and reproduction of plants and animals in ways that increased their abundance. And they developed effective harvesting and processing equipment that allowed them to thrive in the environment they had created. The Jomon

era is an especially well-documented example of a constructed niche, but comparably ‘domesticated landscapes’ have been described in other parts of the world.”

“Using niche construction theory to focus on the human role in the creation of these environments offers a means of understanding their development, but it cannot explain the origins of agriculture. Jomon Japan shows that sensitive, expert, and extensive human investment in natural systems was not sufficient to result in agriculture. A better use of niche construction is to consider how non-human species interacted with—and shaped—human environmental adjustments. Agriculture has two sides, cultivators and cultigens. What Jomon Japan lacked was not human endeavor but species that could respond to human manipulation in ways that encouraged increased investment.”

“Domesticates are plants and animals that are fit for human management. They are not common since, as Diamond (...) shows, a handful of species support the world’s population. Their fitness has two sides (...). First of all, domesticates must be able to live with people. This excludes species that are overly aggressive, that require large spaces or isolation, or that do not deal well with human company (...) Beyond survival together with people, successful domesticates must also be able to outcompete other species that attract human attention (...) Species that responded to human interaction with increased abundance of sustenance or some other vital resource could draw people away from other pursuits and into activities that supported their own survival.”

“Niche construction can help understand how agricultural systems originated by exposing the factors that allowed successful domesticates to enter and thrive in the human niche. In that sense, agriculture is an ecological niche operated by people, but was ‘constructed’—at least partially and initially—by species that interacted with humans. **Agriculture grew as successful domesticates directed human effort toward themselves and away from other resources.** Agriculture did not develop in Japan because no Japanese species were able to so command the attention of Jomon communities that they stopped fishing, hunting, and harvesting other resources that were available to them. Given its wonderful archaeological record, Jomon Japan is a good place to observe how hunter-gatherers could engineer ecosystems (...). It also presents evidence about why and how the hunter-gatherer lifestyle could flourish without agriculture.”

“The Jomon example shows that, by itself, intensive, assertive, and deliberate human supervision of other species does not explain the origins of the kind of agriculture that expanded across much of the world in Holocene times. The Japanese case indicates that an important part of understanding the development of vigorous agricultural systems is recognizing that some species had qualities that so attracted human investment that people became committed to their survival.”

Peter Bleed; Akira Matsui (2010): “Why Didn’t Agriculture Develop in Japan? A Consideration of Jomon Ecological Style, Niche Construction, and the Origins of Domestication”, *Journal of Archaeological Method and Theory* 17(4), 356-370.

## 2. Complejidad cultural en las sociedades de cazadores-recolectores

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“... the traditional dichotomy of forager versus farmer has little significance with regard to the organizational development of human society—that means of subsistence do not dictate levels of cultural complexity.”

“The archaeology of hunter-gatherers has generally relied on rather simplistic models to describe preagricultural adaptations. This perspective is perhaps best summed up by Richard Lee and Irven DeVore (1968:11) (...): “We make two assumptions about hunters and gatherers: (1) they live in small groups, and (2) they move around a lot.” (...) We continue to read the archaeological record of pre-farming groups as one represented by small, ephemeral encampments occupied by a few people eating, sleeping, scraping hides, and only occasionally reproducing.” p. 3

“Hunter-gatherers surviving to the ethnographic present do so in the most marginal areas of the planet. We have depended too heavily on those groups in peripheral regions that have survived only by the grace of distance from arable land. Complexity is not a phenomenon limited to societies of advanced agriculturalists.” p. 4

“It would seem obvious that complex foraging adaptations did not appear everywhere—they are situational; certain conditions are necessary for intensification to occur. Three factors appear to be common among complex hunter-gathers: societal circumscription, abundant resources, and higher population (...) Circumscription is significant because mobility is constrained, solutions to situations of stress cannot be sought by emigration, and internal means for resolving problems must be developed. In one sense, complexity arises as a solution to the problems of reduced mobility.” p. 8

“From our perspective, the effects of population growth cannot be dismissed as a major condition for change in society. Population growth in the context of circumscribed but relatively abundant environments leads to a reduction in available resource area and an imbalance between population and resources (...) This imbalance is likely involved in the intensification of productivity, a reduction in mobility, and an increase in territorial demarcation (...) Continued population growth contributes to larger communities and larger societal population. In essence, the population-resource imbalance sets the stage for a series of options for intensification. However, population numbers or densities should not be regarded in terms of an absolute constant or threshold value. We cannot specify the number of people, abundance of environment, or degree of circumscription that is necessary and sufficient for intensification to appear. Population growth per se cannot and does not cause intensification. Population growth as a process does not directly modify behavior or activity. Greater numbers of people create, not eliminate, problems. Stress in human adaptation is resolved by changes in human behavior. It is more useful to consider the factors of environment, population, and circumscription—all notably difficult to define—as conditions under which more complex adaptations may emerge.” p. 10

“Differentiation becomes more pronounced as group size and diversity increases (...) The position of decision making, essential in larger groups (...), must be imbued with authority (...) Status differential and inequality offer a means for such designation of authority. Egalitarian relations are

not a uniform characteristic of hunter-gatherer society. The seeds of status differentiation are present in all groups of hunter-gatherers (...) Harmony and equality may be more a romantic figment of the ethnographers' imaginations. Dominance behaviors are prevalent in many species of animals, including the higher primates. Although suppressed for the good of the whole in small groups, this behavior comes to the fore as a mechanism for assigning authority and decision making to individuals in a larger group. From this perspective the origins of hereditary inequality—one of the 'thorniest questions in cultural evolution' (Flannery 1972:401)—becomes a nonproblem. Constraints may be released and dominance behaviors promoted for the establishment of positions of authority and high status. Inheritance is a straightforward, if risky, means for designating new leaders and avoiding conflict." p. 12

"Environmental causality is frequently discussed in terms of the end of the Pleistocene and major climatic change. Deleterious changes in climate and resources at that time are assumed to require an intensification in food procurement that results in domestication (...) However, since examples of intensification among foragers occur both before and after the close of the Pleistocene and appear in a wide range of environments (...) environmental factors seem to be less a cause and more a condition of intensification.

Cohen (1977) and Harris (1977) provide lucid arguments for the importance of demography and population in causal explanations of increasing complexity. Cohen offers a general examination of the cultural changes observed around the close of the Pleistocene, arguing that gradual growth is an inherent characteristic of human population. On a broad canvas, this tendency is traced through the course of prehistory. By the end of the Middle Paleolithic, around 40,000 years ago, virtually all of the inhabitable areas of the Old World were occupied. Subsequent migrations to insular Asia, Australia, and the New World took place, but by the end of the Pleistocene, human population had spread over the entire planet and population growth continued. It is at this time that new adaptive strategies began to manifest themselves in the form of intensified food collection or production. Both strategies have the same goal: to increase the yield per unit of land." p. 13

"Bender (...) has argued that environmental, technological, or demographic causes are dependent on social relations (...) Demographic pressure is only perceived when the social structure is under threat. Bender argues that it is the alliances that maintain social relations that generate demands for increased production (...) Causes of change are argued to be internal to the society rather than imposed from the outside. Production for use by the domestic household (...) characterizes hunter—gatherers. Surplus production is generated to cover social obligations such as those of marriage and ceremonial or exchange alliances. Individuals within alliance networks can make demands on production as a result of competition. 'Ultimately it is social relations that articulate society and set the evolutionary pattern' (...) Such approaches are posed in opposition to systemic technoecological or demographic perspectives, which are said to ignore internal causes and the significance of social relations (...) Clearly, no consensus has been reached with regard to the causes of increasing complexity. Demographic, ecological, and structural perspectives have attractive elements." p. 15

“Archaeologists tend to agree that it is always easier to explain stability than it is to account for change, but they differ in fundamental ways about how to account for change.” p. 427

“One thing still troubles me about the discussions on intensification, and my concern applies equally to intensification among hunter—gatherers and farmers. It has to do with the assumption that increased efforts at improving facilities, techniques, crops, and the like have anything directly to do with increased production, especially of food. There are situations in which hunter—gatherers and farmers apply increased inputs of labor in order to ensure sufficient amounts of key ‘crops’ to make it through stressful periods. In the long run, we would expect such intensive behavior to produce greater amounts of food, since any behavior that eliminates or mitigates the effects of a limiting factor can be expected to lead to such long-term results. But what we are really seeing is risk-minimizing behavior, in which the concern is for more immediate results that will safeguard the wild or cultivated crops that already exist. Sweet-potato cultivators in highland New Guinea (...) who elevate their crops on artificial mounds to avoid damaging pockets of frost or Scandinavian farmers who practice elaborate and labor-intensive field drainage to reduce soil moisture and the consequent danger of supercooling during summer frost (...) are examples of what I mean.” pp. 430-431

“The real question then is: When and under what circumstances do hunter-gatherer societies change from food- and resource sharing (‘social capital’) to aggrandizive storage of food and resources (‘money in the bank’)?” p. 432

“... the theme of mobility versus sedentism (...) may well emerge as the most promising archaeological signature of hunter-gatherer intensification. Hayden, the Eldridges, and Cannon regard increased sedentism and stability of settlement, in the form of large pithouse clusters, as the hallmark of possible stratified communities of hunter—gatherers on the interior plateau of British Columbia (...) Above all, we need to guard against the assumption that such trends as nucleation and sedentism are inevitable in the evolution of hunter-gatherer societies. Perhaps the most difficult task we face is that of considering conditions as they must have appeared to hunter-gatherers who were actually in the process of intensifying their food-getting behavior and nucleating into larger and more stable settlements without the benefit of over 10,000 years of hindsight based on increasingly expanding agriculture. This is the only way we can replace the ‘just-so’ stories of recent archaeological parlance that say ‘Now let’s invent agriculture. . .’ with empirical examinations that break this barrier of ethnocentric assumptions.” p. 432-433

“This volume—along with *Affluent Foragers*, edited by Koyama and Thomas (1982)—musters an impressive list of case studies in support of the thesis that cultural complexity has arisen among hunting and gathering economies as part of a regular evolutionary process. These groups are not idiosyncratic but are part of a worldwide phenomenon. The image of the prototypic foraging society as a monolithically simple entity has been steadily undermined by the discovery of one contrary example after another in the last decade.” p. 435

“Hunter-gatherer economies are no longer regarded as self-limiting (...) To the contrary, many today argue that the transition toward reliance on domesticated food sources is a by-product of the very successes of complex hunting and gathering (...) Within this volume, individual chapters promote

the notion that hunter-gatherers as an economic type incorporate a wide range of more complex behaviors and, moreover, that this range broadly overlaps agricultural economies (...) Complexity among hunter-gatherers is recognized in this volume by a variety of indicators: population density, maximum settlement size, permanent shelter, permanent ceremonial grounds, art styles, and differences in burials due to grave wealth, location, and the energy invested in grave preparation. Through the use of these indicators, evidence for complexity has been discovered where it previously was unknown.” p. 437

“Cultural complexity in one sense is a response to the problems resulting from decreased mobility. Continual movement among foraging groups is responsible for the maintenance of certain archtypical features of primeval hunter-gatherer adaptations. Decreased mobility retards flexible response to stress and engages more institutional structures as essential solutions. Although the rewards of settled life often have been regarded as adequate compensation for the loss of mobility, there is no inherent benefit to sedentism per se (...) Binford argues (...) that sedentism is a response to increasing intergroup competition and conflict.” p. 437-438

“The millennia that it took for sedentary settlement systems to become completely established in certain areas necessitates rethinking the processes by which such changes took place. Examples abound. Ames (...) calculates that sedentism emerged over 1500 to 5000 years on the Northwest Coast of North America. Brown (...) finds that sedentism took 7000 years to become complete in the drainage of the Mississippi River.” p. 438

“... no one single factor is responsible for the rise of cultural complexity (...) Increased complexity appears in too many diverse and historically unconnected places to be a result of a single factor. The concept of complexity combines elements of size, scale, and organization that cannot be encompassed by unitary phenomenon. Prime movers have become obsolete along with the trend toward downplaying linear evolutionary typologies.” p. 439

“Gould (...) noted the conspicuous presence of distinctly different explanatory perspectives. He distinguished what he called the adaptational and the transformational views of cultural change. The former refers to the posture that dominated the cultural ecological perspectives of Steward (1955) and his successors. Factors such as ecology or environment—external to the cultural system—are emphasized. The transformational explanations, on the other hand, emphasize internal changes.” p. 439

T. Douglas Price; James A. Brown (1985): *Prehistoric Hunter-Gatherers. The Emergence of Cultural Complexity*, Academic Press.

### 3. El auge de occidente

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“To get from Europe 1 AD to modernity, while paying reasonable attention to the many accidents along the way, there are really only two possible narrative genres.

The first is the *rock falling down a mountain*. It starts with one big, random event. This then triggers other events, and they trigger others, and now you have an unstoppable landslide. But the chance is at the start.

The second is the *cyclist pushing his bike up a mountain*. It takes an actor who deliberately over time overcomes one obstacle and dodges another, until eventually they get to the top, and from there it's a downhill ride.”

“Here is one difference between a bicycle push and a landslide: once started, landslides always keep going (...) The bicycle push uphill is different. If you stop pushing, you might stop moving.”

“WEIRD [‘People from Western, Educated, Industrialized, Rich and Democratic societies’] belongs firmly in the landslide genre. The big event is the Marriage and Family Program of the Western Church. This sets off a landslide, which the later chapters detail: the decline of kin institutions, the rise of Italian communes and city-states in the middle ages, the idea of individual rights in the European law merchant, the development of Protestantism, and finally the trifecta of science, commerce and democracy. WEIRD psychology is there, as an unobserved helper, for each stage of this journey, but each stage also builds on the previous ones.”

<https://wyclif.substack.com/p/book-review-the-weirdest-people-in>

“Diamond's approach is of the ‘rock falling down a mountain’ genre. It's much more likely that one big factor favored Eurasia, rather than lots of little things just happened to go their way time and time again.” **agp**

“One problem I have with Diamond's theory is that I doubt that there is anything for it to explain. The Americas and Eurasia/Africa were essentially isolated from each other for about 15,000 years. In 1500 AD, the Americas were roughly 3500 years less advanced than Eurasia/Africa. That seems well within the random variation one would expect between two isolated instances of human cultural development over a 15,000 year time span. If you think there is still some remaining indication that the Americas were disadvantaged, the fact that the Americas are about half the size of Eurasia/Africa seems like a sufficient explanation.” **Radford Neal**

<https://www.lesswrong.com/posts/YwMaAuLJDkhazA9Cs/ten-thousand-years-of-solitude>

“Many academics cherish an irritating myth: that Jared Diamond's *Guns, Germs, and Steel* is an error-strewn and racist endorsement of European imperialism (...) But *Guns, Germs, and Steel*—which is explicitly anti-racist— (...) tries to explain ‘why history unfold[ed] differently on different continents’ with answers that don't ‘involve human racial differences’. Geography is just dumb luck. Diamond

doesn't believe in any innate European 'superiority': the opening passages of the book actually suggest that New Guineans might be smarter than Western readers!"

"Diamond attempts to answer 'Yali's question', the crown jewel of the social sciences: what explains the enormous international inequalities in technology, wealth, and power that persist in today's world? In 2020, to illustrate, GDP per capita was \$59,920 in the US, \$14,064 in Brazil, and just \$936 in the Central African Republic. The official languages of these countries are English, Portuguese, and French—the languages of their colonial conquerors."

[“Yali's question is the famous inquiry posed by a Papua New Guinean man named Yali to anthropologist Jared Diamond in 1974: ‘Why is it that you white people developed so much cargo, but we black people had little cargo of our own?’. The term ‘cargo’ refers to the material goods, technology, and wealth that Europeans brought to New Guinea.” **Google**]

“Diamond's explanation is deceptively simple (...) Out of the sites in which agriculture was independently invented—New Guinea, China, the Middle East, North America, Mesoamerica, and the Andes (and more recently, appending North/East Africa and India to the list)—Mesopotamia had the easiest to tame, fastest-growing, and largest-seeded plants. Eurasia in general also had a bunch of large animals, like horses, donkeys, aurochs, sheep, and goats, that could be domesticated for productivity increases. Diamond counted 13 species of domesticable animals over 100 pounds in Eurasia, one in South America, and none whatsoever in the rest of the world. Human hunters killed off the potential candidates in North America and Australasia during the Pleistocene, and the remaining African species, like zebras, onagers, and the African elephant, either proved untameable or difficult to breed in captivity.

Eurasia's east-west supercontinental orientation facilitated the relatively rapid diffusion of 'technologies' to its poles, whereas traversing vertically-oriented continents like Africa and the Americas required innovations to pass through new ecological zones at different latitudes (rainforests, deserts, pampas, etc.). Further, these continents contained chokepoints (i.e. the isthmus of Panama) and outright 'ecological barriers' in which agriculture was unsuitable. 'As a result,' writes Diamond, 'there was no diffusion of domestic animals, writing, or political entities, and limited or slow diffusion of crops and technology, between the New World centers of Mesoamerica, the eastern United States, and the Andes and Amazonia'. Similar story in Africa. But in Eurasia, Mesopotamian plants, animals, and agricultural techniques reached the Mediterranean by the first millennium BC and Europe by the first millennium AD.

Concentrations of domesticable plants and animals permitted the accumulation of food surpluses, which in turn allowed societies to support members working outside agriculture. This meant craftsmen and scribes, whose labors accelerated technological progress, as well as priests, kings, and bureaucrats, who created hierarchies and states. Food surpluses also permitted more dense settlements, with the result that Eurasia received the bulk of the world's population and the majority of the inventions. Combine high population density, proximity to animals, and long-range trade networks, and one also gets the devastatingly toxic Eurasian disease pool—smallpox, influenza, measles, etc. Eurasians developed immunity to many pathogens, but the Americas, excluded from the periodically devastating plagues, did not. Thus guns, germs, (writing,) (states,) and steel.

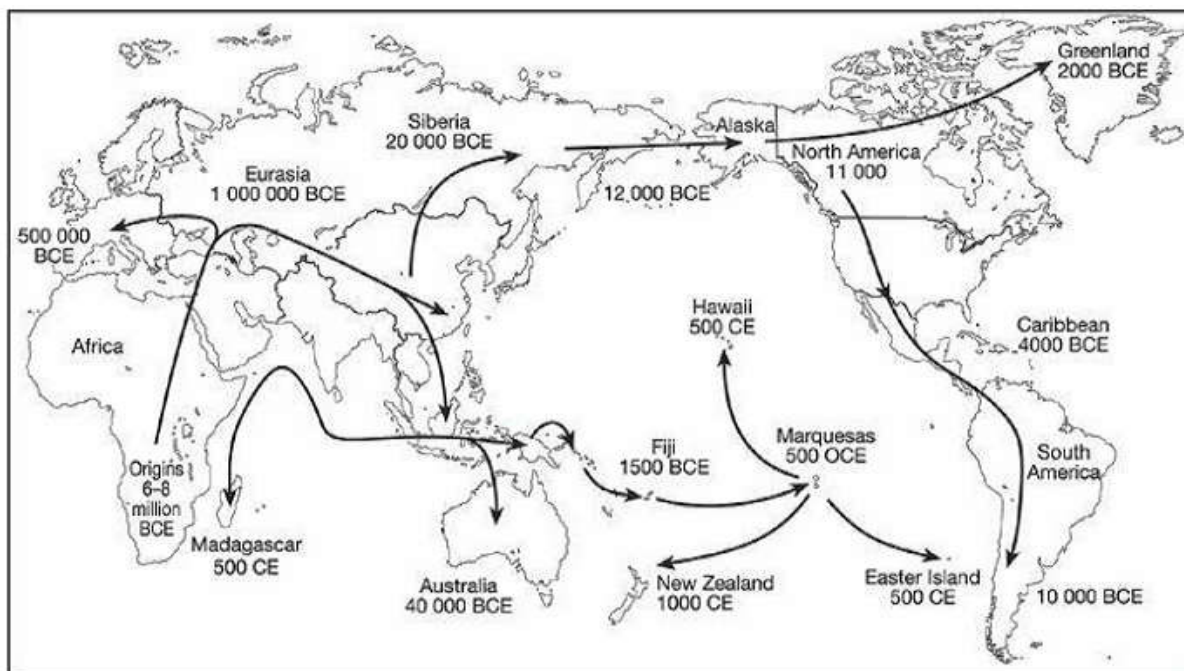
Thus Diamond argues that the early European colonists of the Americas hit unprepared native societies like a whirlwind. Deadly plagues ripped ahead of the conquistadors, who then toppled the already-weakened American polities via brutal conquest and massacre, aided by local allies. Africa was harder to seize, in part thanks to its links with the Eurasian disease pool via southern Asia. But the 'technological and political differences of A.D. 1500 were the immediate cause of the modern world's inequalities. Empires with steel weapons were able to conquer or exterminate tribes with weapons of stone and wood.'

Diamond also attempts to explain why European, rather than Chinese, conquerors were the ones who did all the colonizing. This is a simple balkanization theory—Europe divided into many areas conducive to states, China formed a great homogenous core—that does not need lengthy restatement. Europe has a highly indented coastline with multiple large peninsulas, all of which developed independent languages, ethnic groups, and governments, plus two large islands. The Chinese heartland, meanwhile, is connected by two large river valleys—the Yangtze and Yellow Rivers—from east to west, and bound from north to south by relatively easy transit between those two tributaries. Europe, consequently, boasts many independent core regions that have been impossible to unify, even under the Romans; China has only been politically fragmented for (relatively) brief spells since 221 B.C. Consequently, Europe received the benefits of interstate competition for power (rise of the fiscal-military state), entrepreneurs, and inventors; China's rule by single autocrats left it vulnerable to lock-in on bad decision paths."

<https://blog.daviskedrosky.com/p/jared-diamond-a-reply-to-his-critics>

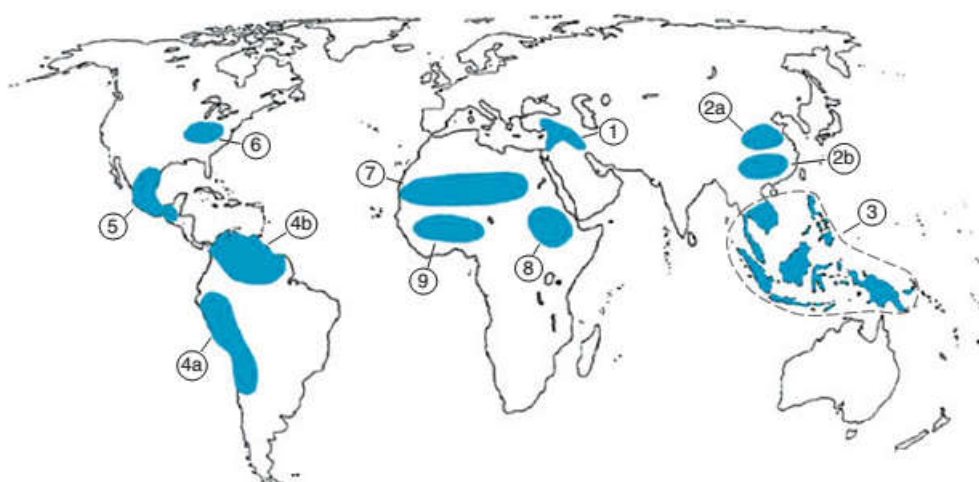
## 1. Intensificación de la interdependencia global (globalización) en el largo plazo

• **Período 1: conquista territorial del planeta.** La especie humana se expande por el planeta. La migración es la fuerza impulsora de la conquista global de la tierra. La economía única era de tipo cazador-recolector.



*Early human migrations, Steger (2013, p. 39)*

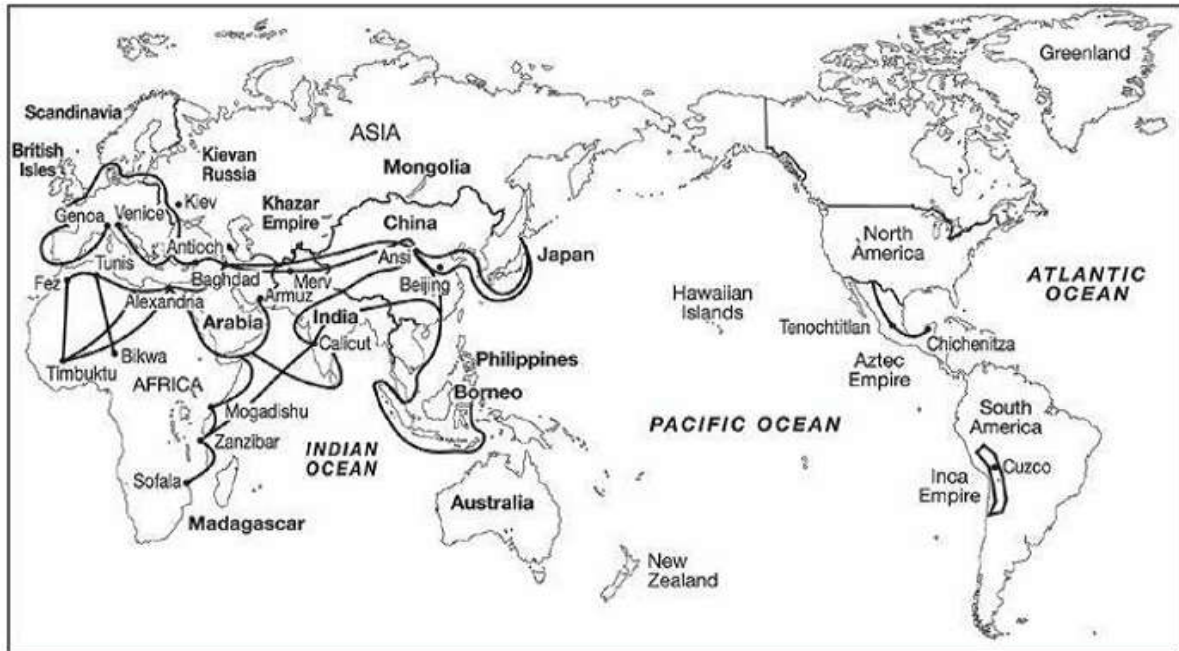
• **Período 2: globalización antigua.** Asociada con la revolución agrícola (que tardó milenios en desarrollarse). Las sociedades recolectoras de alimentos pasan a ser sociedades productoras de alimentos. Las civilizaciones agrarias se enfocaban en la expansión política, no en el desarrollo económico. Difusión tecnológica lenta. Principal problema ambiental: mantener el suelo rico en nutrientes.



*Centres of origin of agriculture.*  
1 Middle East; 2a northern China; 2b southern China; 3 Southeast Asia; 4a South American highlands; 4b South American lowlands; 5 Central America, 6 arid savannas of northern Africa; 7 eastern North America; 8 highlands of Ethiopia; 9 humid savannas of West Africa (K. Martin; J. Sauerborn (2013): *Agroecology*, Springer, p. 17)

• **Período 3: globalización pre-moderna.** Comienza alrededor de 1500, cuando el Viejo y el Nuevo Mundo se conectan. Se asocia con la conquista de los mares: los estados reconquistan el planeta. Globalización de los alimentos. Más redes de comercio global. Difusión tecnológica más rápida. Origen de los estados modernos. Emergencia de hegemonías globales. Capitalismo emergente. La economía global sacudida recurrentemente por ciclos de auge y caída.

- **Período 4: globalización moderna.** Nace alrededor de 1800 con la Revolución Industrial. La industrialización y la democracia representativa se extienden. La expansión de la industrialización se mide en siglos, no en milenios. Edad de los minerales (combustibles fósiles y recursos minerales). Aumento de los flujos de bienes y personas. Rápida innovación tecnológica. Antropoceno: la humanidad altera la trayectoria del planeta. Auge de Occidente y la Gran Divergencia. Origen de un sistema político internacional basado en el Estado. Estados modernos en todas partes: la globalización política ha concluido. Expansión política del centro contra la periferia. Fuerza unificadora de la ciencia. Crecimiento demográfico explosivo.

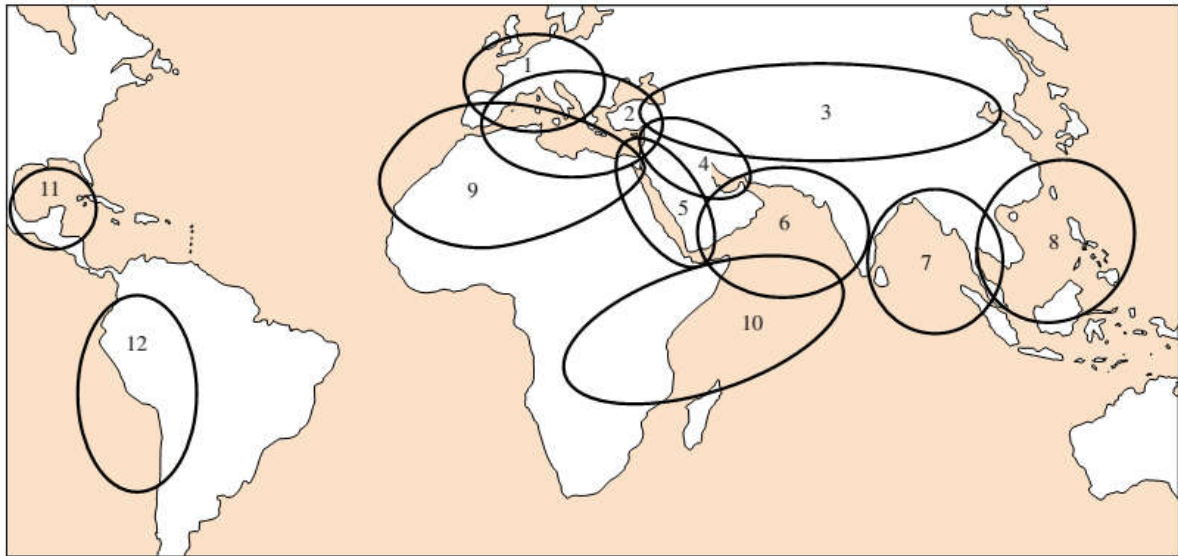


*Major world trade networks, 1000-1450, Steger (2013, p. 44)*

- **Período 5: hiperglobalización.** Iniciada alrededor de 1980, implica la globalización de la información: revolución de las conexiones (ordenador personal, internet, teléfono móvil). Expansión digital. Innovación tecnológica acelerada. Gran aceleración: el período posterior a la Segunda Guerra Mundial hasta la actualidad es el período de la historia de la humanidad con los cambios más rápidos y generalizados (crecimiento económico, uso de recursos, generación de residuos, perturbación del sistema terrestre). Origen de un sistema económico plenamente globalizado (basado en empresas multinacionales). Mercado laboral: el menos integrado globalmente. Auge de las finanzas internacionales. Producción globalizada (subcontratación). Empresas de plataforma, capitalismo de plataforma. Revolución silenciosa: producción a coste marginal cero. Auge del Resto. Monopolios del centro: tecnología, finanzas, explotación de recursos, armas de destrucción masiva y medios de comunicación. Lanzamiento del nuevo capitalismo en la década de 1980 (Samir Amin: capitalismo monopolista generalizado). Debilitamiento del trabajo: ¿está el capital aplastando al trabajo?

- **Período 6: ¿globalización futura?** Podría comenzar en un futuro no muy lejano. Mecanización y automatización: ¿el auge de los robots y el fin del trabajo? ¿Será peligrosa la inteligencia artificial? ¿Desestabilizarán los humanos el sistema terrestre? ¿Gobernanza global o estados nacionales soberanos? ¿Se controlará la desigualdad excesiva? ¿Revolución de las élites o triunfo global de la democracia? ¿El fin de la guerra? ¿Se alcanzará la pacificación social? ¿Se erradicarán los principales

conflictos/tensiones sociales (o sus fuentes)? ¿Cuán sostenible será el crecimiento económico global? ¿Tiene la globalización una fecha de caducidad? Bombardeo demográfico: ¿superpoblación, colapso demográfico, población bajo control? ¿Conquista del espacio o atrapados en la Tierra? (“Todas las civilizaciones se vuelven espaciales o se extinguen”, Carl Sagan (1994): Punto azul pálido: Una visión del futuro humano en el espacio). ¿Cuál es el futuro del estado del bienestar? ¿Cómo se resolverá la escasez de energía? ¿Sobrevivirá el capitalismo a sus fuentes de inestabilidad (finanzas, agotamiento de recursos, cambio climático, contaminación, desigualdades, despoblación)? ¿Se reinventará?



*Regions of the 15th-century world economy, O'Brien and Williams (2016, p. 42)*

O'Brien, Robert; Marc Williams (2016): *Global political economy. Evolution and dynamics*, Palgrave.

Steger, Manfred (2013): *Globalization. A very short introduction*, Oxford University Press.

## 2. ¿Competición histórica entre Europa y Asia?

Goody (2010) afirma que, desde la Revolución Urbana de la Edad de Bronce (que creó la cultura de las ciudades, la ‘civilización’), ha habido una alternancia en el liderazgo del desarrollo material e informativo entre la parte occidental y la oriental del continente euroasiático. La historia no parece respaldar la idea de una ventaja permanente: toda ventaja/dominio/superioridad es temporal.

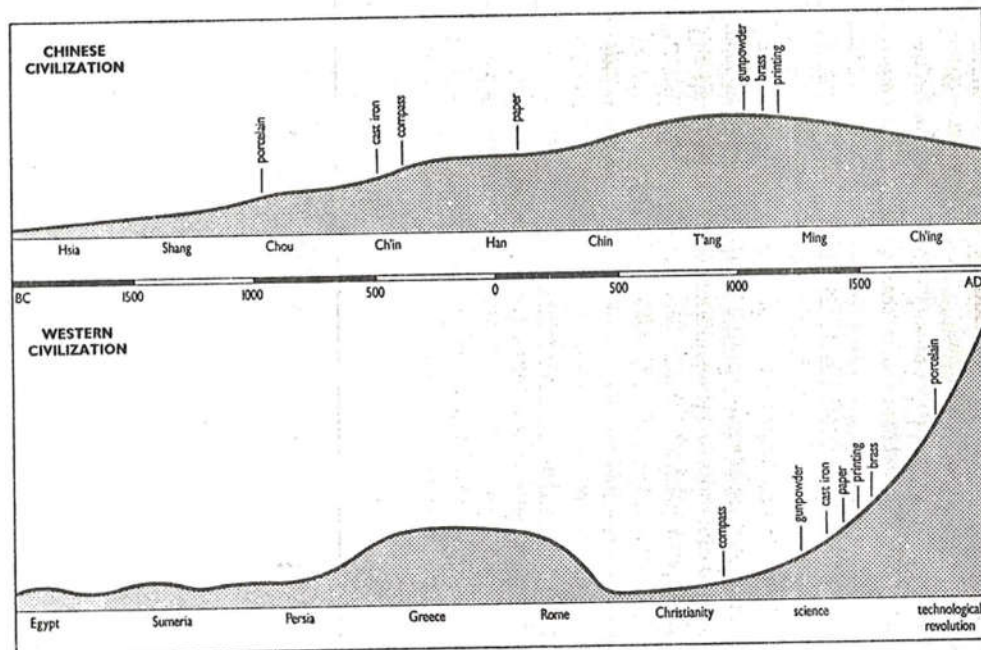
## 3. El milagro euroasiático

Existe una historia común del desarrollo de la civilización entre Oriente y Occidente. El desarrollo no ha sido un fenómeno única ni exclusivamente europeo. El ‘milagro europeo’ (que la Revolución Industrial y el crecimiento sostenido del nivel de vida ocurrieran en Europa) forma parte, en realidad, de un ‘milagro euroasiático’ mayor. No existe una discontinuidad radical en el desarrollo mundial: las sociedades y culturas urbanas de Eurasia experimentaron un desarrollo continuo, mediado en gran medida por la actividad comercial, mercantil y manufacturera. La invención de la escritura aceleró la innovación cultural hacia el establecimiento de una sociedad del conocimiento.

Goody, Jack (2010): *The Eurasian miracle*, Polity Press.

## 4. La Gran Divergencia

Es una expresión que se refiere a la brecha de prosperidad (más o menos evidente tras la Revolución Industrial) entre Occidente (los países de Europa occidental y sus derivados, EE. UU., Canadá, Australia y Nueva Zelanda) y el resto del mundo. Esta divergencia se originó porque los países occidentales entraron antes del actual régimen de

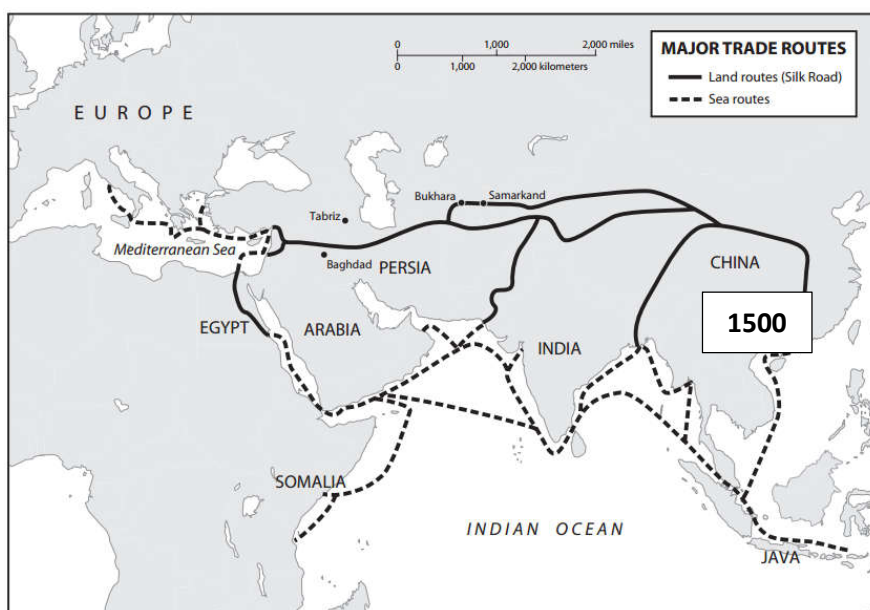


crecimiento económico moderno, en el que el PIB per cápita crece de forma continua, en gran medida gracias a los continuos avances tecnológicos aplicados a los procesos de producción. Una explicación de esta brecha es que Occidente siguió una vía de desarrollo intensiva en capital, mientras que el resto del mundo (en concreto, las economías del este asiático) optó por una vía intensiva en mano de obra. Pomeranz (2000) atribuye esta diferencia a una mera casualidad: el acceso de Occidente a los recursos del Nuevo Mundo. Una interpretación paralela es que los miembros de Occidente tuvieron la oportunidad de globalizar sus economías primero (ventaja del pionero).

*Pomeranz, Kenneth (2000): The great divergence. China, Europe, and the making of the modern world economy, Princeton University Press.*

## 5. Explicaciones de la Gran Divergencia

Explicaciones generales de la Gran Divergencia (estrechamente relacionadas con los llamados determinantes fundamentales del crecimiento: cultura, geografía e instituciones): (i) acceso a los recursos naturales (carbón); (ii) instituciones (aquellas que favorecen la expansión de las actividades de mercado); (iii) papel del Estado (promoción de la industrialización); (iv) ciencia y tecnología (contextos culturales e institucionales que favorecen o dificultan su desarrollo);



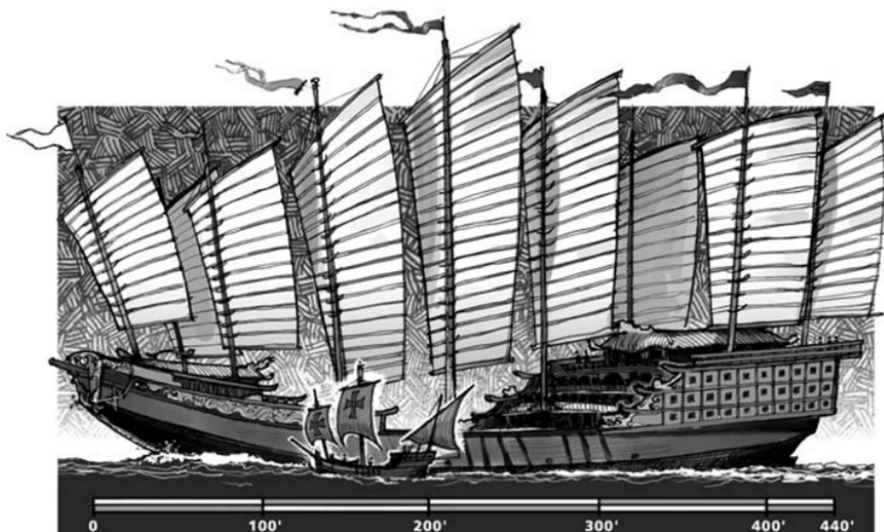
(v) la magnitud del mercado de bienes de consumo (revolución del consumo, Revolución Industrial); (vi) desindustrialización de la periferia (principalmente durante el siglo XIX).

## 6. El auge de Occidente

El auge o el ascenso de Occidente (*the Rise of the West*) se refiere a la preeminencia económica y política alcanzada globalmente por Europa Occidental (y sus colonias británicas) tras (y gracias a) la Revolución Industrial. La Gran Divergencia es la contraparte del ascenso de Occidente: mientras Occidente entraba en el régimen de crecimiento económico moderno (crecimiento sostenido de la renta real), el 'resto' divergía en términos relativos con Occidente en cuanto a niveles de renta. ¿Fue el auge de Occidente (la transición europea del subdesarrollo al desarrollo a través de la Revolución Industrial que estableció la superioridad europea en riqueza y poder en el siglo XIX) en realidad un largo ascenso (que comenzó en la época medieval europea) o una divergencia repentina (y posiblemente accidental) del resto del mundo?

## 7. Visión tradicional del auge de Occidente

Algunas características de la sociedad europea (¿una sociedad singularmente creativa, multipolar e internacionalmente abierta?) finalmente produjeron el auge de la productividad, el progreso tecnológico y el poder militar. Si esta visión es correcta, ¿implica que, para alcanzar el mismo desarrollo que las sociedades europeas/occidentales, el resto de las sociedades deben asemejarse a ellas? ¿Existe una forma esencialmente única de alcanzar el desarrollo y la prosperidad? Si las sociedades europeas tardaron mucho en desarrollarse, ¿las sociedades no occidentales también necesitarán mucho tiempo para alcanzar los niveles occidentales de bienestar material y progreso tecnológico?



La Santa María de Colón (20 m) frente al buque insignia del almirante Zheng He (1371-1433, el 'Colón chino') (138 m x 56 m; en lugar de 138, quizá media entre 61 y 76). Se emprendieron ocho expediciones de carácter más bien diplomático (1405-1433) a los 'Océanos Occidentales': para impresionar y conseguir aliados, consolidar la paz y preservar el poder en el país. El primer viaje contó con 312 barcos y 27.800 hombres.

Bennett Peterson, Barbara (1994): "The Ming Voyages of Cheng Ho (Zheng He), 1371-1433", *The Great Circle* 16(1), 43-51.

Church, Sally K. (2005): "Zheng He: An investigation into the plausibility of 450-ft treasure ships", *Monumenta Serica* 53, 1-43.

Finlay, Robert (1991): "The treasure-ships of Zheng He: Chinese maritime imperialism in the age of discovery", *Terrae Incognitae* 23, 1-12.

Goldstone, Jack A. (2009): *Why Europe? The Rise of the West in world history, 1500-1850*, McGraw-Hill.

## 8. Una visión disidente: la escuela de historiadores globales de California

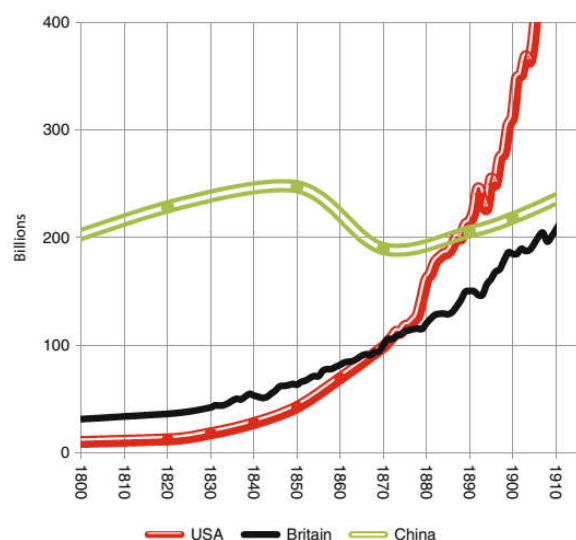
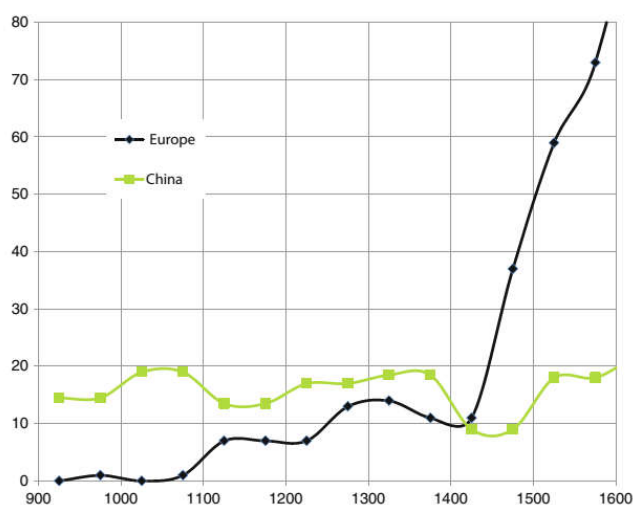
Las economías asiáticas disfrutaron de niveles de productividad y bienestar material similares a los europeos, probablemente hasta 1750-1800. India y China eran potencias manufactureras incluso durante el siglo XVII. El éxito/superioridad europea llegó tarde y rápidamente. Fue el resultado accidental de una abundancia de recursos (la explotación de las Américas) combinada con el declive de las economías asiáticas. Una implicación de esta visión es que las economías no occidentales podrían alcanzar rápidamente el nivel de desarrollo. Evidencia que respalda esta conclusión: Japón y Corea del Sur han logrado alcanzar los niveles occidentales de prosperidad y tecnología; y, en las últimas décadas, China e India (y otras economías asiáticas) han alcanzado tasas de crecimiento mucho mayores que las occidentales.

## 9. El rompecabezas de Joseph Needham (*The Needham puzzle*) Needham)

Si China realizó tantas innovaciones tecnológicas fundamentales (la imprenta, la brújula, la pólvora, el papel), ¿por qué la ciencia moderna no se desarrolló primero en China?

## 10. La Pequeña Divergencia

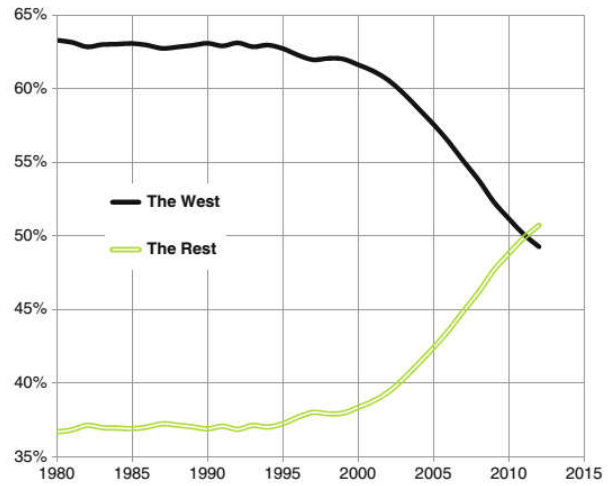
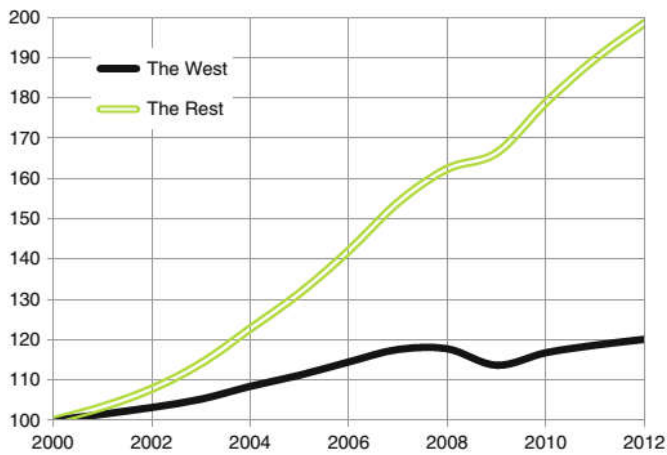
La Pequeña Divergencia es un fenómeno intraeuropeo. Hay una versión más antigua de la divergencia referida a la creciente divergencia económica (durante los siglos XVII y XVIII) entre las economías más dinámicas y expansivas del noroeste de Europa (Holanda, Inglaterra) y las economías comparativamente más estancadas del sur de Europa (Mediterráneo: España, Italia, Francia). Una versión más reciente se asocia con la creciente brecha en el PIB per cápita entre la Europa noroccidental (Atlántica) y la Europa mediterránea y centro-oriental después de aproximadamente 1750. La Pequeña Divergencia representa la divergencia en el desarrollo económico dentro de los países occidentales durante los siglos XIX y principios del XX: un norte europeo más rico frente a un sur europeo más pobre.



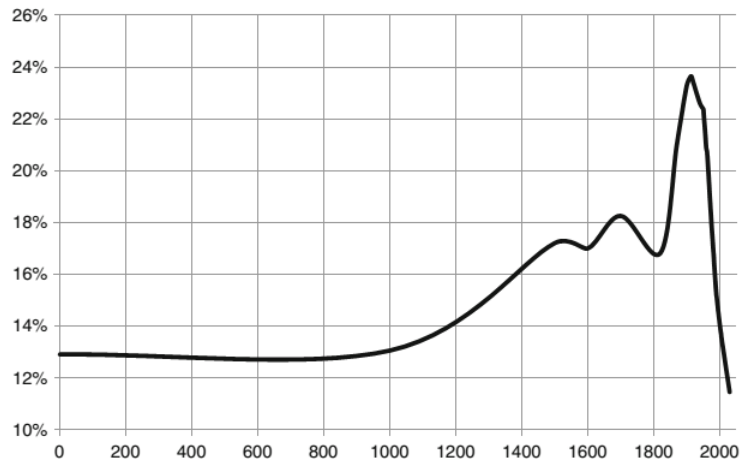
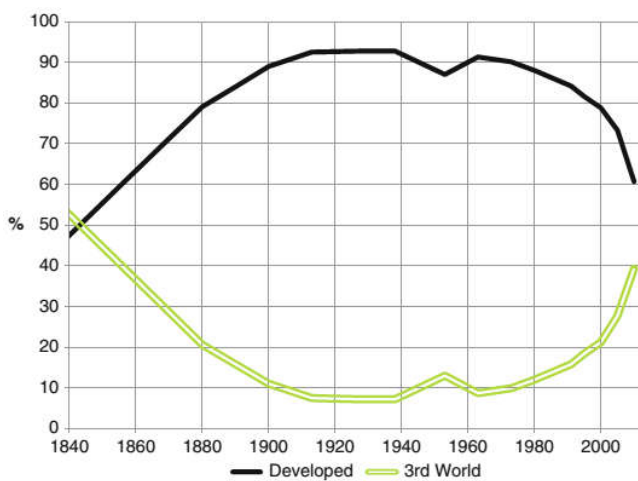
Izquierda: Número de innovaciones científicas y tecnológicas, 900–1600

Grinin y Korotayev (2015, p. 46): *Great Divergence and Great Convergence. A Global Perspective*

Derecha: dinámica del PIB, 1800–1917, Grinin y Korotayev (2015, p. 80)



Izquierda: Dinámica relativa del PIB entre Occidente y el resto, 2000–2012 (2000 = nivel 100)  
 Derecha: Proporción de Occidente y del resto en el PIB global, 1980–2012  
 Grinin y Korotayev (2015, p. 91)



Izquierda: Proporción de Occidente y del resto en la manufactura global, 1840–2010  
 Grinin y Korotayev (2015, p. 94)

Derecha: Proporción de Occidente en la población mundial, Grinin y Korotayev (2015, p. 94)

## 11. Explicando la Gran y la Pequeña Divergencia

Una explicación de la Gran y la Pequeña Divergencia (Davids, 2013) destaca la importancia de la religión como factor clave en el cambio tecnológico, a través de su impacto en: (i) la formación de conocimientos y habilidades; (ii) la circulación del conocimiento; y (iii) la innovación técnica. La Reforma Protestante se considera un evento que promovió el establecimiento y desarrollo de instituciones sociales y políticas favorables al crecimiento económico (mediante incentivos para acumular capital humano, aumentar la oferta laboral y adoptar formas de gobierno más responsables y predecibles).

Cappelen, Ådne (2007): “Convergence, divergence and the Kuznets curve”, en Erik S. Reinert; ed. (2004): *Globalization, economic development and inequality. An alternative perspective*, Edward Elgar, Cheltenham, UK, 309-325.

“Why shouldn’t the Spanish or Ottomans have been able to turn their territorial and trade advantages into a long-run economic advantage? (...) Why did two states that seemed at least as primed for takeoff as, say, England fall behind while Protestant northwestern Europe surged ahead? (...) Underneath the geopolitical expansion of these empires were inherent economic weaknesses traceable to the institutions that propagated political power. It was no coincidence that neither Spain nor the Ottoman Empire experienced a fundamental institutional change akin to those that occurred in Protestant nations. The mechanisms through which the Spanish and Ottoman propagated rule allowed them to ignore the economic elite, and this in turn had a detrimental effect on their long-run economic fortunes (...) The histories of the Spanish and Ottoman Empires provide a telling counter-story to the histories of England and the Dutch Republic. In all four histories, the same message holds: *it matters who propagates political rule.*”

“Ironically, the strength of the Spanish monarchs and Ottoman sultans was the long-run undoing of both of their economies. Because these rulers were so strong, they did not have to bring the economic elite to the bargaining table, and they consequently never enacted the types of laws that facilitate long-run economic growth. This was the key similarity between the Spanish and Ottoman Empires that was not present in early modern England or the Dutch Republic: the Spanish monarch and the Ottoman sultan were too legitimate. In other words, there is some optimal middle ground for a ruler’s legitimacy: a weak ruler will not have people follow him, and the benefits associated with centralized governance will be lost, while a strong ruler does not have to negotiate with the economic elite in order to propagate rule. Early modern Spain and the Ottoman Empire had the latter problem, while the relatively weak (though not too weak) legitimacy of rulers in England and the Dutch Republic fostered a situation that eventually enabled prosperity.”

“In Spain and the Ottoman Empire, a mix of religious authorities, local power brokers, and military elite propagated rule, leaving rulers with little incentive to negotiate with the economic elite. In England and the Dutch Republic, the Reformation provided the death knell to the Church as an agent that could provide religious legitimacy, forcing (in England) the Crown to negotiate with the economic elite or (in the Dutch Republic) propelling the economic elite to a position of political power. The long-run effects of these institutional differences are clear. After the Reformation in England and the Dutch Republic, rulers and parliaments drafted laws and policies conducive to long-run economic success. These included stronger and clearer property rights, new institutions for the provision of public goods, poor relief, and investment in transportation networks. Spanish and Ottoman rulers did not undertake such reforms. Their policies gave their citizens less incentive to invest in productive pursuits, and the bases for sustained economic growth were largely missing.”

Rubin, Jared (2016): *Rulers, religion, and riches. Why the West got rich and the Middle East did not*, Cambridge University Press.

## 12. El enigma del subdesarrollo económico del Oriente Próximo

En la actualidad, el Oriente Próximo se considera una región económicamente rezagada que sufre una inferioridad económica general en comparación con regiones más avanzadas (en términos de esperanza de vida, consumo de energía y recursos, PIB per cápita y alfabetización). Alrededor del

año 1000, esto no era cierto: la región era económicamente avanzada. Incluso alrededor de 1750, la inferioridad no parecía tan evidente. La brecha entre Occidente y Oriente Próximo se creó en el siglo XIX. El siglo XX no sirvió para cerrarla, sino para mantenerla abierta. En comparación con Occidente, Oriente Próximo ha experimentado (al menos desde 1750) un declive relativo: el crecimiento ha sido más lento que en los países más ricos. ¿Por qué?

Kuran (2010) sugiere que Oriente Próximo se rezagó con respecto a Occidente debido a la tardía adopción de las instituciones fundamentales de una economía moderna: empresas privadas duraderas o de larga duración, las únicas capaces de movilizar grandes cantidades de recursos para las actividades productivas y, por lo tanto, garantizar transformaciones económicas duraderas. Hasta hace muy poco, las empresas en Oriente Próximo eran demasiado pequeñas y de corta duración: las empresas rentables eran proyectos temporales que no sobrevivían a sus fundadores. Este tipo de institución era incapaz de movilizar grandes cantidades de ahorro, crear y explotar nuevas tecnologías, desarrollar organizaciones complejas ni considerar horizontes de planificación a largo plazo. La falta de capacidad legal para crear empresas privadas permanentes y de mayor tamaño (la prolongada divergencia en el desarrollo organizacional) explica el rezago en el nivel de vida y la subordinación a las economías occidentales (la prolongada divergencia en la prosperidad).

*Kuran, Timur (2010): [The Long Divergence. How Islamic law held back the Middle East](#), Princeton University Press.*

“The fundamental difference between Western Europe and the Middle East (...) is that Islamic doctrine is more conducive to legitimizing rule than Christian doctrine is. The reason for this doctrinal difference was the circumstances under which the religions were born. Christianity was born in the Roman Empire, which had well- functioning legal and political institutions. Moreover, early Christians were in no position to legitimize the Roman emperor. Islam, on the other hand, formed initially alongside the expansion of a political state under Muhammad. The corpus of Islamic law grew further under the empires of the First Four Caliphs and the Umayyads– the largest empires the world had ever seen at the time. A natural consequence of this coevolution (...) was the formation of Islamic doctrine supporting the legitimation of rule by Islam (...) The spread of Islamic political rule helped promote trade by providing greater security for merchants, a common social and religious network, a common currency, a common language, and common financial instruments.”

“... the strength of early Muslim rulers, due in large part to their ability to derive legitimacy from Islam, allowed Muslim-governed states to support trade in a manner unachievable by the more decentralized states of the pre-Islamic Middle East and post-Roman Europe. But this strength ultimately became a weakness. As trade expanded, new laws and policies were required for further expansion (...) Yet, Middle Eastern rulers had little incentive to adopt such laws and policies. Doing so would have undermined the religious elite, who were the primary interpreters of commercial law and were largely responsible for the rulers’ strength in the first place.”

“There was nothing predetermined about this outcome. Indeed, it was hardly unthinkable that Muslim rulers circa 1000 could have reformed Islamic law in a manner that would have benefited the

economic elite. This book has provided two historical processes (...) that can account for their failure to do so. The static process consists of the 'game' a ruler plays to determine how to best propagate his rule. He considers the costs and benefits of different forms of propagation (...) and chooses some combination of propagating agents that best help him stay in power. These choices have dynamic consequences over the long run, many of which are unforeseeable or occur so far in the future that they are of minimal concern to the ruler in the present. These consequences stem from the fact that propagating agents do not support the ruler for free – they expect some say in laws and policies in return. Their choices can have unintended, path-dependent consequences for future rulers."

Rubin, Jared (2016): *Rulers, religion, and riches. Why the West got rich and the Middle East did not*, Cambridge University Press.

### 13. ¿Hacia la Gran Convergencia?

¿La Gran Divergencia en los niveles de vida entre Occidente y el Resto, resultante del Ascenso de Occidente, se ve compensada por una Gran Convergencia en curso (mediante la cual el Resto se está poniendo al día con Occidente)? ¿Es la globalización de la economía mundial el medio por el cual se desarrolla la Gran Convergencia? ¿Es entonces la Gran Convergencia una continuación necesaria de la Gran Divergencia? ¿Son ambas fases de un proceso de Modernización Global?

Kishore Mahbubani (2013) afirma que se han producido más cambios en el mundo en los últimos tres años que en los últimos tres siglos. Este cambio masivo está creando una nueva civilización global. La fuerza impulsora de dicho cambio es la globalización. El problema es que actualmente la economía mundial es como un barco sin capitán: las instituciones de gobernanza global son demasiado débiles. Su tesis es que 'everything that rises must converge'.

Mahbubani, Kishore (2013): *The great convergence. Asia, the West, and the logic of one world*, PublicAffairs.

### 14. La 'ventaja del retraso' de Gerschenkron (*virtue of backwardness*)

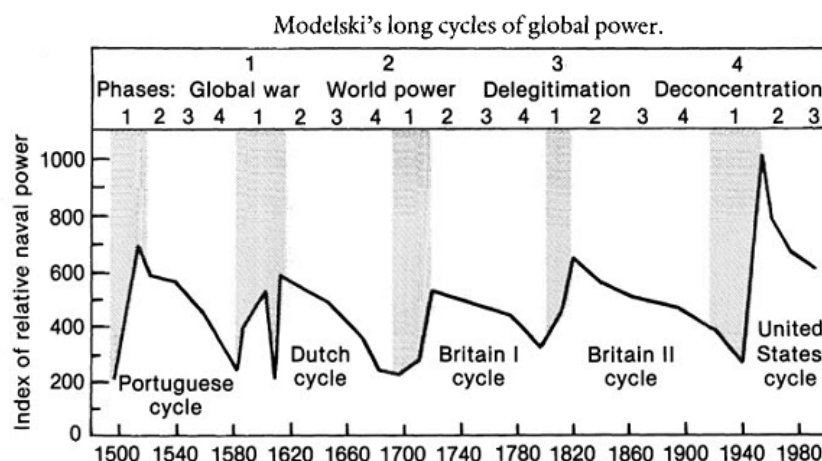
El estudio de Gerschenkron sobre la historia comparativa de la industrialización en Europa lo llevó a cuestionar la idea de que las brechas de desarrollo deben eliminarse haciendo que las economías atrasadas sigan el camino de las economías pioneras. Su argumento es que, una vez alcanzado un resultado (industrialización, desarrollo), no es necesariamente la mejor política replicar la manera original en que se logró. El proceso involucrado es diferente al experimentado por las economías ahora ricas (velocidad de crecimiento industrial, nuevas estructuras organizativas, técnicas y tecnologías industriales novedosas, etc.). Afirma que cuanto más atrasada (menos desarrollada) sea una economía, más rápida podrá/será su industrialización, más se basará en la industria de capital (en lugar de la industria de bienes de consumo), mayor será la escala de las plantas, menor será la importancia de la agricultura para impulsar el desarrollo industrial y mayor la importancia de las instituciones para promover el crecimiento. Su análisis enfatiza las ventajas de los recién llegados.

Gerschenkron, Alexander (1962): *Economic backwardness in historical perspective*, Harvard University Press.

## 15. ¿Ha acabado la dominancia de Occidente?

Tras la caída de la Unión Soviética, parecía que el modelo occidental (democracia liberal, capitalismo y nacionalismo secular) no tenía ningún obstáculo para universalizarse. Kupchan (2012) sostiene que esto no ocurrirá, ya que el modelo occidental depende de las condiciones socioeconómicas propias de los países occidentales. También

sostiene que ningún otro modelo o centro político lo desplazará. Su predicción es que el mundo será multipolar (sin una potencia hegemónica clara) y políticamente diverso, compuesto por grandes potencias con diferentes concepciones políticas.



## 16. Estado y auge de Occidente

“For a period of more than a thousand years after the fall of the Roman Empire, East Asia was probably the most advanced part of the world, with a larger population, more intensive agriculture, larger and better organized cities and stronger states and empires. This changed at some stage in the early modern period, and during the last 200 years, Europe and the USA have dominated the world in a way that has never occurred before (...) The organization and technological innovations in the military field were clearly results of the competition between the European states. The great scientific discoveries from the sixteenth century onwards have been explained in different ways but at least from the time when they had practical applications, the importance of the state must have been great (...) Thus, despite the many deficiencies of the European state of the Old Regime, it seems to have been based more on support from at least a portion of its subjects than most kingdoms and empires in other parts of the world, which in turn forms part of the explanation for later Western dominance.”

Bagge, Sverre Håkon (2019): *State formation in Europe, 843-1789. A divided world*, Routledge.

## 17. Ondas largas de desarrollo y dominancia

### El declive relativo de Occidente

El ascenso de India y China señala el fin del dominio occidental, anunciado recientemente por el ascenso de Japón y el posterior éxito de los Cuatro Dragones (Singapur, Hong Kong, Taiwán y Corea del Sur), y consolidado por la reciente ola de industrialización de las economías asiáticas (los Cuatro Tigres: Tailandia, Filipinas, Indonesia y Malasia). La globalización está desplazando el foco económico y político de Occidente hacia Oriente: el ascenso de Asia es el descenso de Occidente. Indicadores de este descenso son el creciente desempleo y la creciente deuda pública en Europa y, en Estados Unidos, los déficits comerciales, la deuda pública y los niveles de deuda de los consumidores, junto con los mayores riesgos de un dólar inestable.

## **Un efecto de trinquete global (*global ratchet effect*)**

Hay períodos de crecimiento de unos 300 años, que terminan por choques externos o internos, seguidos de un colapso. Las civilizaciones que lideran un ciclo de crecimiento no pueden elevar el nivel de vida de forma permanente, pero la humanidad se beneficia de un efecto de trinquete: el siguiente ciclo de crecimiento comienza a un nivel superior (Graeme Snooks, 1993).

## **Fenómenos históricos paralelos de crecimiento y rivalidad (Manfred Neumann, 1997)**

La creciente riqueza genera expectativas de mayor riqueza; cuando las ganancias marginales de la acumulación comienzan a disminuir, los problemas de distribución se vuelven más acuciantes; cuando la política económica pasa de la creación de riqueza a la distribución de la riqueza, el potencial de creación de crecimiento se ve socavado y las presiones distributivas se refuerzan.

## **El síndrome Buddenbrook (tomado de la novela de Thomas Mann)**

El abuelo logra el éxito de la empresa fundada por su padre. El hijo del abuelo consolida el negocio. El nieto no logra mantener el éxito. La riqueza heredada cambia las preferencias de la acumulación de capital al consumo presente: el presente se percibe como más valioso que el futuro. Quienes están acostumbrados a disfrutar de la riqueza dedican más tiempo y esfuerzo a consumir (reduciendo la riqueza) que a invertir (aumentándola)..

## **El síndrome internacional Buddenbrook (Manfred Neumann)**

“The economic rise of a country and the achievement of leadership depend on time preference being comparatively low [= savings comparatively high] and the burden of military expenditures being light because of population size (...) Conversely, the decline of once-leading nations can, in all cases, be attributed to a rising rate of time preference (...) Innovative activity diminishes and the ability to cope with the challenges of foreign competition dwindles.”

## **¿La globalización genera convergencia?**

La visión determinista del proceso de globalización se ajusta a la premisa de la convergencia histórica. La idea es que el progreso tecnológico impulsa cambios sociales, que estos son inevitables y, por lo tanto, que (independientemente de la historia, las particularidades culturales, las ideologías y prácticas nacionales) las sociedades se asemejarán más en su organización básica y convergerán, también en sus niveles de vida. La única diferencia radica en la velocidad con la que las sociedades alcanzan el destino común.

## **Ciclo de vida institucional (Avner Greif)**

Las instituciones creadas para sostener la cooperación finalmente generan las condiciones que conducen a su propia desaparición. Ejemplo: Génova fue un próspero centro comercial en el siglo XI gracias a la cooperación entre los clanes comerciales gobernantes; con el éxito, la recompensa por

controlar la ciudad eclipsó las ganancias de la cooperación continua. Con la desaparición de la amenaza militar común extranjera

## 18. ¿Por qué no está desarrollado todo el mundo?

Easterlin (1981) considera que la expansión del crecimiento económico moderno depende de la difusión del conocimiento de nuevas técnicas de producción, cuya adquisición y aplicación ha dependido del grado en que la población ha adquirido los rasgos y motivaciones que proporciona la educación formal. A su vez, las condiciones políticas y las influencias ideológicas parecen haber determinado en el pasado la implementación de los sistemas educativos modernos. Easterlin (1988) atribuye la insuficiente difusión de la tecnología a la falta de instituciones apropiadas (capacidades sociales).

“This, then, is the future to which the epoch of modern economic growth is leading us: a world in which ever-growing abundance is always outpaced by material aspirations, a world of increasing cultural uniformity. (...) The proximate roots of the epoch of modern economic growth lie in the growth of science and diffusion of modern education”.

Easterlin, Richard A. (1981): “Why isn’t the whole world developed?”, *Journal of Economic History* 41(1), 1-19.

Easterlin, Richard A. (1988): *Growth triumphant. The twenty-first century in historical perspective*, The University of Michigan Press.

## 19. Preguntando a la IA de Google (11/12/25): “In the last 50 years, how many developing countries have risen to the rank of developed countries?”

“In the last 50 years (since 1974), a small group of countries and territories have successfully transitioned from developing to developed status. The most prominent examples are the Asian Tigers (South Korea, Taiwan, Singapore, and Hong Kong), along with several countries in Eastern Europe and some Gulf States.

The exact number can vary depending on the specific criteria used for ‘developed’ status, as definitions from different organizations (like the UN, World Bank, and IMF) can differ. Some countries that meet most economic metrics still self-classify as developing to receive preferential trade treatment in forums like the World Trade Organization (WTO).

### Key Examples of Transitioned Economies

- **The Asian Tigers (Hong Kong, Singapore, South Korea, Taiwan):** These economies are the most frequently cited success stories of rapid industrialization and economic growth, achieving high-income, developed status within this timeframe.
- **European Nations:** Several Eastern European countries, following the end of the Cold War and joining the European Union, have converged toward developed economy living standards.

Examples include Poland, the Baltic states (Estonia, Latvia, Lithuania), the Czech Republic, Slovakia, and Slovenia.

- **Gulf States:** Driven by vast fossil fuel deposits, some Gulf states, such as Qatar, the United Arab Emirates, Kuwait, and Bahrain, have achieved extremely high per capita incomes, placing them in the high-income category.
- **Other Individual Cases:** Other countries often mentioned in the context of significant development progress include Botswana, the Maldives, and Cape Verde, although their classification may vary by source.

The general consensus is that this transition is a rare and difficult process, with only a limited number of nations successfully making the jump in recent history."

## 20. Pregutando a la IA de Google (11/12/25): "In the transition from developing to developed country, how important has industrial policy been?"

"Industrial policy has been a **highly important, if not essential, component** in the successful transition of many countries from developing to developed status. The historical evidence suggests that virtually all nations that successfully caught up to leading industrial economies have used some form of state intervention to foster economic change.

### The Role of Industrial Policy in Success Stories

- **East Asian 'Miracles':** Countries like South Korea and Taiwan represent prime examples where assertive industrial policies were central to rapid development. The state actively guided resources toward specific, strategic sectors, fostering the growth of globally competitive industries such as steel, shipbuilding, and electronics.
- **Structural Transformation:** Industrial policy serves to accelerate the shift from low-value-added activities (e.g., agriculture or raw material extraction) to high-value-added manufacturing and advanced services. This involves building the necessary infrastructure, skills base, and technological capabilities that the private sector might not develop on its own.
- **Addressing Market Failures:** Proponents argue that strategic intervention helps overcome market failures, such as a lack of coordination among different firms or insufficient private investment in new, risky technologies and research and development (R&D).

### Conditions for Effective Policy

The success of industrial policy is not guaranteed and often depends on specific implementation features:

- **Strong State Capacity:** Effective policies rely on capable bureaucracies that can implement complex strategies, monitor performance, and resist political capture or corruption.
- **Export Orientation and Accountability:** The most successful industrial policies often linked government support (e.g., subsidies, protected markets, subsidized loans) to strict performance

metrics, such as achieving specific export targets. This "export discipline" ensured that supported industries were forced to become internationally competitive.

- **Learning and Adaptation:** Successful nations were adept at adapting their policies over time, moving from simple protectionist measures to more sophisticated strategies that encouraged innovation and integration into global supply chains.

### Counterarguments and Risks

While many success stories exist, industrial policy remains a subject of debate:

- **Risk of Failure:** Many attempts at industrial policy in other regions have resulted in failure due to poor governance, rent-seeking, and the misallocation of capital and labor ("picking losers").
- **Market Distortions:** Interventions inherently distort free-market allocations of resources, which can lead to inefficiencies if not managed carefully.

Ultimately, historical transitions show that industrial policy has been a critical tool for development when carefully designed and implemented with strong institutional support and accountability mechanisms."

La respuesta a la misma pregunta formulada segundos antes es:

"Industrial policy has been **highly important** in the transition of several key developing countries to developed status, particularly the East Asian "miracle" economies. Proponents argue that strategic state intervention to direct resources and foster specific industries has been a defining feature of successful development stories.

### Importance in Successful Transitions

- **East Asian Success Stories:** Countries like South Korea and Taiwan are prime examples where proactive and targeted industrial policies were central to their rapid economic development. Their governments steered resources into sophisticated industries, beyond their initial comparative advantage, focusing on technology and innovation.
- **Structural Change:** Industrial policy has been effective in promoting structural change, encouraging the shift from low-value-added production to high-value-added manufacturing and technology-intensive sectors. This often involved supporting "infant industries" until they could compete globally.
- **Addressing Market Failures:** Advocates argue that state intervention can correct market failures that the free market alone cannot overcome, such as coordination problems or a lack of investment in new, risky technologies.
- **Conditions for Success:** Successful industrial policies in these cases typically involved specific principles:
  - **Export Orientation:** Support was often contingent on achieving export targets, which enforced a discipline tied to international market signals.
  - **Accountability:** Firms receiving support were held accountable for the results, preventing simple rent-seeking.

- **Strong State Capacity:** Effective implementation relied on a capable state bureaucracy with the administrative capacity to design and execute complex policies.

### Risks and Counterarguments

While successful cases exist, the effectiveness of industrial policy has been a subject of long-standing debate, and many attempts in other regions have failed.

- **Risk of Government Failure:** Industrial policy carries significant risks, including political capture by special interests, corruption, and the misallocation of resources (often referred to as ‘picking winners and losers’).
- **Distortion of Competition:** Interventions can distort efficient market allocation of capital and labor, potentially suppressing innovation and driving up prices.
- **Mixed Empirical Evidence:** The overall empirical evidence on the aggregate impact of industrial policy is mixed. While some targeted sectors may thrive, it can sometimes be at the expense of untargeted sectors, leading to a net negative impact on the broader economy if not managed carefully.

In essence, industrial policy can be a powerful engine for development, but its success relies heavily on specific design principles and strong institutional capacity, making the transition a challenging process for many countries.”

## 21. La ilusión del atrape (*The catch-up illusion*)

Kim y Kim (2014) sostienen que las altas tasas de crecimiento de los países rezagados en el proceso de desarrollo económico dependen de los países desarrollados. Esto implica que los países en desarrollo pueden, como máximo, aspirar a mantener el ritmo de los países avanzados, no a superarlos. Los líderes (países que se industrializaron primero) probablemente seguirán siéndolo para siempre, y los seguidores (los rezagados) también lo seguirán siendo; la única diferencia será la distancia entre los avanzados y los rezagados.

Tai-Yoo Kim; Seung-hyun Kim (2014): “The Catch-Up Illusion: Why Developing Nations that Experience Rapid Economic Growth Can Never Catch Up with Advanced Countries”, pp 237–261 en Tai-Yoo Kim; Almas Heshmati: *Economic Growth. The New Perspectives for Theory and Policy*, Springer.

## 22. Unas 'leyes', reglas y principios

### Las leyes de la predicción de Arthur C. Clarke

- First law. "When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong."
- Second law. "The only way of discovering the limits of the possible is to venture a little way past them into the impossible."
- Third law. "Any sufficiently advanced technology is indistinguishable from magic."

### Variante de la tercera ley de Clarke por Mark Stanley (Freefall)

- "Any technology, regardless of how advanced, will seem like magic to those who do not understand it."

### Cinco de las seis leyes de la tecnología de Melvin Kranzberg

- First law. "Technology is neither good nor bad; nor is it neutral."
- Second law. "Invention is the mother of necessity."
- Third law. "Technology comes in packages, big and small."
- Fourth law. "Although technology might be a prime element in many public issues, nontechnical factors take precedence in technology-policy decisions."
- Fifth law. "All history is relevant, but the history of technology is the most relevant."

### La ley de Hofstadter

- "It always takes longer than you expect, even when you take into account Hofstadter's Law."

### El dilema libertad-seguridad

- "The product of Freedom and Security is a constant."

### La tecnología rehace tanto el mundo físico como el mental

- "Ethics change with technology."

### La ley de Amara (Roy Charles Amara, 1925-2007)

- "We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run."

### La ley de Goodhart (Charles Goodhart)

- "When a measure becomes a target, it ceases to be a good measure." (Cuando cierras la puerta espera que la gente abra alguna ventana)

### La ley de Hutber (Patrick Hutber)

- "Improvement means deterioration." (Lo que se presenta como mejora oculta algún deterioro)

### **La segunda regla de Orgel (Leslie Orgel)**

- “Evolution is cleverer than you are.”

### **La regla de Pareto (Vilfredo Pareto)**

- “80% of the output/consequences tends to be accounted by 20% of the inputs/causes.”

### **El principio de Peter (Laurence J. Peter)**

- “In a hierarchy, every employee tends to rise to his level of incompetence.”

### **El principio de Shirky (Clay Shirky)**

- “Institutions will try to preserve the problem to which they are the solution.” (Las instituciones desarrollan un instinto de autoconservación)

### **La ley de Sturgeon (Robert Sturgeon)**

- “Ninety percent of everything is crud.”

### **La ley invisible de la estupidez del mercado**

- “The market is more stupid than everybody thinks.”

### **Las leyes fundamentales de la estupidez humana de Cipolla (Carlo Maria Cipolla)**

- First law. “Always and inevitably everyone underestimates the number of stupid individuals in circulation.”
- Second law. “The probability that a certain person be stupid is independent of any other characteristic of that person.”
- Third law. “A stupid person is a person who causes losses to another person or to a group of persons while himself deriving no gain and even possibly incurring losses.”
- Fourth law. “Non-stupid people always underestimate the damaging power of stupid individuals. In particular non-stupid people constantly forget that at all times and places and under any circumstances to deal and/or associate with stupid people infallibly turns out to be a costly mistake.”
- Fifth law. “A stupid person is the most dangerous type of person.”

### **Las leyes de la sociodinámica de Serge Lang (Lang, Serge (1998): *Challenges*, Springer, p. 797)**

- First law. “(a) The power structure does what they want, when they want; then they try to find reasons to justify it. (b) If this does not work, they do what they want, when they want, and then they stonewall.”
- Second law. “An establishment will close ranks behind a member until a point is reached when closing ranks is about to bring down the entire establishment; then the establishment will jettison that member with the least action it deems necessary to preserve the establishment.”
- Third law. “It’s like the video games: one can’t shoot fast enough.”

## La navaja de Hanlon (Robert J. Hanlon)

- “Never attribute to malice that which is adequately explained by stupidity.”

## La ley de los expertos sobre la pericia

- “For every expert, there is an equal and opposite expert.”

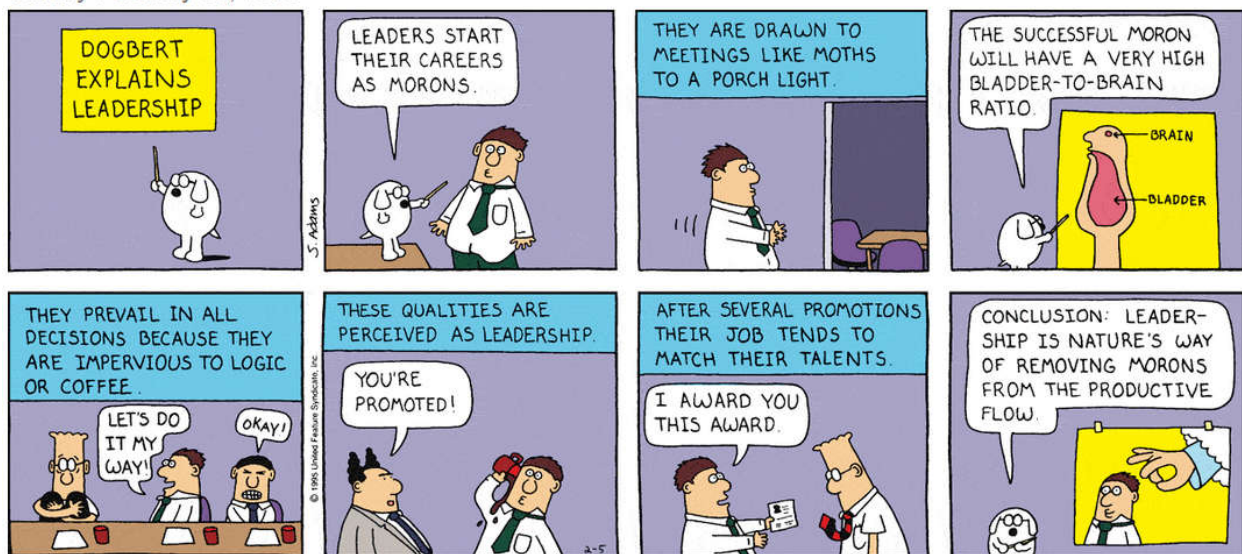
## Las leyes de Murphy (Koch, Richard (2013): *The 80-20 Principle and 92 Other Power Laws of Nature*)

- “Left to themselves, things go from bad to worse.”
- “If anything can go wrong, it will.”
- “If several things can go wrong, the one that will cause the most damage will go wrong first.”
- “If anything just cannot go wrong, it will anyway.”
- “The probability of anything happening is proportional to the damage it will cause.”

## El principio de Dilbert (Scott Adams)

- “Leadership is nature's way of removing morons from the productive flow.”

Sunday February 05, 1995



<http://dilbert.com/strip/1995-02-05>

## El efecto Dunning–Kruger effect (David Dunning y Justin Kruger)

- “People tend to regard themselves as more competent or capable than they actually are.”

## El principio de entropía social

- “For something to operate smoothly in a social organization, someone must take on the burden without enjoying much of the benefits.”

## El efecto de la Reina Roja

- “Constant effort is required to just maintain success.” (La condición natural del mundo social es el crecimiento de la entropía, no el equilibrio)

## 23. Maldiciones económicas

- **La maldición financiera** (*The finance curse*, Nicholas Shaxson, 2018)

“The concept of the finance curse is simple: it’s the idea that once a financial sector grows above an optimal size and beyond its useful roles, it begins to harm the country that hosts it. Finance turns away from its traditional role serving society and creating wealth, and towards often more profitable activities to extract wealth from other parts of the economy. It also becomes politically powerful, shaping laws and rules and even society to suit it. The results include lower economic growth, steeper inequality, inefficient markets, damage to public services, worse corruption, the hollowing-out of alternative economic sectors, and widespread damage to democracy and to society.”

Shaxson, Nicholas (2018): *The finance curse. How global finance is making us all poorer*, The Bodley Head.

- **La maldición de las instituciones** (*The institutions curse*, Victor Menaldo, 2016)

“... overreliance on natural resources is simply one symptom of a deeper, underlying disease that afflicts developing countries. This book labels that disorder the institutions curse. Other symptoms include fiscal monopolies that represent hyper-regressive forms of taxation, urban bias that ruins farmers, crony capitalism that erodes consumer surplus, and politicized finance that rations already scarce credit.

Countries cursed by their institutions fail to provide the type of political, legal, and infrastructural ecosystem that fosters broad-based economic development. Most investors outside of extractive industries tend to stay away. Governments therefore lack a revenue base that can be taxed at low cost (...) The government’s inability to credibly commit to repaying its debts, exacerbated by a genuine lack of economic growth, domestic revenues, and foreign currency, heightens political risk.

(...) Weak states cursed by their institutions may erect fiscal monopolies on inelastic goods and turn to financial repression. Or they may create marketing boards that siphon money away from the countryside by paying farmers below market prices for the food they produce and then re-exporting it at a substantial profit. They may also indulge in industrialization via crony capitalism and inflationary taxation. Finally, they may erect natural resource sectors from scratch since, unlike their counterparts in industries centered on intangible goods and services, such as intellectual property, foreign investors operating in extractive industries do not really fear political risk. They are too shrewd, powerful, and wealthy to be stopped from striking it rich in the developing world’s mines and oil basins.”

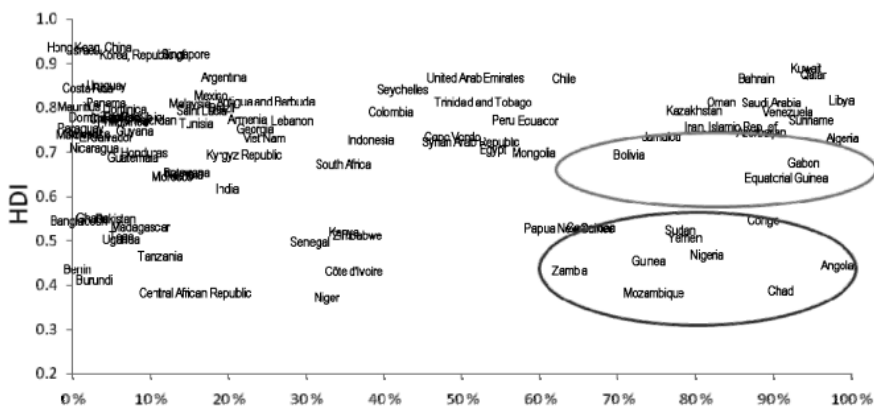
Menaldo, Victor (2016): *The institutions curse: Natural resources, politics, and development*, Cambridge University Press.

- **La maldición de los recursos** (*The resource curse thesis*): **paradoja de pobreza en la abundancia**

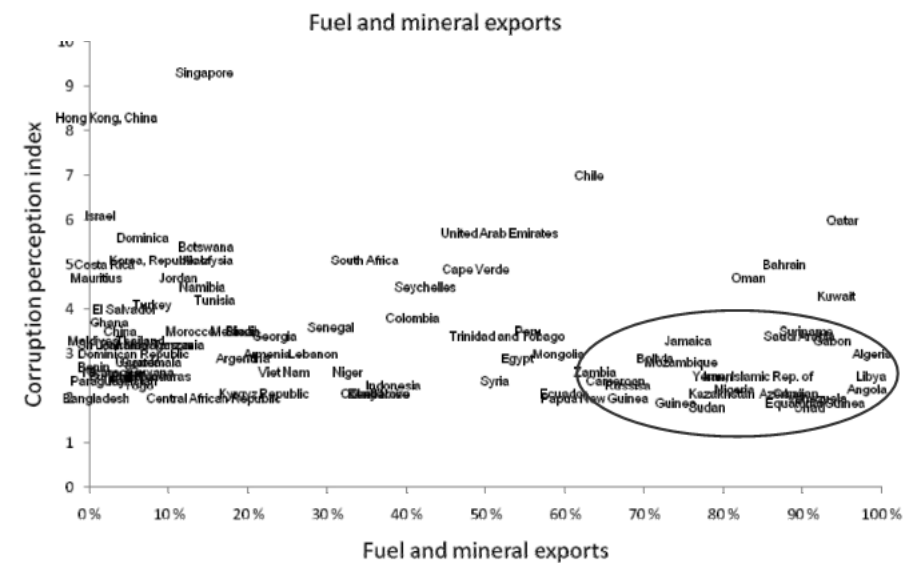
La tesis de la maldición de los recursos sostiene que las economías con abundantes recursos de valor internacional (petróleo, gas, diamantes, cobre, etc.) tienden a ser más pobres, tener líderes más corruptos y ser más propensas a sufrir guerras o conflictos. El crecimiento impulsado por los recursos puede resultar beneficioso a corto plazo (los ingresos se obtienen fácilmente exportando recursos y

se atrae capital extranjero), pero, según esta tesis, los efectos a largo plazo tienden a ser negativos: el crecimiento económico se desacelera; los niveles de pobreza, desigualdad y desempleo se mantienen altos; se evita la diversificación económica; los programas de bienestar social no pueden sostenerse. La tesis se basa en la observación que numerosos países ricos en recursos son pobres en desarrollo.

“The resource curse view postulates that natural resource exports –and especially oil– constitute an external, unearned, and ‘easily capturable’ source of rents. This severs the fiscal link between rulers and the ruled and renders the former unaccountable to the latter. Once rulers are freed from taxing their citizens, they are freed from having to solicit their consent or input. Natural resource revenues therefore bolster the power of executives and the bureaucracy and create countless opportunities for rent-seeking and corruption. Paradoxically, although these rents may prolong the tenure of tyrants, they might also catalyze civil wars in a bid to capture this valuable prize.” (Menaldo, 2016, p. 2)



Gøril and Santiso (2011, Fig. 1.3): un grupo de países con altas exportaciones de minerales y combustibles tienen puntuaciones muy bajas en el índice de desarrollo humano.



Gøril and Santiso (2011, Fig. 1.4): un grupo de países con altas exportaciones de minerales y combustibles tienen puntuaciones muy altas en el índice de percepción de la corrupción (a mayor índice, menor percepción).

Havro, Gøril; Javier Santiso (2011): “Benefiting the resource rich: How can international development policy help tame the resource curse?,” IDS Working Paper 355, Institute of Development Studies at the University of Sussex.

Shaxson, Nicholas (2007): “Oil, corruption and the resource curse”, *International Affairs* 83(6), 1123-40.

• **La riqueza mineral como posible maldición**

“... the dominance of oil and gas in the Russian economy has helped to weaken democracy in that country, and seems likely to keep things that way. And it is no coincidence that the four longest-

servicing rulers in Africa, all autocrats, are in oil zones. Their governments do little more than keep themselves in power, being frequently embroiled in armed conflict, and certainly deliver very little to their citizens."

"Minerals do not just help prolong civil wars, they also attract unwelcome attention from outside. One of the misfortunes of the beleaguered Democratic Republic of Congo (...) is to have deposits of coltan, a mineral used in the manufacture of mobile phones. It also has diamonds, copper, and gold. Several countries, including Uganda, were widely reported as having sent troops over the border to plunder the resources during the DRC's civil war between 1997 and 2003 (...) Another useful, and hence disastrous, aspect of minerals is that governments with them find it easier to borrow (...) Many developing countries have built up spectacular debt burdens from borrowing recklessly from reckless lenders, but it is hard to top the oil producers. By the time Saddam Hussein's regime fell, in 2003, Iraq had accumulated, and defaulted on, debt somewhere between two and four times the size of the entire economy, estimated to equal around \$6,000 for each Iraqi."

"The peculiarity of Botswana has attracted a lot of attention from political scientists and economists, who wonder why it is such a success, and why its success is such an anomaly (...) Its government made a whole string of good decisions where other countries made bad ones. Sound political institutions, including the rule of law, if not multiparty democracy, managed to develop alongside the exploitation of diamond wealth (rather than existing before it). Seretse Khama, Botswana's first president, and his associates made a series of textbook moves. They created a national fund for the diamond wealth, thus avoiding the ethnic divisions that would have followed had tribes been allowed to appropriate the proceeds for themselves. They mined the diamonds slowly, in order to match the capacity of the country to spend the proceeds wisely. (De Beers actually wanted to dig them out faster.) They chose projects for the fund in strict order of what economic return they were likely to produce (...) If every African country with a mineral resource exploited it as well as has Botswana, the continent would be vastly better off."

"Two problems arise in trying to replicate Botswana's success. One, most governments simply refuse to bind themselves to the mast. Two, particularly in a continent like Africa with recent memories of domination by colonial powers, it is close to impossible for an outsider to come in and force them to do so. To know what the right policies are does not mean it is straightforward to ensure they are implemented."

*Beattie, Alan (2009): False economy. A surprising economic history of the world, Riverhead Books.*

- **Mala adaptación de creencias y prácticas**

"All societies are sick, but some are sicker than others (...) Even populations that appear to be well-adapted to their environments maintain some beliefs or practices that unnecessarily imperil their well-being or, in some instances, their survival. Populations the world over have not been well served by some of their beliefs such as, for example, those concerning witchcraft, the need for revenge, or male supremacy, and many of their traditional practices involving nutrition, health care, and the treatment of children have been harmful as well. Slavery, infanticide, human sacrifice, torture, female genital mutilation, rape, homicide, feuding, suicide, and environmental pollution have sometimes

been needlessly harmful to some or all members of a society and under some circumstances they can threaten social survival.”

“Some populations have failed to survive or have lost their culture, language, or social institutions because they were not able to cope with the demands that their environments made on them. This failure to thrive is the most calamitous form of maladaptation, but it is not the only one. A few people in all societies, and many people in others, feel alienated, become depressed, or attempt suicide. Others withdraw from social life or emigrate, and it is not uncommon for people to protest or rebel (...) Beliefs or practices that leave a population seriously discontented or rebellious are, under most circumstances, maladaptive because they threaten the survival of that sociocultural system and endanger the physical and emotional wellbeing of the people in it.”

“Much of what we have learned about human history and human nature suggests a picture of human accomplishment, not discord, failure, or pathology. Throughout the world, people have developed effective techniques of hunting, gathering, herding, and gardening, domesticated plants and animals, built houses, developed trade, established meaningful religions, and learned to govern themselves. They have also created moving forms of music and dance and dazzling works of art.”

“Counterintuitive though it may seem after an exposure to this compelling record of human ingenuity, it must nevertheless be acknowledged that populations have not always gotten things right. Inefficiency, folly, venality, cruelty, and misery were and are also a part of human history. Human suffering is one result (...) Incredible folly followed by incredible heroism is not a rare occurrence in human history.”

“Some (...) believe that the prime mover of evolution has not been competition among species but environmental change that creates opportunities for some species more than others to proliferate (...) These two evolutionary phenomena are sure to continue into the future, when the already great interconnectedness of peoples and their societies will no doubt increase still further (...) Yet, paradoxically, if recent experience is any guide, neither these developments nor the increased power of regional or worldwide forms of governance will put an end to ethnic and religious factionalism, xenophobia, and strife. Instead, one form of irredentism or another can be expected to flourish virtually everywhere on earth. These ethnic and religious revivalisms, these passionate strivings for lost autonomy and misplaced meaning, will likely bring about ever more intense valorization of traditional beliefs, rituals, and customs.”

Edgerton, Robert B. (1992): *Sick societies. Challenging the myth of primitive harmony*, The Free Press.

### • **Impedimentos para el desarrollo (*development traps*)**

La derecha niega la existencia de las trampas del desarrollo: las buenas políticas permiten a cualquier país escapar de la pobreza. La izquierda considera estas trampas una consecuencia del capitalismo global. Collier (2007) identifica cuatro de estas trampas: la trampa del conflicto (guerra civil y golpes de Estado), la trampa de los recursos naturales, la trampa de la falta de salida al mar con malos vecinos y la trampa del mal gobierno en un país pequeño. Ninguna trampa es ineludible, pero la globalización ha dificultado el uso del mercado global para escapar de ellas: para aprovechar la

globalización, una economía debe estar suficientemente desarrollada (ser 'fuerte') y el problema de las economías atrapadas es que están insuficientemente desarrolladas (son 'débiles'). Se crea entonces un círculo vicioso: un país está subdesarrollado por alguna trampa porque no puede integrarse adecuadamente en el proceso de globalización, y no puede integrarse en el proceso porque el país está subdesarrollado. En 2006, según Collier (2007), había 58 países atrapados, con alrededor de 980 millones de personas viviendo allí. La característica típica de estos países es su pequeño tamaño.

Collier, Paul (2007): *The bottom billion. Why the poorest countries are failing and what can be done about it*, Oxford University Press.

Reinert, Erik S. (2011): "Review of The bottom billion by Paul Collier", *Journal of Global History* 6(1), 156-158.

#### • La paradoja de la prosperidad (Todd Buchholz, 2016)

Buchholz sugiere la siguiente 'paradoja de la prosperidad': "It is a common and dangerous mistake to think that societies are less vulnerable when they are relatively prosperous (...) even relatively prosperous societies have a tendency to come apart." Identifica cinco "potent forces that can shatter even a rich nation: (1) falling birthrates, (2) globalized trade, (3) rising debt loads, (4) eroding work ethics, and (5) the challenge of patriotism in a multicultural country." Con relación a (1):

"As countries grow rich, their birthrates fall and the average age of the population climbs. In order to keep up a lofty standard of living, citizens need workers to serve them, whether as neurosurgeons in hospitals, waiters in restaurants, or manicurists in nail salons. This requires an influx of new workers, which means opening up the gates to more immigrants. Unless a country has strong cultural and civic institutions, new immigrants can splinter the dominant culture. Thus countries face either (1) declining relative wealth or (2) fraying cultural fabric. Prosperous nations cannot enjoy their prosperity without becoming multicultural. But if they become multicultural, they struggle to pursue unified, national goals."

Buchholz deriva la siguiente regla general de su investigación: la tasa de fecundidad cae a 2,5 hijos por mujer cuando el PIB crece por encima del 2,5% durante dos generaciones (unos 50 años). Tras una tercera generación de crecimiento, la tasa cae por debajo del 2,1%.

Buchholz, Todd G. (2016): *The price of prosperity. Why rich nations fail and how to renew them*, Harper.

#### • La paradoja del desarrollo (Ian Morris, 2010)

"Rising social development generates the very forces that undermine further social development." Una consecuencia imprevista del éxito es la aparición de nuevos problemas, cuyas soluciones conllevan problemas adicionales (probablemente más graves). El desarrollo social se estanca o decaen cuando no se supera el reto del éxito temporal: cada sociedad compite contra sí misma bajo un imparable efecto de la Reina Roja (*Red Queen effect*, hay que moverse para mantenerse en el sitio).

Morris, Ian (2010): *Why the West rules —for now. The patterns of history and what they reveal about the future*, Profile Books.

- Los males de España en 1600

**P**A R A el aumento y riqueza vniuersal de estos Reynos, importa mucho aplicar la gente, à la dichosa ocupacion de la la- uor del campo, à quien es muy propria la criança de todas las cosas, que fertilizan los estados, y todo lo demas que en nombre de agricultura està comprehendido: porque en la materia de estado no ay principio, mas sin excepcion para el Principe, que quisiere ver sus Reynos ricos y poderosos: quãto que se aproueche de lo que en ellos fructifica, y que à esto acudan sus vassallos con cuydado: pues el tra- bajo como ordenado de Dios à los hombres, es de rãta nobleza, que jamas dexò de premiar al que le sigue. Hã dexado este modo de en- riquecer los nuestros siendo tan cierto: por dar à renta sus haziendas à gente pobre que los sustente: siendo esta la causa general, por cuyo respecto faltan los fructos, y se empobrecen los Reynos. La razon de ello es, que como dizen los Jurisconsultos, <sup>b</sup> en todas las acciones humanas se requiere poder y querer juntamẽte: y no basta lo vno sin lo otro, y el no disponer esto es, por donde le entra el daño à nuestra España: porque los que pueden no quieren: y los que quieren no pueden, y así se està la lauor de por hazer: q̄ es dezir, que los que tienen con que poder sustentar las costas de la labrança, y con ella sacar fru- cto la rehusan, y los que por el contrario siendo renteros, ò siendo gẽ te pobre, que no alcançan el caudal necessario; aunque lo quieren, y mas procuran, no pueden: respecto de auer menester, aun mayores ayudas, que los dueños de las tierras, y mas cierta ganancia para po- der sustentar las costas y grandes gastos que consigo trae.

“Para el aumento y riqueza universal de estos reinos, importa mucho aplicar la gente a la dichosa ocupación de la labor del campo, a quien es muy propia la crianza de todas las cosas que fertilizan los estados (...) Ha dejado este modo, siendo tan cierto, de enriquecer nuestros reinos por dar sus haciendas a renta a gente pobre que los sustente; siendo esta la causa general, por cuyo respeto faltan los frutos y se empobrecen los reinos. La razón de ello es que, como dicen los jurisconsultos, en todas las acciones humanas se requiere poder y querer juntamente. Y no basta lo uno sin lo otro, y el no disponer esto es por donde le entra el daño a nuestra España: porque los que pueden no quieren y los que quieren no pueden. Y así se está la labor por hacer; es decir, que los que tienen con qué poder sustentar las cosas de la labranza, y con ella sacar fruto, la rehúsan; y los que, por el contrario, siendo renteros o siendo gente pobre, no alcanzan el caudal necesario, aunque lo quieren y por más que procuran, no pueden.”

González De Cellorigo, Martín (1600): *Memorial De La Política Necesaria Y Útil Restauración A La República De España.*

[https://archive.org/details/memorial-de-la-politica-necesaria-y-util-restauracion-a-la-republica-de-espana-m\\_202301](https://archive.org/details/memorial-de-la-politica-necesaria-y-util-restauracion-a-la-republica-de-espana-m_202301)

¿Es la 'emulación', en lugar de la 'especialización en ventaja comparativa' y el 'libre comercio', la estrategia que conduce al éxito del desarrollo? Al menos, parece que Occidente se enriqueció mediante la emulación: cuando Occidente comenzó a prosperar, las economías más desarrolladas eran asiáticas (China, India). España, en el siglo XVI, es un ejemplo de lo que no se debe hacer: las inmensas cantidades de oro y plata extraídas de América no se invirtieron en sistemas productivos, sino que desindustrializaron la economía. "Successful states protected manufacturing industry, unsuccessful Spain protected agriculture to the extent that it killed manufacturing." (Reinert, 2007)

Reinert, Erik S. (2007): *How rich countries got rich... and why poor countries stay poor*, Constable.

## 24. La hipótesis de Olson (Mancur Olson, 1984)

La hipótesis de Olson sostiene que la estabilidad política, a largo plazo, probablemente sea económicamente disfuncional, ya que tiende a obstaculizar o retrasar el rendimiento económico mediante las actividades de búsqueda de rentas de grupos de interés consolidados. El argumento es:

- (i) en sociedades estables, el número de colusiones y organizaciones para la acción colectiva tiende a crecer y acumularse;
- (ii) la mayoría de estas organizaciones son coaliciones distributivas, esto es, grupos de interés que buscan rentas y autoconcentrarse;
- (iii) la actividad de estas coaliciones distributivas provoca una disminución del crecimiento económico al frenar el cambio y la innovación, ya que, en general, estas coaliciones no aceptan la adopción de nuevas tecnologías ni las reasignaciones significativas de recursos que podrían ser necesarias para abordar los cambios y las crisis económicas.

Por el contrario, un crecimiento más rápido podría promoverse mediante crisis del orden sociopolítico que desmantelen a los poderosos grupos de interés.

Olson, Mancur (1984): *The rise and decline of nations. Economic growth, stagflation, and social rigidities*, Yale University Press.

Goldsmith, Arthur A. (1987): "Does political stability hinder economic development? Mancur Olson's theory and the Third World", *Comparative Politics* 19(4), 471-480.

Quiggin, John (1992): "Testing the implications of the Olson Hypothesis", *Economica* 59(235), 261-277.

## 25. Población y desarrollo

### • La visión malthusiana (Thomas Malthus): la humanidad no puede derrotar a la naturaleza

Suponiendo que la población tiende a crecer si no se controla y que hay un límite al aumento de la productividad agrícola, no es posible que una economía disfrute de un crecimiento demográfico y una creciente riqueza per cápita. Thomas Robert Malthus (1766-1834) planteó la tesis de que el crecimiento poblacional es (al menos eventualmente) más rápido que el crecimiento agrícola (producción de alimentos) y que, de hecho, la población tiende a aumentar más allá de la población

que puede alimentarse. Esta tesis cuestionaba la sostenibilidad de una población en crecimiento. Como resultado de la diferente capacidad potencial de expansión de la población y el suministro de alimentos, un crecimiento poblacional continuo se verá frenado negativamente por la escasez de alimentos, la pobreza, las privaciones y las enfermedades. Por ello, si la población no se frena positivamente (medidas que reducen la fertilidad), su crecimiento se verá frenado por la hambruna (suministro insuficiente de alimentos). Malthus no veía en el progreso tecnológico una escapatoria a esta ley: el aumento de la población siempre es peligroso y se ve estimulado por el aumento de la prosperidad, por lo que las mejoras tecnológicas simplemente aumentan el tamaño de la población frenada por la hambruna.

- **La visión neomalthusiana**

En lugar de la disponibilidad de alimentos, todas las economías están limitadas en última instancia por la capacidad de sustentación del planeta Tierra. Esta versión moderna y ambiental de la visión malthusiana sostiene que el crecimiento de la población está, por necesidad, limitado por el entorno natural.

- **Inestabilidad malthusiana (David Layzer, 1988)**

Los sistemas que pueden reproducirse (seres vivos, economías) y operar en condiciones favorables tienden a superar la capacidad de carga de su medio. Esto crea la necesidad y el incentivo para que el sistema se adapte y mute en algo diferente.

Layzer, David (1988): "Growth of order in the universe", en B. H. Weber; D. J. Depew; J. D. Smith; eds.: *Entropy, Information and Evolution*, MIT Press.

- **La visión boserupiana (Ester Boserup, 1965)**

El crecimiento poblacional genera mejoras en la productividad agrícola, la tecnología agrícola, el uso y la tenencia de la tierra: un aumento de la población conlleva la intensificación (mayor inversión de mano de obra) en el uso de los recursos existentes (tierra). Boserup sostiene que el crecimiento poblacional no depende del suministro de alimentos.

"Population growth, she argued, is independent of the food supply; indeed rather than population increase being a result of increased agricultural output, it is a cause of changes in agriculture. The principal means of increasing agricultural output is intensification (...) Any given area will go through a series of stages of increasing land use intensity under the spur of population growth (...) When population densities are low, little of the total area is cropped, and land which has been cropped for one or two years is left to revert to long periods of natural fallow. But as population density rises so the period under crops increases and the length of the fallow has to be shortened. In the final stage not only is there no fallow, but more than one crop is sown on each unit of land in a year. But although total output increases as the frequency of cropping rises, output per head declines. Output per head is highest in the most extensive system of land use, lowest in the most intensive."

Grigg, David (1979): "Ester Boserup's theory of agrarian change. A critical review", *Progress in Human Geography* 3(1), 64-84.

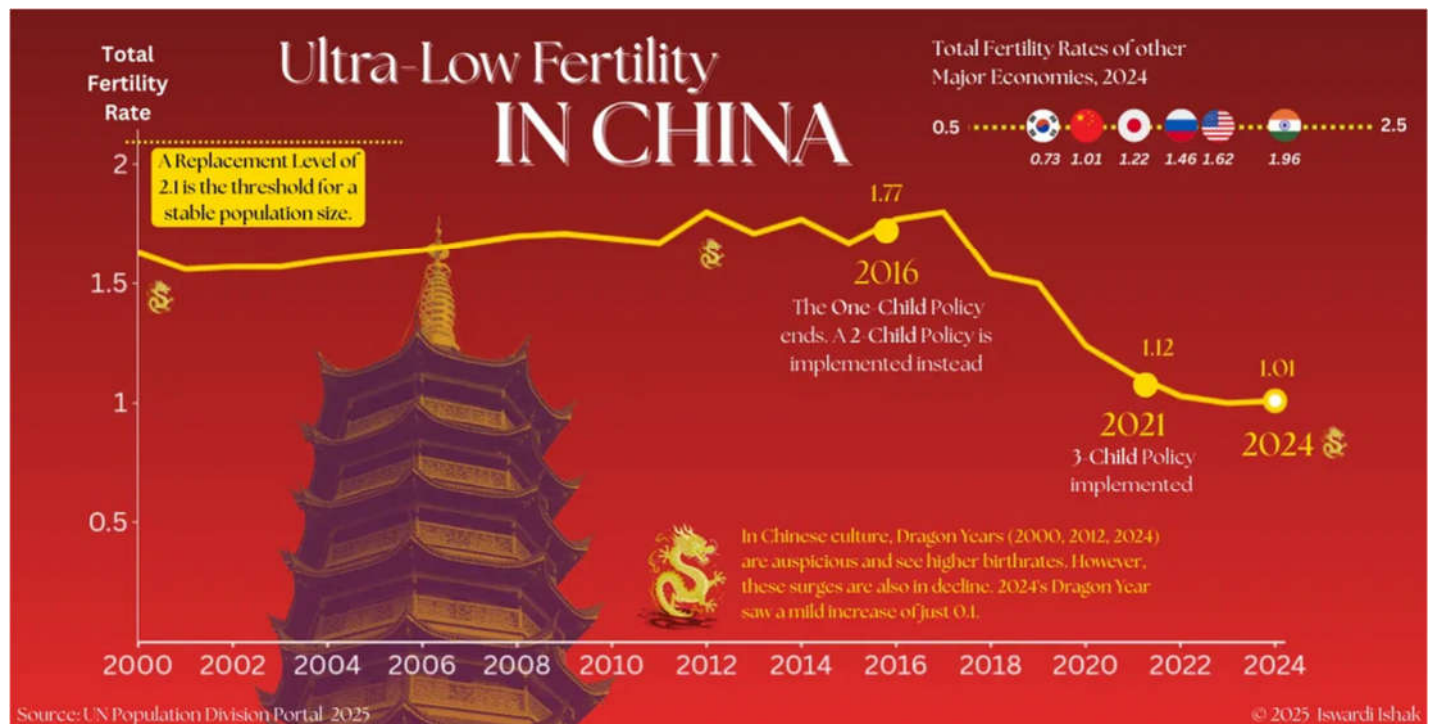
Boserup, Ester (1965): *The conditions of agricultural growth*, Allen and Unwin.

Boserup, Ester (1981): *Population and technology*, Basil Blackwell.

- **La visión brenneriana (Reuven Brenner, 1983)**

Muchas características de las sociedades modernas (el surgimiento de la agricultura, la alfabetización, las instituciones de mercado, el gobierno, el sistema legal) pueden considerarse adaptaciones al aumento demográfico. Un aumento demográfico reduce la riqueza per cápita y altera su distribución. Esto induce a quienes se encuentran en la escala más baja de distribución de la riqueza a asumir mayores riesgos (apostar por ideas novedosas, revolucionarias e innovadoras; participar en actos ilegales; ser más creativos; apostar más). Los individuos más envidiosos son más propensos a apostar más para intentar mejorar su posición relativa. Quienes tienen éxito en la apuesta por ideas novedosas generan una externalidad positiva para el resto: las innovaciones finalmente se difunden. "The continuing growth of human populations ... is the engine that drives everything" (Robert May, 1993).

Brenner, Reuven (1983): *History. The human gamble*, The University of Chicago Press.



<https://www.voronoiaapp.com/demographics/Ultra-Low-Fertility-in-China-7283>

- **La gente es el recurso definitivo (Julian Simon, 1996)**

### Más gente, buena cosa

"Adding more people to any community causes problems, but people are also the means to solve these problems. The main fuel to speed the world's progress is our stock of knowledge, and the brake is our lack of imagination. The ultimate resource is people —skilled, spirited, hopeful people— who will exert their wills and imaginations for their own benefit as well as in a spirit of faith and social

concern. Inevitably they will benefit not only themselves but the poor and the rest of us as well.” Having more people creates more problems but people are the means to solve them.

### Recursos naturales

“...our supplies of natural resources are not finite in any economic sense. Nor does past experience give reason to expect natural resources to become more scarce. Rather, if history is any guide, natural resources will progressively become less costly, hence less scarce, and will constitute a smaller proportion of our expenses in future years.” The same conclusion is said to apply to energy: more people will speed the development of cheap energy supplies.

### Cenizos y fatalistas

“The doomsters reply that because there are more of us, we are eroding the basis of existence, and rendering more likely a ‘crash’ due to population ‘overshoot’; that is, they say that our present or greater numbers are not sustainable. But the signs of incipient catastrophe are absent. Length of life and health are increasing, supplies of food and other natural resources are becoming ever more abundant, and pollutants in our environment are decreasing.”

### El problema del mundo

“The world’s problem is not too many people, but lack of political and economic freedom. Powerful evidence comes from pairs of countries that had the same culture and history and much the same standard of living when they split apart after World War II — East and West Germany, North and South Korea, Taiwan and China.”

### No hay límites

“In the short run, all resources are limited. An example of such a finite resource is the amount of attention that you will devote to what I write. The longer run, however, is a different story. The standard of living has risen along with the size of the world’s population since the beginning of recorded time. There is no convincing economic reason why these trends toward a better life should not continue indefinitely.”

### Lo que funcionó, funcionará

“Greater consumption due to an increase in population and growth of income heightens scarcity and induces price run-ups. A higher price represents an opportunity that leads inventors and business people to seek new ways to satisfy the shortages. Some fail, at cost to themselves. A few succeed, and the final result is that we end up better off than if the original shortage problems had never arisen. (...) The most important benefit of population size and growth is the increase it brings to the stock of useful knowledge. (...) Progress is limited largely by the availability of trained workers. In the long run the basic forces influencing the state of humanity and its progress are (a) the number of people who are alive to consume, but also to produce goods and knowledge; and (b) the level of wealth. Those are the great variables which control the advance of civilization.”

### Lo nuevo

Lo que diferencia nuestra época de las anteriores es la disminución de la mortalidad y el aumento de la esperanza de vida. Lo que tenemos en común es el afán de superación, la búsqueda continua de la superación. Para lograrlo, debemos evitar la complacencia: toda mejora requiere esfuerzo.

Simon, Julian Lincoln (1996): *The ultimate resource 2*, Princeton University Press.

## 26. Ideas sobre el desarrollo

- En cuanto al proceso de desarrollo: los pioneros tardaron más en desarrollarse (podían permitírselo); ¿deberían los rezagados lograr el mismo resultado en menos tiempo? Esta exigencia dificulta el desarrollo. Los rezagados se enfrentan a una nueva limitación: la 'aceleración del tiempo' (es necesario concentrar los esfuerzos, puesto que estrategias demasiado graduales ahora fracasan).
- La trayectoria de desarrollo no es totalmente replicable: las posiciones más favorables y ventajosas ya las han adoptado los pioneros. Los países industrializados de inicio temprano se especializan en productos de mayor valor añadido, mientras que los países industrializados de inicio tardío se especializan en productos de menor valor añadido. Esto limita el potencial de crecimiento y desarrollo.
- Parece que no todas las estrategias de crecimiento son equivalentes en términos de desarrollo.
- ¿Implica el crecimiento continuo la necesidad de crecer más (integrar más mercados)? ¿Puede el crecimiento solo darse mediante la integración de mercados? ¿Es la globalización el resultado de tener que mantener el crecimiento, que de otro modo se detendría?
- Dos procesos parecen generar un vacío de poder: el surgimiento de una nueva y poderosa aristocracia mundial no estatal y el declive de la antigua aristocracia de los Estados-nación. Los gobiernos no pueden resolver por sí solos los problemas globales y las empresas transnacionales no están interesadas en asumir esa responsabilidad.
- ¿Es el desarrollo político inseparable del desarrollo económico? ¿El Estado-nación es necesario para el desarrollo? Según la experiencia occidental, la creación de una clase media, junto con la integración del mercado nacional, condujo al surgimiento del Estado-nación moderno. La estrategia inversa (primero el Estado moderno y luego intentar generar una clase media y articular un mercado interno) no parece haber funcionado (América Latina).
- **El mito del desarrollo.** La mayor parte de la humanidad sigue viviendo con bajos ingresos, en la pobreza, tecnológicamente atrasada y gobernada por regímenes autoritarios o, en el mejor de los casos, en democracias con bajo poder. La receta para el desarrollo: modernizar las exportaciones y limitar la fertilidad. La pobreza proviene de lo contrario: exportaciones insuficientemente procesadas, explosión demográfica. "The crude reality is that today nobody knows how to reach El Dorado. The rich are getting richer and the poor poorer, in all countries."

de Rivero, Oswaldo (2010): *The myth of development. Non-viable economies and the crisis of civilization*, Zed Books.

- **El factor extra.** Hidalgo (2015) añade a los factores convencionales con los que los libros de texto de economía describen una economía (capital, trabajo) y a los de ciencias naturales (energía, materia, información) otro factor que vincula las magnitudes físicas con los procesos sociales: la complejidad económica, que se refiere al conocimiento acumulado a nivel agregado, que se expresa en la diversidad y sofisticación de las actividades económicas.

Hidalgo, César (2015): *Why information grows. The evolution of order, from atoms to economies*, Basic Books.

- **La gran evasión** (*The great escape*, Angus Deaton, 2013). La expresión, tomada de la película sobre prisioneros de guerra en la Segunda Guerra Mundial (dirigida por John Sturges, 1960), se refiere a que, gracias al progreso material iniciado en la Revolución Industrial, gran parte de la humanidad ha escapado de la pobreza, la enfermedad y la privación (si bien los episodios de progreso son simultáneamente episodios de creciente desigualdad). “The greatest escape in human history is the escape from poverty and death.”

Deaton, Angus (2013): *The Great Escape. Health, wealth, and the origins of inequality*, Princeton University Press.

## 27. Población y sostenibilidad

### • Teoremas sobre la población de Kenneth Boulding

- **El teorema lúgubre** (*The Dismal Theorem*). Si el único control definitivo sobre el crecimiento de la población es la miseria, entonces la población crecerá hasta que sea lo suficientemente miserable como para detener su crecimiento.
- **El teorema absolutamente deprimente** (*The Utterly Dismal Theorem*). Las mejoras técnicas sólo pueden aliviar la miseria temporalmente: dado que, según el teorema lúgubre, la miseria en última instancia controlará la población, el resultado final de cualquier mejora técnica es aumentar la cantidad de personas que vivirán en la miseria y, en consecuencia, la cantidad total de miseria humana.
- **El teorema lúgubre moderadamente alegre** (*The Moderately Cheerful Form Dismal Theorem*). Si la miseria y el hambre no son la única manera de mantener bajo control a una población próspera, la población no tiene por qué crecer hasta que sea miserable y muera de hambre, para que pueda ser establemente próspera.

### • Leyes de sostenibilidad de Albert Bartlett

- “Population growth and/or growth in the rates of consumption of resources cannot be sustained”.
- “The larger the population of a society and/or the larger its rates of consumption of resources, the more difficult it will be to transform the society to a condition of sustainability”. These two laws imply that the concept of sustainable growth is an oxymoron.

Bartlett, Albert A. (1998): “Malthus marginalized: The massive movement to marginalize the man’s message”, *The Social Contract*, 239-252

Boulding, Kenneth (1971): “Foreword to T. R. Malthus, *Population, The First Essay*”, en *Collected Papers, Vol. II*, Colorado Associated University Press, pp. 137-142.

Bartlett, Albert A. (1994): "Reflections on sustainability, population growth, and the Environment", *Population & Environment* 16(1), pp. 5-35.

### • El teorema de imposibilidad de Herman Daly de crecimiento ilimitado en entorno limitado

- "It is impossible for the world economy to grow its way out of poverty and environmental degradation. In other words, sustainable growth is impossible."
- Corolario de Magdoff y Foster (2011) al teorema de imposibilidad de Daly: "The continuation for any length of time of capitalism, as a grow-or-die system dedicated to unlimited capital accumulation, is itself a flat impossibility". "We are constantly being told by the vested interests (...) that capitalism offers the solution to the environmental problem: as if the further growth of capital markets, green consumption, and new technology provide us with miraculous ways out of our global ecological dilemma. Such views are rooted in an absolute denial of reality."

Magdoff, Fred; John Bellamy Foster (2011): *What every environmentalist needs to know about capitalism. A citizen's guide to capitalism and the environment*, Monthly Review Press.

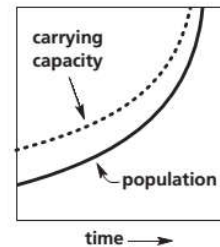
### • Dinámicas del modelo World3 de Meadows et al. (2005, ch. 4)

#### World3

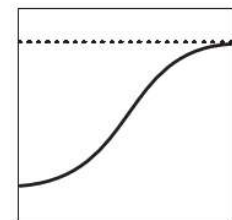
World3 es un modelo informático de la economía mundial de Meadows et al. (2005) "to understand the broad sweep of the future": las formas en que la economía mundial interactuará con la capacidad de sustentación de la Tierra durante muchas décadas.

#### Población y capacidad de carga (o sustentación)

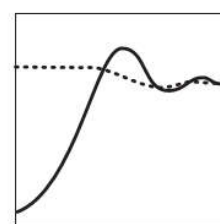
El gráfico de la derecha muestra cuatro dinámicas de convergencia a la capacidad de carga del planeta: crecimiento continuo de población y capacidad de carga, convergencia hacia la capacidad desde abajo, sobreimpulso con convergencia cíclica y sobreimpulso seguido de colapso. Los autores creen que la economía mundial ya está por encima de la capacidad de carga de la Tierra (sobreimpulso).



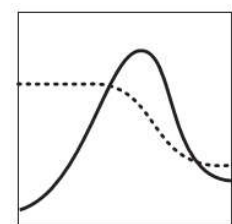
a) Continuous Growth



b) Sigmoid Approach to Equilibrium



c) Overshoot and Oscillation



d) Overshoot and Collapse

#### Ciclos de retroalimentación

Las Fig. 1 y 2 describe las relaciones de retroalimentación que regulan el crecimiento poblacional y la acumulación de capital. La Fig. 1 identifica la conexión entre población y capital que se transmite a través de la agricultura; la Fig. 2, la que se transmite a través de los recursos y servicios.

En el Escenario 1 (Fig. 3), el modelo informático World3 se ejecuta con valores de parámetros que representan la continuación de la trayectoria que siguió la economía mundial durante el siglo XX. La población y la producción aumentan hasta alcanzar el límite de recursos. La imposibilidad de

mantener los flujos de recursos provoca una caída de la producción y la esperanza de vida, así como un aumento de las tasas de mortalidad.

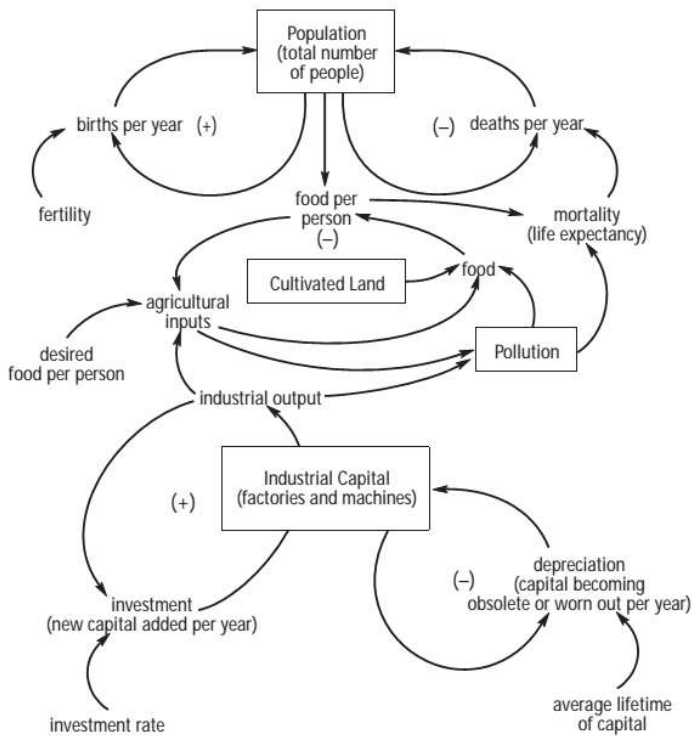


Fig. 1. Ciclos de retroalimentación de población, capital, agricultura y contaminación (Meadows et al., 2005, p.144)

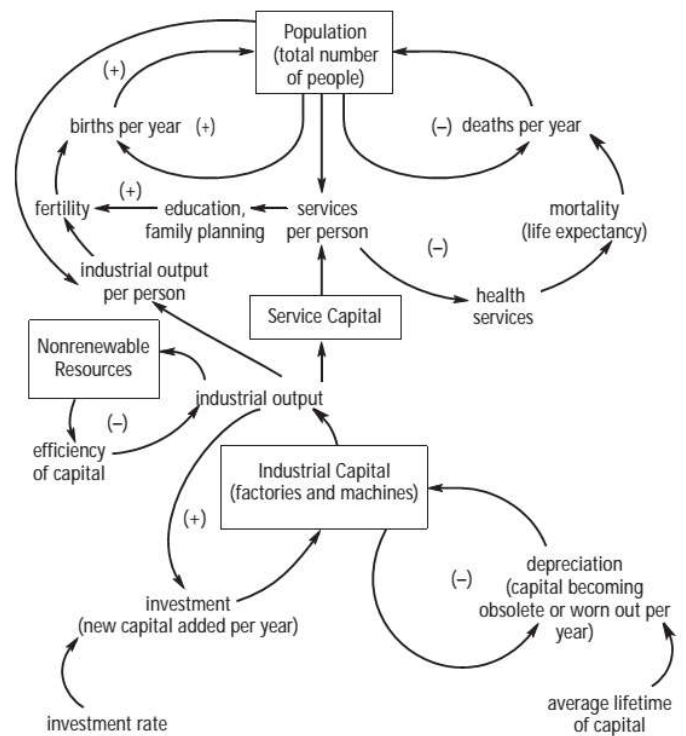


Fig. 2. Ciclos de retroalimentación de población, capital, servicios y recursos (Meadows et al., 2005, p.145)

En el Escenario 2 (Fig. 4), la economía desarrolla simultáneamente tecnologías costosas para la reducción de la contaminación, la mejora del rendimiento de la tierra, la protección del suelo y la conservación de recursos no renovables. La implementación completa de estas tecnologías tarda dos décadas, pero al final la economía es relativamente grande y próspera (aunque por debajo del nivel máximo jamás alcanzado).

Meadows, Donella; Jorgen Randers; Dennis Meadows (2005): *Limits to growth. The 30-year update, Earthscan.*

### • Auge y caída del imperio romano

Roma fue un experimento político basado en la ciudadanía con ingredientes particulares: piedad religiosa, sacrificio cívico, militarismo y mecanismos legales y culturales para incorporar a antiguos enemigos como aliados y ciudadanos. Los romanos gestionaron el éxito (la adquisición de enormes cantidades de riqueza a partir de las conquistas) con éxito. La gran estrategia consistió en la integración: los romanos gobernaron a través de las ciudades y sus élites. Las élites locales de tres continentes recaudaron impuestos para mantener el imperio y, a cambio, se les permitió ingresar a la clase gobernante romana. La durabilidad del imperio dependía de ese acuerdo. La estabilidad del pacto lo estabilizó, lo que permitió la expansión demográfica y económica, que a su vez reforzó su poder.

En el período 150-450 d. C., una de las secuencias más dramáticas del cambio climático parece haber llevado al límite la resiliencia del imperio. Según Ian Morris, la caída del Imperio Romano es la mayor regresión en toda la historia de la humanidad. El ascenso de Occidente puede haber sido un efecto secundario del experimento extraordinariamente exitoso y duradero que fue el imperio romano.

Harper, Kyle (2017): *The fate of Rome. Climate, disease, and the end of an empire.*

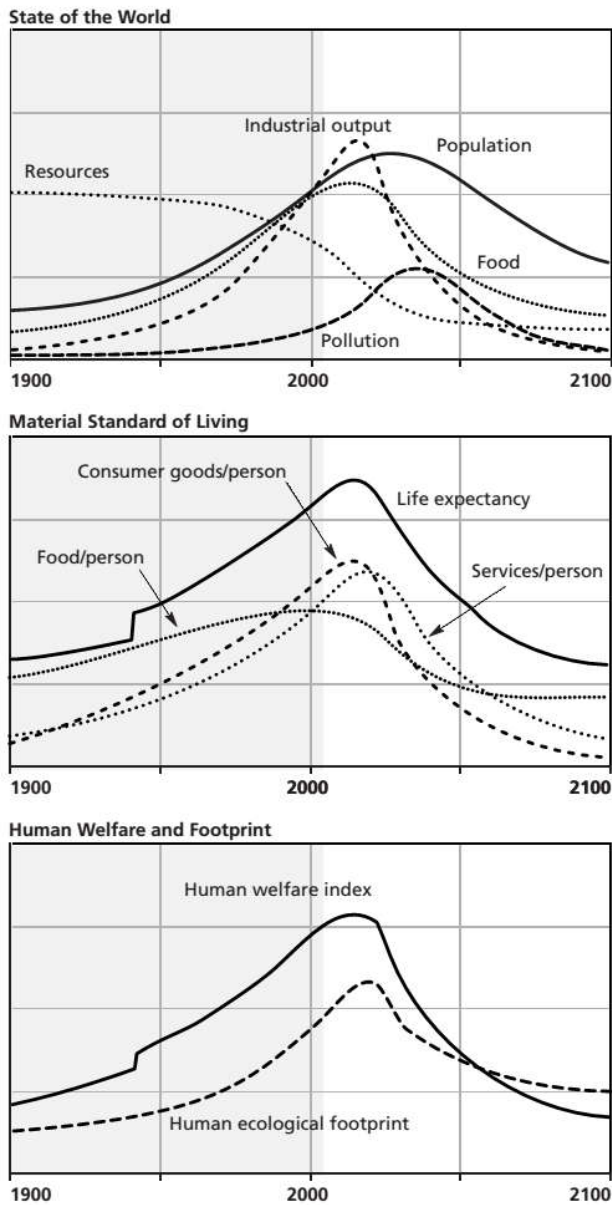


Fig. 3. Scenario 1 of World3  
(Meadows et al., 2005, p. 169)

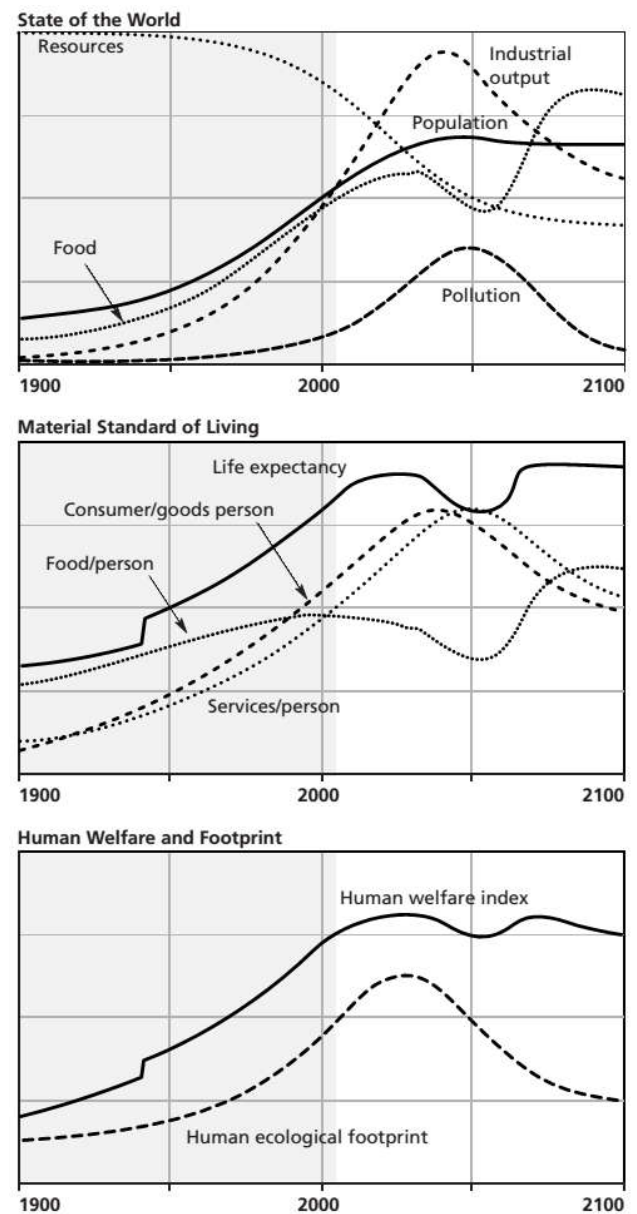


Fig. 4. Scenario 6 of World3  
(Meadows et al., 2005, p. 219)

- **La predicción del modelo y la realidad**

La siguiente gráfica ompara valores observados con los valores predichos por la ejecución estándar del modelo World3 de *Limits to growth* (con actualización en 2000).

“A comparison of The Limits to Growth with 30 years of reality”, *Journal of Global Environmental Change*, 2008, 387-411

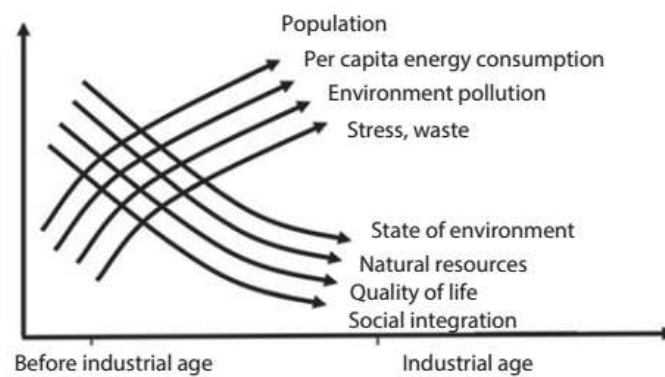
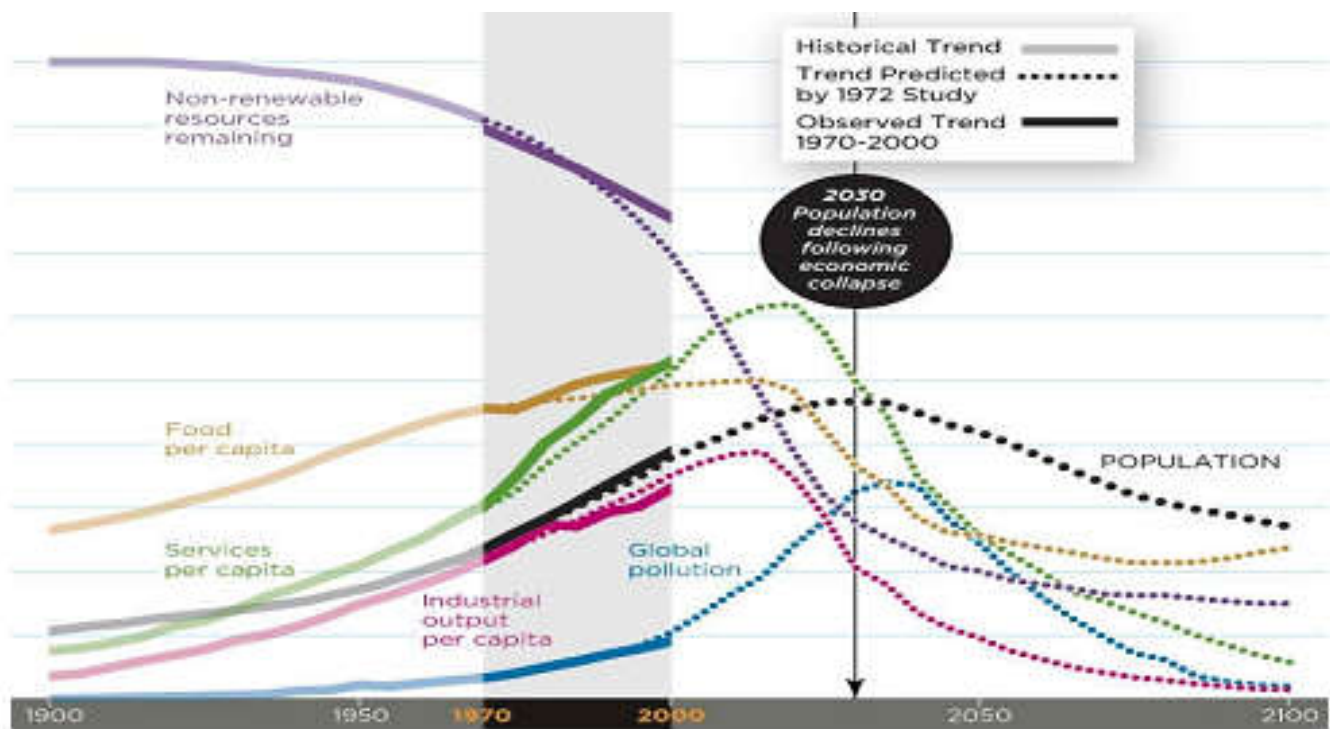


Figure 3.8 Our current epoch is an epic failure of intangible values.

## 28. El imperativo/trampa del crecimiento

“Plants grow, people grow, even whole forests, jungles, and coral reefs grow—but eventually, they stop. This doesn’t mean they’re dead. They’ve simply reached a level of maturity where health is no longer about getting bigger but about sustaining vitality. There may be a turnover of cells, organisms, and even entire species, but the whole system learns to maintain itself over time, without the obligation to grow. Companies deserve to work this way as well. They should be allowed to get to an appropriate size and then stay there, or even get smaller if the marketplace changes for a while. But in the current business landscape, that’s just not permitted. Corporations in particular are duty bound to grow by any means necessary. For Coke, Pepsi, Exxon, and Citibank, there’s no such thing as “big enough”; every aspect of their operations is geared toward meeting new growth targets perpetually. That’s because, like a shark that must move in order to breathe, corporations must grow

in order to survive (...) A corporation is just a set of rules, and so is software. It's all code, and it doesn't care about people, our priorities, or our future unless we bother to program those concerns into it."

"The corporation has no choice other than to exercise the four sides of its original tetrad: extract value, squash local peer-to-peer markets, expand the empire, and seek personhood—all in order to grow pots of money, or capital.

Tipos de economía	ARTISANAL 1000–1300	INDUSTRIAL 1300–1990	DIGITAL INDUSTRIALISM 1990–2015	DIGITAL DISTRIBUTIVISM 2015–
Direction	•	↗	↻	♻️
Purpose	Subsistence	Growth	Exponential growth	Sustainable prosperity
Company	Family business	Chartered monopoly/corporation	Platform monopoly (Amazon, Uber)	Platform cooperative (Mondragon, La'Zooz)
Currency	Market money (support trade)	Central currency (support banks)	Derivative instruments (leverage debt)	Bitcoin and P2P (promote circulation)
Investment	Direct investment	Stock markets	Algorithms	Crowdfunding
Production	Handmade (manuscript)	Mass-produced (printed book)	Replicable (file)	Collaborative (wiki)
Marketing	Human face	Brand icon	Big data (prediction)	Utility, legacy (product attributes, company ethics)
Communications	Personal contact	Mass media	Apps	Networks
Land & resources	Church commons	Colonization	Privatization	Public commons
Wages	Paid for value (craftsperson)	Paid for time (employee)	Not paid/underpaid (independent contractor)	Value exchanged (community member)
Scale	Local	National	Global	Strategically bounded
Optimized for	Creation of value	Extraction of value	Destruction of value	Exchange of value

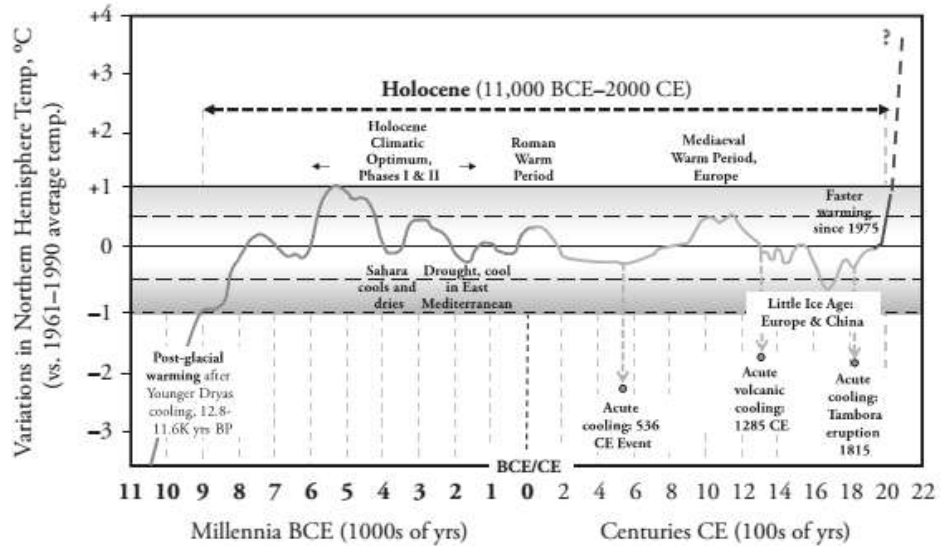
The most successful and most loathed corporations of the last century all work this way. Walmart, for one ready example, lives by the tetrad. It extracts value from local communities, replacing their peer-to-peer economies with a single, one-way distribution point for foreign goods. Workers are paid less than they earned in their previous jobs or businesses and are often limited to part-time employment so the company can externalize the cost of health care and other benefits to local government (...) When it moves into a new region, it undercuts the prices of local merchants—often taking a loss on sales of locally available goods simply to put smaller merchants out of business (...) Walmart retrieves the values of empire, where expansion is the primary aim. It has opened as many as one store a day in the United States alone.<sup>7</sup> The company sometimes opens two stores, ten or twenty miles apart in a new region, and keeps them both open until local merchants go out of business and new consumer patterns are established. Then it closes the less popular store, forcing those consumers to travel to the other one (...) Finally, in its flip toward personhood, Walmart has attempted to accomplish all this with a human face—quite literally. The company adopted a version of the iconic 1970s yellow smiley face as a brand personality (...) Walmart's motto went from the utilitarian and immortal 'Always Low Prices' to the much more humanistic 'Save Money. Live Better.'"

Rushkoff, Douglas (2016): *Throwing rocks at the Google bus. How growth became the enemy of prosperity*, Portfolio/Penguin.

## 29. Impacto medioambiental del crecimiento

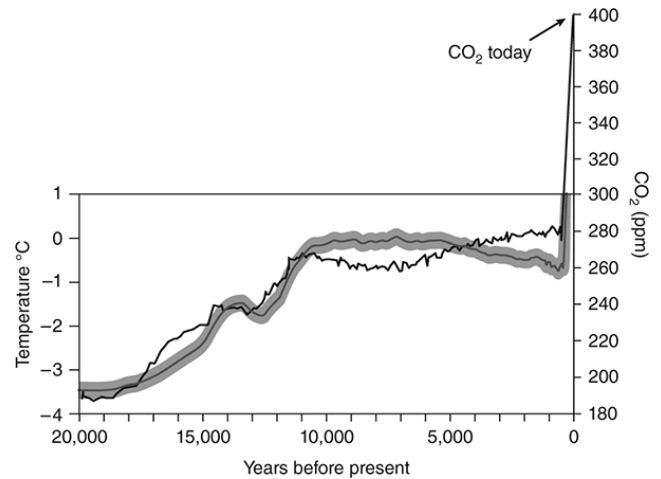
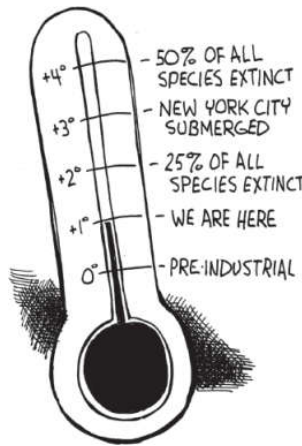
### • Emisiones de CO<sub>2</sub>

La actividad humana genera más de 30 000 millones de toneladas de CO<sub>2</sub> al año. Con un peso promedio de una persona de 70 kg, las 30 gigatoneladas equivalen al peso de 428.500 millones de personas. Así que el peso anual de las emisiones de CO<sub>2</sub> es unas 60 veces el número total de personas en el planeta.



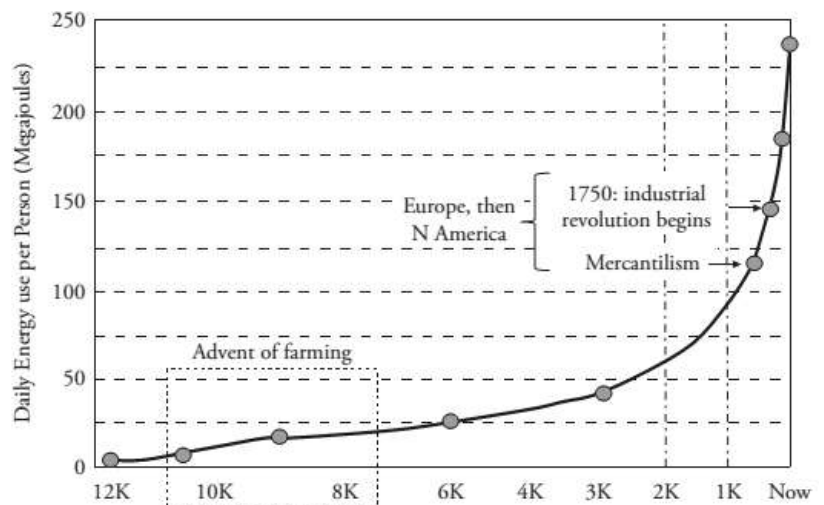
### • Huella ecológica

La huella ecológica es una estimación de la cantidad de recursos, producción, consumo y residuos utilizados por una persona. Sus unidades son unidades planetarias: el número de planetas Tierra necesarios si cada individuo viviera como lo hace. Esta huella está creciendo. La demanda humana total superó la biocapacidad de la Tierra alrededor de 1980. Actualmente, la demanda requiere la biocapacidad equivalente a 1,5 Tierras para alimentarse, proporcionar materiales, regenerarse, autoabastecerse y absorber residuos.



### • Consumo de energía

Al inicio de la revolución agraria (hace unos 10.000 años), los agricultores utilizaban 20 megajulios de energía (trabajo físico) diariamente. El norteamericano promedio ahora opera diariamente con al menos 1.000 megajulios. El promedio mundial actual ronda los 250 megajulios.



### • ¿Ha sido la humanidad afortunada climáticamente?

Durante el Holoceno, los últimos 12.000 años, el clima global se ha mantenido relativamente constante. La temperatura superficial global promedio fue de 15 °C. Las temperaturas promedio

regionales decenales rara vez superaron los 2 °C. En Europa, las temperaturas entre el pico del Cálido Medieval y el nadir de la Pequeña Edad de Hielo difirieron en aproximadamente 1,5 °C. En consecuencia, la trayectoria de la economía mundial desde la revolución agraria se ha visto favorecida por un clima global (¿extraordinariamente?) estable. ¿Cuánto tiempo pueden durar estas condiciones afortunadas? En la actualidad, la humanidad se enfrenta a cambios en el clima global más grandes y rápidos que en cualquier otro en la historia. Hay estimaciones que predicen un calentamiento global promedio de hasta 4 °C durante el siglo XXI.

• **Mensaje sobre el cambio climático a los líderes mundiales**

“Human-induced climate change is an issue beyond politics. It transcends parties, nations, and even generations. For the first time in human history, the very health of the planet, and therefore the bases for future economic development, the end of poverty, and human wellbeing, are in the balance. If we were facing an imminent threat from beyond Earth, there is no doubt that humanity would immediately unite in common cause. The fact that the threat comes from within —indeed from ourselves— and that it develops over an extended period of time does not alter the urgency of cooperation and decisive action.”

Firmado por más de 4.000 científicos de todo el mundo entre julio y agosto de 2014.

Mann, Michael E.; Tom Holes (2016): *The madhouse effect. How climate change denial is threatening our planet*, Columbia University Press.

Maslin, Mark (2014): *Climate change. A very short introduction*, Oxford University Press.

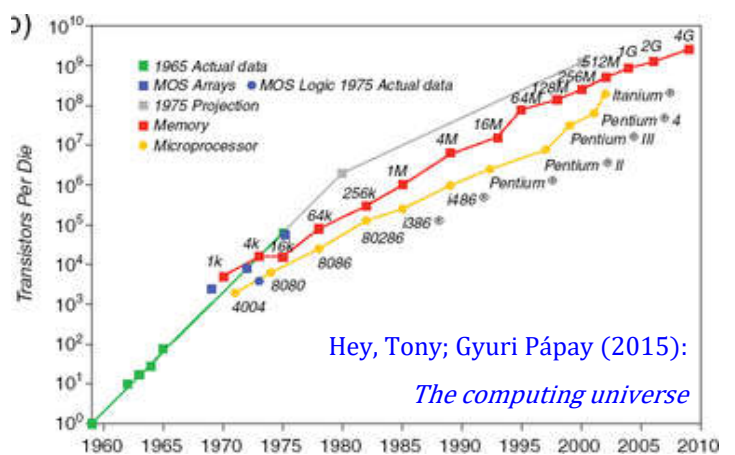
McMichael, Anthony J.; Alistair Woodward; Cameron Muir (2017): *Climate change and the health of nations. Famines, fevers, and the fate of populations*, Oxford University Press.

National Academy of Sciences; The Royal Society (sin fecha): *Climate change: Evidence and causes*.

Westergård, Rune (2018): *One planet is enough. Tackling climate change and environmental threats through technology*.

**30. Tecnología y ley de Moore (Gordon Moore, 1965)**

La ley de Moore se fundamenta en una observación técnica sobre el desarrollo de la electrónica digital y la informática. En 1965, Gordon E. Moore predijo que el número de elementos de circuito en un chip de un centímetro cuadrado se duplicaría cada año y medio: profetizó que nuevos métodos harían que los microchips fueran más pequeños, más fiables, consumieran menos energía y fueran más económicos. Su predicción parece haberse mantenido durante más de cincuenta años: al reducirse el tamaño de los transistores y aumentar la



capacidad de un microchip, los chips se han vuelto mejores, más rápidos, más económicos y su uso se ha extendido. Una formulación general de la ley es que

“the level of chip complexity that can be manufactured for minimal cost is an exponential function that doubles in a period of time”.

En términos económicos, la ley establece que la evolución tecnológica aumenta el número de componentes (y, por lo tanto, proporciona mayor funcionalidad) por el mismo coste. La mejora exponencial de la tecnología no se ha limitado a los microchips, sino también a la capacidad de las memorias de los ordenadores, la velocidad de transmisión de datos y el número de píxeles en la fotografía digital. Sobre cuánto durará la ‘ley’, Moore sentenció que

“All good exponentials come to an end”.

Thackray, Arnold; David C. Brock; Rachel Jones (2015): *Moore’s Law. The life of Gordon Moore, Silicon Valley’s quiet revolutionary*, Basic Books.

Huff, Howard (ed) (2009): *Into the nano era. Moore’s Law beyond planar silicon CMOS*, Springer.

“Moore’s Law, the biennial doubling of computer chip performance that had accelerated the pace of innovation and become the metronome of the modern world (...) guaranteed that change would be so central to modern life that there would be precious little time left for nostalgia. When you are being chased by demons, your only chance of survival is to keep racing forward as fast as you can; looking back can only scare you. Worse, as Moore’s Law had been warning for a half century now, it wasn’t even enough just to go fast. Rather, you had to go faster and faster, progressing at a pace humanity had never before known, just to keep up (...) And through Intel’s products and commitment to Moore’s Law, they [Gordon Moore and Andy Grove] had made possible the consumer electronics revolution that now defined the lives of three billion people, with millions more joining every day. Humanity was now richer, healthier, smarter, and more interconnected than ever before because of what they achieved.” (Malone, 2014)

“Moore’s Law is the product of human imagination. The phrase Moore’s Law is known around the world as a technical observation, one that describes the development of digital electronics and computing (...) In April 1965 (...) Moore described how the chemical printing of microchips was open ended. If investment was made, technology would advance, and such investment would reward microchip makers handsomely. It was a win-win situation. By shrinking transistors, and putting more of them into individual microchips, everything became better: as chips became both better and less expensive, use would spread. Moore presciently envisaged the world we know today, ‘such wonders as home computers, automatic controls for automobiles, and personal portable communications equipment.’ (...) Since 1959 (...) the number of transistors on a chip had doubled each year, so that microchips now incorporated more than 50 transistors each. Moore predicted this dynamic would continue for the coming decade. By investing in chemical printing technology, doubling transistor counts each year, and shrinking cost (...) manufacturers would in 1975 be making microchips containing not 50 but 65,000 transistors. This was the first formulation of Moore’s Law, displaying its essence.” (Thackray et al., 2015)

“By 1975 Moore was CEO of Intel, and microchips did contain 65,000 transistors (...) Moore predicted that in the decade ahead, with mechanisms to develop the technology becoming more expensive, the ‘annual doubling law’ would slow to a doubling every eighteen months. By 1985 microchips with 16 million transistors would represent the cheapest form of electronics. And so it went. Today, the transistor on a microchip has become the most manufactured object in all of history. Transistors now produced in a single year most likely exceed the proverbial grains of sand upon all the seashores of the world. The price of computing has fallen well over a millionfold, while the cost of electronics components has shrunk more than a billionfold.” (Thackray et al., 2015)

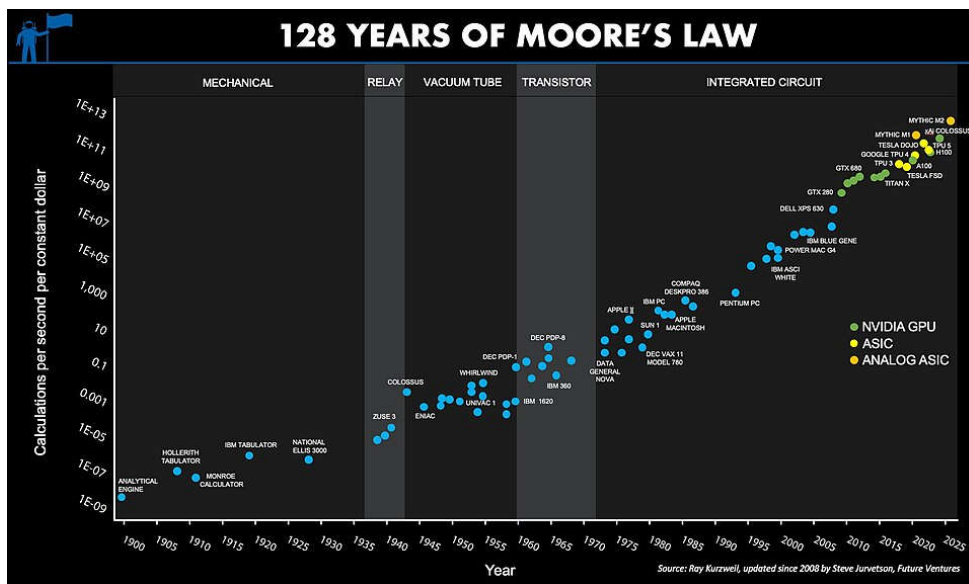
“Microchip complexity has increased at a metronomic pace for the past six decades, as Moore’s Law is everywhere observed. That ‘law’ is a social product, inspired by imagination, made possible through experience, and enforced through the cooperative and competitive efforts of the global semiconductor industry. The development of chemical printing and the design of complex microchips have required the investment of many billions of dollars and the coordinated effort of hundreds of thousands of people, through the organizing interventions of consortia, conferences, and ‘technology road maps.’ In the history of technology, the silicon transistor within the microchip ranks alongside the steam railroad, the automobile, and the airplane in its revolutionary impact.” (Thackray et al., 2015)

“Moore’s Law is unique: the deliberate human creation of an unusually regular pace of unusually rapid change. We take this for granted and enjoy it. But it will not last. ‘All good exponentials come to an end,’ observes Moore. He has long glimpsed the eventual emergence of fundamental barriers. On the technical side, it is impossible to print chemically a feature that is smaller than an atom (in 2015 some features of transistors on microchips are just tens of atoms thick). More significantly, Moore foresees disruption in the economic side of Moore’s Law. The growing expense of ever more exacting manufacturing technology, in factories costing several billion dollars apiece, will erode economic incentives, slowing to a crawl the future career of the microchip.” (Thackray et al., 2015)

*Malone, Michael S. (2014): The Intel trinity. How Robert Noyce, Gordon Moore, and Andy Grove built the world’s most important company, Harper Business.*

*Thackray, Arnold; David C. Brock; Rachel Jones (2015): Moore’s law. The life of Gordon Moore, Silicon’s Valley quiet revolutionary, Basic Books.*

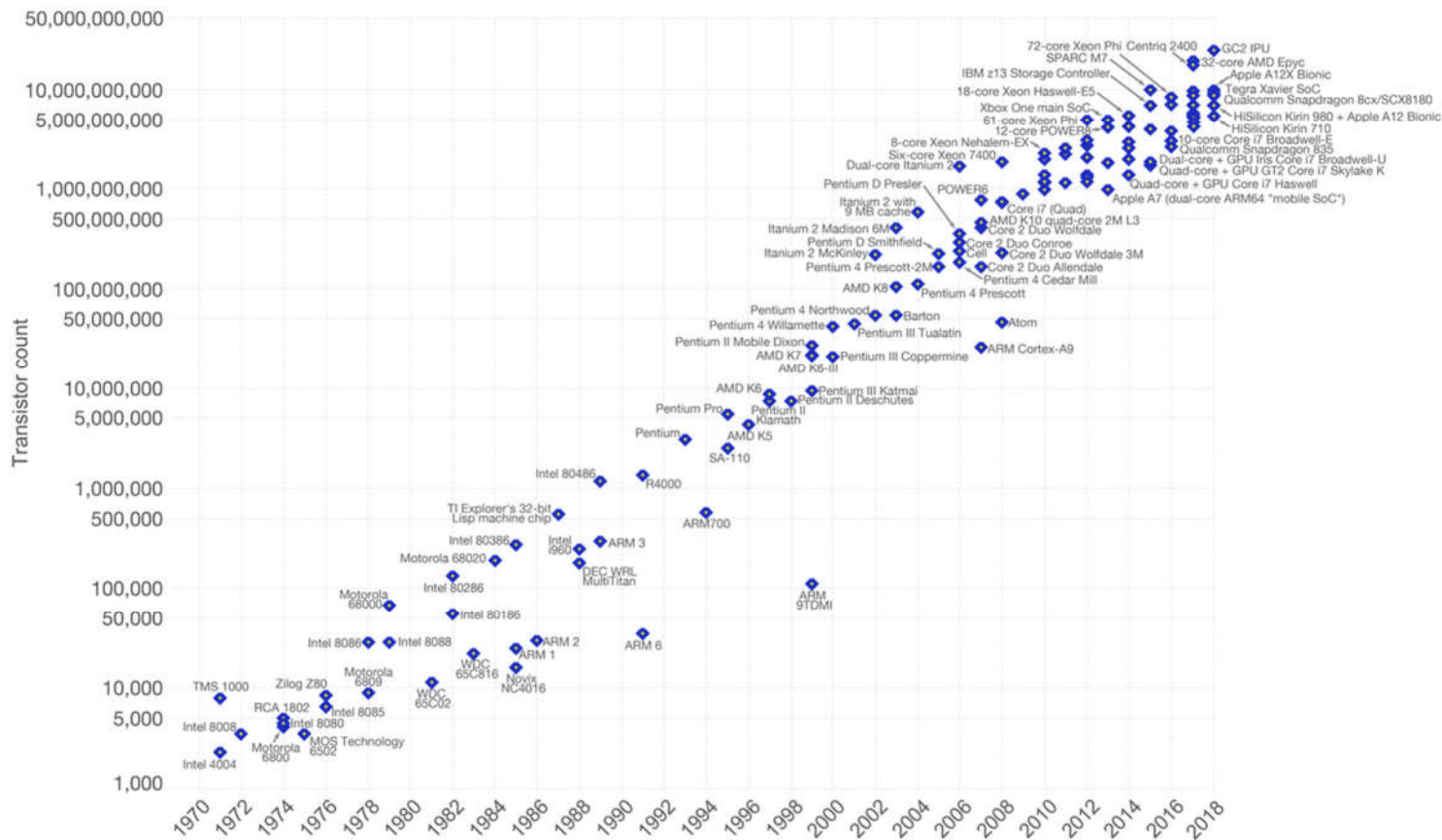
“Moore's law is the observation that the number of transistors in an integrated circuit doubles about every two years. Moore's law is an observation and projection of a historical trend. Rather than a law of physics, it is an empirical relationship. It is an experience curve effect, a type of observation quantifying efficiency gains from learned experience in production.”



[https://en.wikipedia.org/wiki/Moore%27s\\_law](https://en.wikipedia.org/wiki/Moore%27s_law)

## Moore's Law – The number of transistors on integrated circuit chips (1971-2018)

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are linked to Moore's law.



## • La ley de Moore de todo (*Moore's law of everything*, Samuel Arbesman, 2013)

"... there are regularities in these changes in technological knowledge. It's not random and it's not erratic. There is a pattern, and it affects many of the facts that surround us, even ones that don't necessarily seem to deal with technology. The first example of this? Moore's Law."

"These technological doublings in the realm of science are actually the rule rather than the exception. For example, there is a Moore's Law of proteomics, the field that deals with large-scale data and analysis related to proteins and their interactions within the cell. Here too there is a yearly doubling in technological capability when it comes to understanding the interactions of proteins (...) So while exponential growth is not a self-fulfilling proposition, there is feedback, which leads to a sort of technological imperative: As there is more technological or scientific knowledge on which to grow, new technologies increase the speed at which they grow.

"These doublings have been occurring in many areas of technology well before Moore formulated his law. As noted earlier, this regularity just in the realm of computing power has held true as far back as the late nineteenth and early twentieth centuries, before Gordon Moore was even born. So while Moore gave a name to something that had been happening, the phenomenon he named didn't actually create it. Why else might everything be adhering to these exponential curves and growing so rapidly? A likely answer is related to the idea of cumulative knowledge. Anything new—an idea, discovery, or technological breakthrough—must be built upon what is known already. This is generally how the world works. Scientific ideas build upon one another to allow for new scientific knowledge and technologies and are the basis for new breakthroughs. When it comes to technological and scientific growth, we can bootstrap what we have learned before toward the creation of new facts. We must gain a certain amount of knowledge in order to learn something new (...) We should imagine that the magnitude of technological growth is proportional to the amount of knowledge that has come before it. The more preexisting methods, ideas, or anything else that is essential for making a certain technology just a little bit better, the more potential for that technology to grow."

*Arbesman, Samuel (2013): The half-life of facts. Why everything we know has an expiration date, Current.*

## • Las sendas de la tecnología

"...we do have three types of evidence strongly suggesting that the paths of technologies are inevitable:

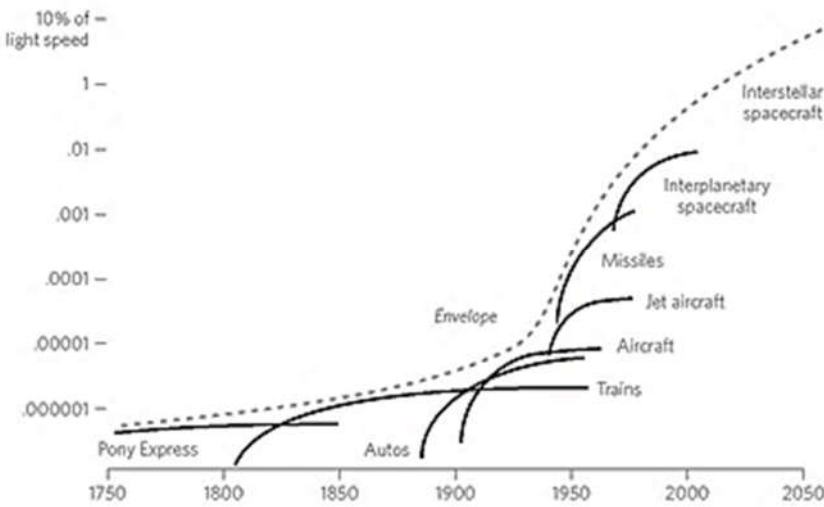
1. In all times we find that most inventions and discoveries have been made independently by more than one person.
2. In ancient times we find independent timelines of technology on different continents converging upon a set order.
3. In modern times we find sequences of improvement that are difficult to stop, derail, or alter.

"The kind of inevitability I am speaking of here in the digital realm is the result of momentum. The momentum of an ongoing technological shift. The strong tides that shaped digital technologies for the past 30 years will continue to expand and harden in the next 30 years. These apply to not just North America, but to the entire world (...) Change is inevitable (...) At the center of every significant

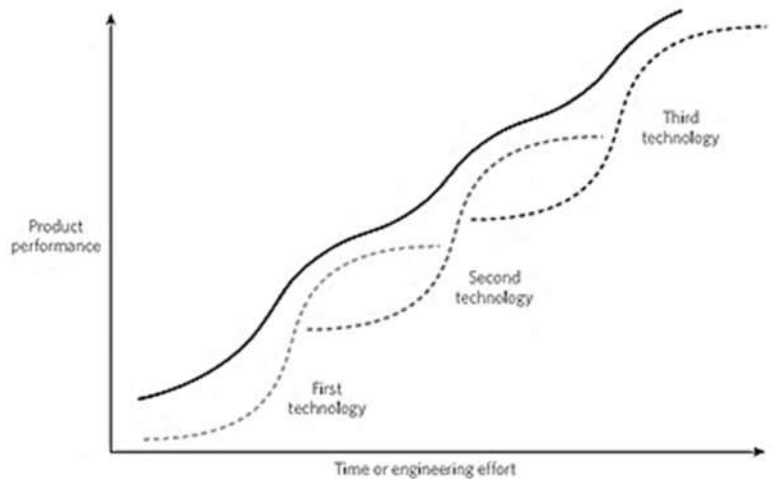
change in our lives today is a technology of some sort. Technology is humanity's accelerant. Because of technology everything we make is always in the process of becoming. Every kind of thing is

becoming something else, while it churns from 'might' to 'is.' All is flux. Nothing is finished. Nothing is done. This never-ending change is the pivotal axis of the modern world." Kelly (2016)

"Speed Trend Curve. The U.S. Air Force's plot of historical speed records up to the 1950s and their expectations of the fastest speeds in the near future."



"Compound S Curves. On this idealized chart, technological performance is measured on the vertical axis and time or engineering effort captured on the horizontal. A series of sub-S curves create an emergent larger-scale invariant slope."



TECHNOLOGY	METRIC	MONTHS
Fiber-optic throughput	Wavelengths per fiber	9
Optical network	Dollars per bit	9
Wireless	Bits per second	10
Communication	Bits per dollar	12
Magnetic areal storage	Gigabits per square inch	12
Digital cameras	Pixels per dollar	12
Microprocessor	Dollars per cycle	13
.....		
Supercomputer power	FLOPS	14
RAM	Mebibytes per dollar	16
Transistor	Dollars per transistor	18
PCU power consumption	Watts per square centimeter	18
Pixels	Per array	19
Hard-drive storage	Gigabytes per dollar	20
.....		
Chip	MIPS	21
DNA sequencing	Dollars per base pair	22
Trunk-line data speed	Bits per second	22
Microprocessor	Transistors per chip	24
Chip processor	Megahertz per dollar	27
Bandwidth	Kilobits per second per dollar	30
Microprocessor	Hertz	36

"Doubling Times. Performance ratios of various technologies measured as the number of months required to double their performance."

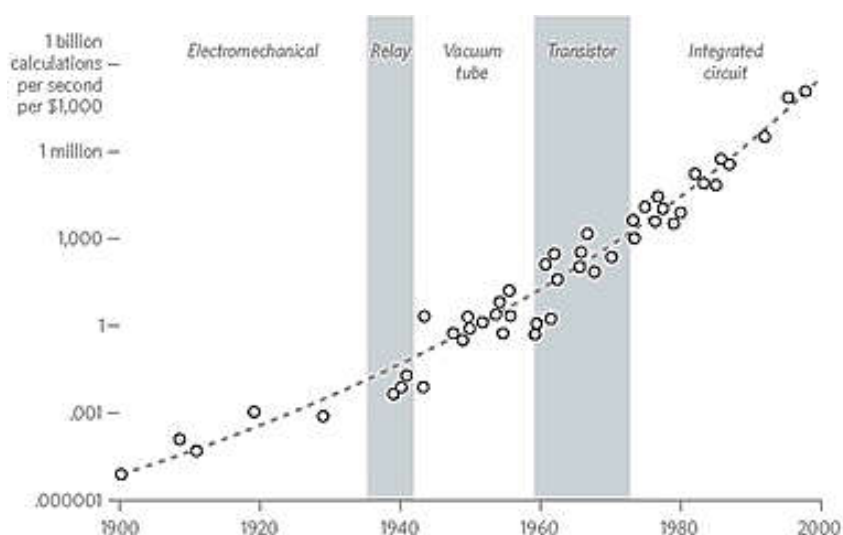
Kelly, Kevin (2016): *The inevitable: Understanding the 12 technological forces that will shape our future*, Viking.

Kelly, Kevin (2010): *What technology wants*, Viking.

## • La ley de rendimientos acelerados (o ley de Kurzweil) y 'la Singularidad' (Ray Kurzweil)

La ley de rendimientos acelerados de Ray Kurzweil (una generalización de la ley de Moore) postula que la tasa de evolución se acelera inherentemente de manera continua. Cada etapa de la evolución utiliza las capacidades y los resultados de la etapa anterior y, para cada etapa, pasar de una etapa a la siguiente lleva un tiempo más corto.

"This law posits that the rate of change and progress in a wide variety of evolutionary systems, particularly technology, increases exponentially over time, contrary to the common intuitive linear view." (Google IA)



Kurzweil define seis épocas en la evolución. Estas épocas expresan la evolución continua de la información: física y química (información capturada por patrones de materia y energía); biología y ADN (mecanismos de autorreplicación creados: vida); cerebros (mecanismos para adquirir y procesar información biológicamente); tecnología (creaciones humanas); fusión de la tecnología humana con la inteligencia humana; y el universo se despierta: "the universe wakes up (...) the 'dumb' matter and mechanisms of the universe will be transformed into exquisitely sublime forms of intelligence, which will constitute the sixth epoch in the evolution of patterns of information. This is the ultimate destiny of the Singularity and of the universe" (Kurzweil, 2005, cap. 1).

La Singularidad de Kurzweil es la era definida por la inteligencia que se vuelve no biológica e incontables veces superior al nivel actual de inteligencia humana como resultado del rápido cambio tecnológico. El impacto de este cambio transformará la vida humana: las limitaciones biológicas se superarán, la creatividad se amplificará, los humanos y las máquinas se integrarán, podremos ocupar cuerpos diferentes y todos los problemas humanos se resolverán (envejecimiento, enfermedad, contaminación, hambre, pobreza... incluso la muerte). La nanotecnología permitirá producir cualquier cosa a bajo costo. La Singularidad culmina la fusión de la biología con la tecnología: es el momento en que la inteligencia artificial se fusiona con la inteligencia humana y la supera.

*Kurzweil, Ray (2005): The singularity is near. When humans transcend biology, Viking.*

*Kurzweil, Ray (2024): The singularity is nearer. When we merge with AI, Penguin*

## • La singularidad tecnológica

"The coming of a Technological Singularity is one of the most exciting and controversial predictions to emerge in recent decades. As posited by influential writers and thinkers such as Ray Kurzweil, Vernor Vinge, and Peter Diamandis, this will be a point in time when revolutionary advances in science and technology happen too rapidly for the human mind to comprehend. After the Singularity,

these pundits predict, robots or other machines will have greater general intelligence than humans. These post-human intelligences would be able to 3D print any form of ordinary matter at low cost. They could cure diseases and perhaps even abolish aging. On the other hand, there are also darker possibilities – they could decide to wipe out human beings altogether, or just keep a few of us in a zoo for their amusement (...) Some key questions (...) are:

- Artificial General Intelligence (AGI) fairly rapidly achieves massively superhuman intelligence, or does it remain somewhere in the vicinity of the human level?
- Will some sort of global AGI Nanny emerge, providing control or regulation of intelligence on the planet, or does governance remain in the hands of (some form of) humans?
- To what extent will a Global Brain with its own coherent, emergent intelligence arise and become a dominant actor on the planet, as opposed to the main nexus of choice and causation being individual humans or human-scale AGIs?
- To what extent will ‘mindplexes’ or group minds emerge, perhaps on a smaller scale than a Global Brain?
- Will future humans have an experience of scarcity or abundance? That is: will future humans react to the abundance of free “basic needs,” as understood today, with a fixation on competing to acquire more advanced goods and services that remain scarce even as a Singularity approaches, and maybe even thereafter?
- What will people do all day, if they no longer have a need to work in order to acquire scarce resources?
- How will the exchange of desired scarce resources, if any exist, occur in the future? With some future form of money? Or via some different sort of system?
- Will privacy exist in the future?”
- Will humans be annihilated by advanced machines?
- Will there be large-scale military conflicts between those advocating accelerating technological change, and those opposing it?

Goertzel, Ben; Ted Goertzel (2015): “Introduction”, en Goertzel, Ben; Ted Goertzel; eds.: *The end of the beginning: Life, society and economy on the brink of the Singularity*, Humanity+ Press.

“The *technological Singularity hypothesis* stipulates that humans will create machines that have more cognitive ability than humans do. In turn, these machines will be capable of creating even more advanced intelligent machines than themselves. In quick succession, there will be an explosive growth in artificial intelligence resulting in machines with exponentially more knowledge and problem-solving capability than human beings. If the technological Singularity hypothesis is true, this future world is not millennia or centuries away; it will arrive in the coming decades and forever alter the course of humanity in ways that are unpredictable.”

“The technological Singularity will usher in a number of risks and crises for humanity. The Singularity will constitute an economic risk to humanity. As machines begin to surpass human capabilities in every realm, it will be an economic advantage for corporations to use machines rather than humans in every task. We will experience massive unemployment at the same time as our economies exhibit enormous growth in productivity. Enormous wealth will be created, but the distribution of this wealth is likely to be highly unequal.”

“The Singularity will produce an existential risk to humanity. A superintelligence may develop its own motivations and goals that may be in conflict with humankind’s motivations and goals. With its superior intellect and capabilities, it will be able to outthink, outplan, and outwork us. Humans may become irrelevant to a superintelligence’s goals, and, worse, humans may be considered an impediment to those goals. What steps can be taken to prevent such an outcome?”

Guinn, Curry I. (2019): ‘Runaway AI’, chapter 10 in *Savage ecology. War and geopolitics at the end of the world*, Duke University Press.

### • **Perspectivas sobre el futuro de la inteligencia artificial**

Turner (2019, p. 16) define inteligencia artificial como “the ability of a non-natural entity to make choices by an evaluative process.”

- “The optimists emphasise the benefits of AI and downplay any dangers (...) Fundamentally, optimists think humanity can and will overcome any challenges AI poses.”
- “The pessimists include Nick Bostrom, whose ‘paperclip machine’ thought experiment imagines an AI system asked to make paperclips which decides to seize and consume all resources in existence, in its blind adherence to that goal (...) Likewise, Elon Musk has said we risk ‘summoning a demon’ and called AI “our biggest existential threat’.”
- “The pragmatists acknowledge the benefits predicted by the optimists as well as the potential disasters forecast by the pessimists. Pragmatists argue for caution and control.”

Turner, Jacob (2019): *Robot rules. Regulating artificial intelligence*, Palgrave Macmillan.

“Bostrom (*Superintelligence. Paths, dangers, strategies*, 2014) uses the example of a paper clip factory to illustrate how a seemingly benign end goal, maximizing the number of paper clips produced, could have catastrophic results. To maximize the number of paper clips, the intelligent machine would have several subgoals. One of those subgoals is to become more intelligent, because the more intelligent it is, the better it can be in maximizing the production of paper clips. (In fact, the goal of becoming more intelligent would be a subgoal of any intelligent agent for similar reasons.) As it innovates and develops, it would become more efficient at converting matter into paper clips until all the matter on Earth, in the solar system, and in the Milky Way and beyond is converted into paper clips. This example is intentionally absurd for a reason: it illustrates how a superintelligence’s relentless pursuit of a goal could clash with human values. How do we endow these synthetic intelligences with a sense of morality or ethics that correspond to human values?”

Guinn, Curry I. (2019): 'Runaway AI', chapter 10 in *Savage ecology. War and geopolitics at the end of the world*, Duke University Press.

- **Tesis sobre la tecnología (Trevor Kletz, 1996)**

"Every error is a human error because: Someone has to decide what to do. Someone has to decide how to do it. Someone has to do it."

- "We cannot have the benefits of modern technology without some disadvantages in terms of pollution and safety."
- "New technologies are usually less hazardous than old ones."
- "The cost of reducing pollution and increasing safety has to be paid for in the end by the public."
- "People, not technology, create hazards and pollution." "To blame pollution on technology is the ultimate dodge of a society unwilling to take the blame for its own errors and stupidity. It is not computers and automation that cause unemployment but the way we use them."

**"MYTH M5. The best way of conveying information to people is to tell them." (Kletz, 1996)**

"If we have to convey messages that people want to receive ('where to get free beer,' for example), almost all methods of communication are effective. However, if there is some resistance to the message, as there often is when we are making recommendations to increase safety, for example, then we should choose the most effective method of communication: discussion (...) Discussions take longer than a lecture, but more is remembered and people are more committed to the conclusions because they have not been told what to do but have worked it out for themselves (...) The best size for a discussion group is 12-20. If fewer than 12 are present, the group may not be 'critical' (in the atomic energy sense) and discussion may not take off. If more than 20 are present, the quieter members may not be able to contribute."

**"MYTH M10. We need to know what is new." (Kletz, 1996)**

"We do need to know what is new, but that should not negate our concern with what is old. In my own area of expertise, namely, loss prevention and process safety, the majority of accidents have well-known causes (...) Spend less time reading magazines that tell what is new and more time reading books that tell what is old. Today, 'old' implies outdated; in the past, it implied something of enduring value; it had to be good to have lasted so long."

*Kletz, Trevor (1996): Dispelling chemical industry myths, 3rd edition, CRC Press.*

- **La complejidad tecnológica conlleva más vulnerabilidad**

"... we simply have no idea of the huge number of ways that these incredibly complex technologies can go wrong (...) Our technologies—from websites and trading systems to urban infrastructure, scientific models, and even the supply chains and logistics that power large businesses—have become hopelessly interconnected and overcomplicated (...) Computer hardware and software is much more

complex than anything that came before it, with millions of lines of computer code in a single program and microchips that are engineered down to a microscopic scale. As computing has become embedded in everything from our automobiles and our telephones to our financial markets, technological complexity has eclipsed our ability to comprehend it.”

“Our technological realm has accelerated the metabolism of the Earth (...) We are of two minds about all this complexity. On the one hand, we built these incredibly complicated systems, and that’s something to be proud of. They might not work as expected all the time, but they are phenomenally intricate edifices. On the other hand, almost everything we do in the technological realm seems to lead us away from elegance and understandability, and toward impenetrable complexity and unexpectedness (...) there are certain trends and forces that overcomplicate our technologies and make them incomprehensible, no matter what we do. These forces mean that we will have more and more days like July 8, 2015, when the systems we think of as reliable come crashing down in inexplicable glitches.”

*Arbesman, Samuel (2016): Overcomplicated. Technology at the limits of comprehension, Current.*

- **Los ingenieros, héroes de la historia**

“... if there is any one progressive, consistent movement in human history, it is neither political, nor religious, nor aesthetic. Until recent centuries it was not even scientific. It is the growth of technology, under the guidance of the engineers.”

“Technology has progressed continuously from the time of the Agricultural Revolution 10,000 years ago, slowly and hesitantly at first, then with increasing sureness and speed. The sixteenth century marked the beginning of modern engineering because, from that time on, professional societies were formed, treatises on engineering subjects were printed in quantity, engineering schools sprang up, specialization within the profession began, and engineers began to take advantage of the brilliant scientific discoveries of the time. The Industrial Revolution, which started two centuries ago and is still going on, was a surge in the growth of technology. Barring nuclear war, the end of this fruition of engineering is nowhere in sight (...) Today, in technologically advanced lands, men live very similar lives in spite of geographical, religious, and political differences (...) These resemblances are the result of a common technology, and this technology is what many generations of engineers have built up, with the greatest skill and diligence of which human beings are capable, and handed down to us.”

*de Camp, L. Sprague (1993): The ancient engineers, Barnes & Noble Books.*

- **El engaño/espejismo tecnológico (The technological bluff, Jacques Ellul, 1990)**

Jacques Ellul (1990) define como ‘bluff tecnológico’ la presunción en las sociedades occidentales que el progreso tecnológico es un bien en sí mismo si se emplea correctamente. Ellul considera que la tecnología es como un motor que no tiene marcha atrás: una vez una tecnología es creada no puede ser descreada, de manera que la tecnología engendra más tecnología espontáneamente.

## Oposición entre personas y máquinas

Las personas se adaptan mal a las técnicas modernas: las personas no se adaptan a las máquinas, ni las máquinas a las personas. Existe una inadaptación permanente entre el mundo social y el técnico. Las sociedades evolucionan lentamente; las técnicas y las máquinas evolucionan rápidamente. Las sociedades se basan en el pasado (hábitos, tradiciones, normas, convenciones); las tecnologías miran al futuro.

### La gran innovación técnica

La eventual integración de lo social en el mundo técnico, de la cual surgirá una nueva humanidad.

### Tecnología

Ellul considera las afirmaciones excesivamente optimistas de Simon como absurdos pseudocientíficos: Simon simplemente proyecta tendencias (sin justificar la legitimidad de la proyección) y simplemente presupone que todo descubrimiento/invencción tendrá efectos beneficiosos (disfrazando fenómenos inconvenientes para sus tesis, como la simultaneidad de la despoblación rural y la superpoblación urbana). ¿Qué tiene de bueno un virus informático?

### El ascenso de los tecnócratas

"The technocrats have a strange blindness to the complex reality of the world and to the lessons of common sense (e.g., that no system can grow indefinitely in a closed and finite universe, a truth that they treat sarcastically). Their great knowledge and narrow specialization prevent them from understanding questions outside their field. Yet they write authoritatively about tomorrow's world (...) They are thus plunged into electronics and computers without a thought that perhaps in the future being able to till a bit of ground or light a wood fire or do proper grooming might be more useful than being able to tap on a keyboard. Such is their casual ignorance of most of what constitutes our world (...) They immediately retort that what opponents want is a return to the Middle Ages. As they see it, there has to be growth. They will not accept any other hypothesis. They find their justification in the fact that increasingly everything depends on the application of techniques. Not only is technique good, not only is it indispensable, but also (...) it alone can also achieve all that human beings have been seeking throughout the centuries: liberty, democracy, justice, happiness (by a high standard of living), reduction of work, etc."

### La tecnología es ambivalente

La técnica y la tecnología no son neutrales: pueden tener efectos positivos y negativos. Para los optimistas tecnológicos, la tecnología es globalmente buena. Esta ambivalencia se resume en cuatro tesis.

- (1) Todo progreso técnico tiene un precio (la creación implica destrucción, con frecuencia vidas humanas: ningún progreso está libre de sombras).
- (2) En cada etapa, plantea más y mayores problemas de los que resuelve (ley de que los problemas crecen con el desarrollo de las técnicas).
- (3) Sus efectos nocivos son inseparables de sus efectos beneficiosos (los coches generan congestión; más y más alimentos disponibles, obesidad): los efectos favorables tienden a ser evidentes a corto plazo (y a ser concretos y claramente identificables), mientras que los efectos negativos tienden a hacerse evidentes a largo plazo (y a ser quizás difusos y abstractos);

- (4) Además de los deseados y previstos, tiene numerosos efectos imprevistos (las intervenciones quirúrgicas sustituyen una enfermedad por otra; el cultivo empobrece el suelo; efectos nocivos inesperados del DDT; accidentes de las nuevas tecnologías).

### La tecnología es esencialmente impredecible

El cambio técnico no es teleológico: no tiene un objetivo. No hay un destino predeterminado para el cambio técnico: es errático. Por lo tanto, es impredecible (y eso hace que la evolución social también lo sea).

### La paradoja de Harvey Brooks

Los costos y el riesgo de una nueva tecnología suelen ser asumidos por una pequeña fracción de la población, mientras que sus ventajas tienden a ser generalizadas.

Ellul, Jacques (1990): *The technological bluff*, W.B. Eerdmans.

### • La ley de Cardwell (Donald Cardwell)

La ley de Cardwell es la observación que ningún país ha estado a la vanguardia del progreso tecnológico durante más de dos o tres generaciones. La diversidad y multiplicidad de actores en Europa desde la caída del Imperio Romano parece haber definido un entorno favorable para la sustitución de países líderes o hegemónicos. El resultado de este liderazgo renovado ha sido un crecimiento tecnológico continuo durante al menos un par de siglos.

Kindleberger, Charles P. (1996): *World economic primacy, 1500-1990*, Oxford University Press.

### • La paradoja de Moravec (paradoja del progreso robótico, Hans Moravec)

“The discovery by artificial intelligence and robotics researchers that, contrary to traditional assumptions, high-level reasoning requires very little computation, but low-level sensorimotor skills require enormous computational resources.” (Wikipedia).

“It is comparatively easy to make computers exhibit adult-level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility.” (Hans Moravec)

### • El proyecto tecnológico

Capaldi y Lloyd (2011, pp. xiii-xv) sostienen que el auge del proyecto tecnológico en Occidente (el control y la transformación de la naturaleza para beneficio humano) ha sido el desarrollo más importante de los últimos 400 años. Atribuyen al proyecto tecnológico: (i) los cambios en la mentalidad, las creencias y las instituciones occidentales; (ii) la expansión de Occidente para dominar el resto del mundo; (iii) la Revolución Industrial; y (iv) la internacionalización de las instituciones occidentales (‘globalización’). La economía de libre mercado se considera la institución más eficaz para desarrollar el proyecto tecnológico.

Capaldi, Nicholas; Gordon Lloyd (2011): *The Two Narratives of Political Economy*, Scrivener and Wiley.

## • Imposibilidades tecnológicas

"I divide the things that are 'impossible' into three categories.

The first are what I call *Class I impossibilities*. These are technologies that are impossible today but that do not violate the known laws of physics. So they might be possible in this century, or perhaps the next, in modified form. They include teleportation, antimatter engines, certain forms of telepathy, psychokinesis, and invisibility.

The second category is what I term *Class II impossibilities*. These are technologies that sit at the very edge of our understanding of the physical world. If they are possible at all, they might be realized on a scale of millennia to millions of years in the future. They include time machines, the possibility of hyperspace travel, and travel through wormholes.

The final category is what I call *Class III impossibilities*. These are technologies that violate the known laws of physics. Surprisingly, there are very few such impossible technologies. If they do turn out to be possible, they would represent a fundamental shift in our understanding of physics."

*Kaku, Michio (2008): Physics of the impossible. A scientific exploration into the world of phasers, force fields, teleportation, and time travel, Doubleday.*

## • Civilizaciones tecnológicas (Nikolai Kardashev)

"Russian astrophysicist Nikolai Kardashev has conjectured that the stages in the development of extraterrestrial civilizations in the universe could also be ranked by energy consumption. Using the laws of physics, he grouped the possible civilizations into three types:

1. Type I civilizations: those that harvest planetary power, utilizing all the sunlight that strikes their planet. They can, perhaps, harness the power of volcanoes, manipulate the weather, control earthquakes, and build cities on the ocean. All planetary power is within their control.

2. Type II civilizations: those that can utilize the entire power of their sun, making them 10 billion times more powerful than a Type I civilization. The Federation of Planets in *Star Trek* is a Type II civilization. A Type II civilization, in a sense, is immortal; nothing known to science, such as ice ages, meteor impacts, or even supernovae, can destroy it. (In case their mother star is about to explode, these beings can move to another star system, or perhaps even move their home planet.)

3. Type III civilizations: those that can utilize the power of an entire galaxy. They are 10 billion times more powerful than a Type II civilization. The Borg in *Star Trek*, the Empire in *Star Wars*, and the galactic civilization in Asimov's *Foundation* series correspond to a Type III civilization. They have colonized billions of star systems and can exploit the power of the black hole at the center of their galaxy. They freely roam the space lanes of the galaxy.

Kardashev estimated that any civilization growing at a modest rate of a few percent per year in energy consumption will progress rapidly from one type to the next, within a matter of a few thousand years to tens of thousands of years (...) Our own civilization qualifies a Type 0 civilization (i.e., we use dead plants, oil and coal, to fuel our machines). We utilize only a tiny fraction of the sun's energy that falls on our planet. But already we can see the beginnings of a Type I civilization emerging

on the Earth. The Internet is the beginning of a Type I telephone system connecting the entire planet. The beginning of a Type I economy can be seen in the rise of the European Union (...)

The transition between one civilization and the next is far from guaranteed. The most dangerous transition, for example, may be between a Type 0 and a Type I civilization. A Type 0 civilization is still wracked with the sectarianism, fundamentalism, and racism that typified its rise, and it is not clear whether or not these tribal and religious passions will overwhelm the transition. (Perhaps one reason that we don't see Type I civilizations in the galaxy is because they never made the transition, i.e., they self-destructed)."

"The main danger ants face is not that humans want to invade them or wipe them out. Instead it is simply that we will pave them over because they are in the way. Remember that the distance between a Type III civilization and our own Type 0 civilization is far more vast than the distance between us and the ants, in terms of energy usage."

*Kaku, Michio (2008): Physics of the impossible. A scientific exploration into the world of phasers, force fields, teleportation, and time travel, Doubleday.*

#### • ¿Por qué todavía no vuelan los coches?

"There appears to have been a profound shift, beginning in the 1970s, from investment in technologies associated with the possibility of alternative futures to investment technologies that furthered labor discipline and social control (...) Yet even those areas of science and technology that did receive massive funding have not seen the breakthroughs originally anticipated." (Graeber, 2015, p. 120)

"All the labor-saving machinery that has hitherto been invented has not lessened the toil of a single human being." (John Stuart Mill)

*Graeber, David (2015): The utopia of rules. On technology, stupidity, and the secret joys of bureaucracy, Melville House.*

#### • Lecciones de la historia de la tecnología (Tim Hardford)

- "One: don't be dazzled by the fancy stuff."
- "Two: humble inventions can change the world if they're cheap enough."
- "Three: always ask, 'To use this invention well, what else needs to change?' "

*Hardford, Tim (2018): "What else needs to change?", Opinion piece, WTO 2018 Trade Report.*

#### • Una paradoja tecnológica (Riccardo Campa, 2018)

"In a *laissez faire* capitalist economy, the choice boils down to two perspectives:

1) if one introduces policies to safeguard the standard of living of workers by establishing that the minimum wage cannot fall below a certain threshold (moderate left policy), the system produces 'technological unemployment;'

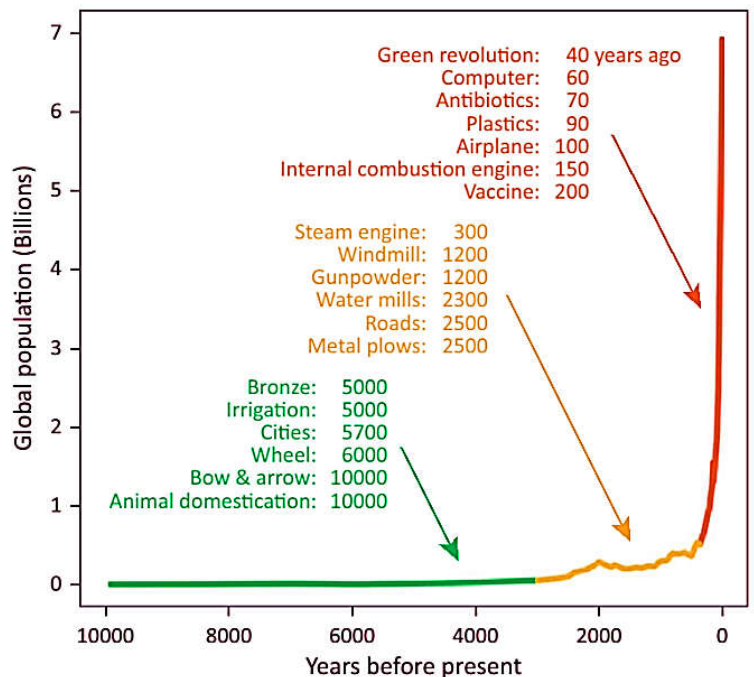
2) if it is established that the government must not interfere in negotiations between capitalists and workers, letting the market decide wage levels (moderate right policy), the system produces 'technological impoverishment.'

All this happens when an impressive technological development may *potentially* improve the life condition of everybody. Thus, contemporary society seems to be inherently characterized by a 'technological paradox.'

Campa, Riccardo (2018): *Still think robots can't do your job. Essays on automation and technological unemployment*, D Editore.

• **Dinámica malthusiana y dinámica darwiniana**

"Two interacting forces influence all populations: the Malthusian dynamic of exponential growth until resource limits are reached, and the Darwinian dynamic of innovation and adaptation to circumvent these limits through biological and/or cultural evolution. The Malthusian dynamic pushes a population to increase until it reaches its environmental limits. The Darwinian dynamic pushes against these limits by incorporating new traits and technologies that enhance survival and reproduction. There are restrictions to this Malthusian-Darwinian Dynamic (MDD) (...): it is logically, physically, and biologically impossible for exponential growth to continue indefinitely within a finite world."



"A central feature of human ecology has been the positive feedback between growth and innovation. As populations grew and aggregated into larger and more complex social groups, more information was acquired and processed. This led to new technologies that further pushed back ecological limits, allowing for continued population growth. The result has been an ascending spiral of exponential processes feeding back on each other: population growth and aggregation begot technological innovation, which in turn allowed for more resource extraction and a greater ability to overcome ecological constraints, begetting still more population growth and socioeconomic development."

"The ruins of Mohenjo Daro, Mesopotamia, Egypt, Greece, Rome, the Maya, Hohokam, Angkor Wat, and Easter Island are enduring evidence that many earlier societies were unable to innovate their way out of local limits and therefore collapsed despite attaining dense populations and advanced cultures (...) Until now, both Malthusians and Cornucopians have been correct: some populations have crashed and cultures have vanished, but our species has endured because these events have been localized. However, behavioral changes and technological innovations over the last century

now intricately interconnect us in a single global society. As a result, local perturbations currently have the ability to reverberate across all of humanity."

"Within the context of our now highly globalized society, the essential question is how much potential exists for the Darwinian side of the MDD to allow for continued adaptation and innovation to push back against global scale constraints (...) The bad news is that the MDD has left humans ill prepared to make the necessary ecological and behavioral changes required to avoid civilization collapse (...) The good news is that the MDD may also provide valuable insights into potential solutions from both natural (in particular evolutionary biology and ecology) and social (in particular economics and sociology) science perspectives."

"We must recognize that a sustainable future will ultimately require: (i) negative population growth for a number of generations, followed by zero growth; (ii) a steady-state economy based on sustainable use of renewable energy and material resources; and (iii) new social norms that favor the welfare of the entire global population over that of specific individuals and groups. It is also essential that we recognize that humanity has not yet evolved the genetic or cultural adaptations needed to accomplish these tasks."

<b>Three Technological Revolutions</b>			
	<b>Agricultural</b>	<b>Industrial</b>	<b>Cybernetic</b>
<b>Origin</b>	Near East, 11,000 years ago	Britain, 1750	United States, 1944
<b>Catalytic Technology</b>	Grain cultivation (wheat)	Steam engine	Computer
<b>Benefits</b>	More food per unit of land; grain storable and tradable	Inexpensive, dependable source of power	Fast, cheap decision making for problems soluble by algorithms
<b>Uses</b>	Feeding people, safeguarding food supply, trading goods (functions like money)	Mechanized pumps, machine powered vehicles, power machinery in factories	Mathematical calculations, processing records, word processing, database management, telephone exchanges, etc.
<b>Effects</b>	Population increase, early cities, roads, shipping, accounting, metal-working, wheeled vehicles, writing, scholarship, science	Factory towns, urbanization, railroads, automobiles, rising living standards, airplanes, surging demand for natural resources—metal ores, coal, petroleum	Faster, cheaper information handling; better management of communications; tighter inventory controls; better distribution of goods; higher standard of living
<b>Workers Displaced</b>	Hunters, gatherers	Farmers, weavers, craftsmen, home workers	Clerks, typists, telephone operators, typesetters, small grocers, middle managers
<b>New Jobs</b>	Early: Farmers, construction workers, carters, brewers, specialized crafts. Later: scribes, scholars	Miners, factory workers, ironworkers, steamship builders, railroaders, steel workers	Computer operators, programmers, repairers, systems analysts, Webmasters, electronic game designers

Jeffrey C. Nekola et al. (2013): "The Malthusian-Darwinian dynamic and the trajectory of civilization," Trends in Ecology and Evolution 1643.

• **Tecnooptimismo/transhumanismo contra tecnopesimismo/primitivismo**

"As the internet became a mainstream form of communication for millions of people there was a surge of techno-optimism. The early nineties were ablaze with utopian ideas about humanity's imminent leap forward, spurred by connectivity and access to information (...) Many of the net's early advocates believed that, by enabling people to communicate more freely with each other, it would help to end misunderstanding and hatred (...) For every starry-eyed vision of future utopias there was an equally vivid dystopian nightmare (...) Worried by the proliferation of pornography—including child pornography—and the growing amount of criminal activity taking place online, governments around the world began to pass legislation designed to monitor, control, and censor cyberspace."

“This divide, between the techno-optimists and the techno-pessimists, is one that stretches back to the birth of the internet, and one that is widening as technology becomes omnipresent, faster, and more powerful. There are, today, two movements that are extreme versions of these opposing views about technology. The transhumanists embrace technology; the anarcho-primitivists reject it. Both groups have existed in some form since the early days of the internet, and both have been steadily growing in popularity (...). Both exist across the dark net (...) But which side is right? Does connectivity bring us together, or supplant real-world relationships? Does access to information makes us more open-minded or committed to our own dogmas? Is there something about the internet, or perhaps technology itself, that shapes and constrains our choices, prodding us to behave in certain ways? And what do their prophetic visions of our technological future—one bright, one bleak—say about the dark net and how we use the internet today?”

“In 2008, the World Transhumanist Association was renamed Humanity+, and remains the largest formal organization of transhumanists, publishing a glossy, quarterly magazine and organizing a number of conferences and academic events (...) Most transhumanist technology focuses on life extension, and technological upgrades to the brain and body.”

[John Zerzan] “is probably the world’s most famous anarcho-primitivist, and the author of several books on why technology—from the internet all the way back to subsistence farming—is at the root of many, if not all, of today’s social problems. He wants to jettison: Facebook, computers, telephones, electricity, steam-powered engines—the lot. Anarcho-primitivism is a branch of anarchist philosophy, which believes in stateless, nonhierarchical, and voluntary forms of human organization, based on simple, precivilization collective living. The most infamous neo-Luddite of modern times was the American Ted Kaczynski, better known as the Unabomber.”

“Instead of looking forward to imagine the future, Zerzan looked back to the past, studying the early Luddite movements, and trade-union groups like the Tolpuddle Martyrs (...) ‘The introduction of industrial mechanization in the nineteenth century wasn’t just an economic move. It was also a disciplinary move! It was a way to make sure that autonomous people could be controlled by capitalists.’”

“Technology is often described as ‘neutral.’ But it could be more accurately described as power and freedom. For the transhumanists, technology provides the ability to stride across the universe, to live forever. For the anarcho-primitivists, it is a tool used to oppress and control others, to become less than human. The dark net is a world of power and freedom: of expression, of creativity, of information, of ideas. Power and freedom endow our creative and our destructive faculties. The dark net magnifies both, making it easier to explore every desire, to act on every dark impulse, to indulge every neurosis (...) Ultimately, the dark net is nothing more than a mirror of society.”

**Bartlett, Jamie (2015): *The dark net. Inside the digital underworld*, Melville House.**

“I feel that one of the main reasons people are blind to the dire situation you describe is because of a deep-seated faith in technology. I call this faith ‘techno-optimism’, which can be broadly defined as the belief that science and technology will be able to solve the major social and environmental

problems of our times without fundamentally rethinking the structure or goals of our growth-based economies or the nature of Western-style, affluent lifestyles.

What is so seductive about this 'techno-fix' approach is that it is politically, economically, and socially palatable. It provides governments, businesses, and individuals with a means of responding to environmental problems (or being seen to respond to environmental problems) without actually confronting the underlying systemic and cultural issues that are driving the crises. Don't worry, is the message, technology will save us from ourselves."

*Read, Rupert; Samuel Alexander (2019): This civilisation is finished. Conversations on the end of Empire — and what lies beyond, Simplicity Institute.*

- **La moderna economía global: innovación, instituciones, población**

"To explain the modern global economy, then, you have to explain where this perpetual innovation machine came from. What kick-started the increasing returns? They were not planned, directed or ordered: they emerged, evolved, bottom-up, from specialisation and exchange. The accelerated exchange of ideas and people made possible by technology fuelled the accelerating growth of wealth that has characterised the past century."

"Innovation is like a bush fire that burns brightly for a short time, then dies down before flaring up somewhere else. At 50,000 years ago, the hottest hot-spot was west Asia (ovens, bows-and-arrows), at 10,000 the Fertile Crescent (farming, pottery), at 5,000 Mesopotamia (metal, cities), at 2,000 India (textiles, zero), at 1,000 China (porcelain, printing), at 500 Italy (double-entry book-keeping, Leonardo), at 400 the Low Countries (the Amsterdam Exchange Bank), at 300 France (Canal du Midi), at 200 England (steam), at 100 Germany (fertiliser); at 75 America (mass production), at 50 California (credit card), at 25 Japan (Walkman). No country remains for long the leader in knowledge creation (...) Why must the torch be passed elsewhere at all? (...) The answer lies in two phenomena: institutions and population. In the past, when societies gorged on innovation, they soon allowed their babies to grow too numerous (...) or they allowed their bureaucrats to write too many rules, their chiefs to wage too many wars, or their priests to build too many monasteries (...) or they sank into finance and became parasitic rentiers."

*Ridley, Matt (2010): The rational optimist. How prosperity evolves, HarperCollins.*

- **Repensando la tecnología**

"Let me begin by stating the obvious: We live in an era of technological enthusiasm. It's not too vast a generalization to say that Americans, along with much of the world, are deeply, passionately in love with the technologies they use in their personal lives. We're also beguiled by the promises of scientists and engineers who say that, thanks to them, we'll soon be able to do just about anything we want to do. 'At our current rate of technological growth,' said Elon Musk, CEO of Tesla Motors and SpaceX, 'humanity is on a path to be godlike in its capabilities.' (...) Such comments also testify to a more recent wrinkle in utopian visions: that new technologies will be able to remedy the problems created by previous technologies. We see the same faith at work in the conviction of those

who believe we'll come up with some way of reversing the catastrophe of global warming by 'geoengineering' the climate of the entire planet."

"Four basic, overlapping characteristics or sets of characteristics can be cited as fundamental elements of the nature of technology. They are (1) Technology is by nature expansive. (2) Technology is by nature rational, direct, and aggressive. (3) Technology by its nature combines or converges with other technologies. (4) Technology by its nature strives for control (...) The four characteristics (...) point to the central question of whether technology at some point becomes autonomous— that is, does technology at an advanced stage of development become impossible for human beings to control?"

"If there is a single lesson (...) that I could drum into the mind of every technician on the planet, it would be the certainty of uncertainty. For despite their willingness to acknowledge uncertainty on the micro level and to use it to improve performance, technophiles consistently evince a depressingly broad degree of myopia in regard to uncertainty on the macro level. In other words, scientists and engineers will focus intently on the inconsistencies that appear within their specific projects and work diligently to get rid of them. At the same time they'll be perfectly willing to overlook the unpredictable results of their projects' interactions with other, supposedly unrelated technologies in the world at large. In doing so they ignore two (...) principles:

1. There are no unrelated technologies.
2. The more powerful a given technology, the more widely its effects will radiate outward, the more difficult it will be to predict those effects, and the more damaging those effects can potentially be (...) The effects of powerful technologies radiate outward, producing in the process consequences that are both unintended and unexpected, often at velocities that exceed our ability to stop or contain them."

"Technology doesn't fix technology, technology *demand*s technology. Given that we seem unable to make even minor sacrifices of consumption and convenience, we probably have no choice but to stay, in some fashion, the technological course (...) The societies we've constructed are so utterly dependent on our machines that any attempt to abruptly disconnect would be spectacularly, fatally disruptive. Unless and until we find a way to reposition ourselves in relation to nature, we're pretty much stuck."

"It's a truism that power corrupts, and at its most fundamental level technology is about power. It follows that arrogance and overconfidence may be natural by-products of technological power."

"[Norbert Wiener] said that the only true security comes from 'humility and restrained ambitions' (...) Technology is a two-edged sword, he said, 'and sooner or later it will cut you deep'."

"I see no harm in mentioning two general suggestions that would, if widely and comprehensively pursued, move us in a positive direction. The first of these is restraint. Cut back, on everything (...) My second suggestion is (...) pay some attention to redressing the imbalance, in the culture in general and in education in particular, between means and ends."

Hill, Doug (2016): *Not so fast. Thinking twice about technology*, University of Georgia Press.

"AI is likely to be the best or worst thing to happen to humanity." (Stephen Hawking)

- **Un panorama sombrío de la inteligencia artificial (Kai-Fu Lee, 2018)**

“When we scan the economic horizon, we see that artificial intelligence promises to produce wealth on a scale never before seen in human history—something that should be a cause for celebration. But if left to its own devices, AI will also produce a global distribution of wealth that is not just more unequal but hopelessly so. AI-poor countries will find themselves unable to get a grip on the ladder of economic development, relegated to permanent subservient status. AI-rich countries will amass great wealth but also witness the widespread monopolization of the economy and a labor market divided into economic castes.

Make no mistake: this is not just the normal churn of capitalism’s creative destruction, a process that has previously helped lead to a new equilibrium of more jobs, higher wages, and a better quality of life for all. The free market is supposed to be self-correcting, but these self-correcting mechanisms break down in an economy driven by artificial intelligence. Low-cost labor provides no edge over machines, and data-driven monopolies are forever self-reinforcing.

These forces are combining to create a unique historical phenomenon, one that will shake the foundations of our labor markets, economies, and societies. Even if the most dire predictions of job losses don’t fully materialize, the social impact of wrenching inequality could be just as traumatic (...) AI risks creating a twenty-first-century caste system, one that divides the population into the AI elite and what historian Yuval N. Harari has crudely called the “useless class,” people who can never generate enough economic value to support themselves. Even worse, recent history has shown us just how fragile our political institutions and social fabric can be in the face of intractable inequality.”

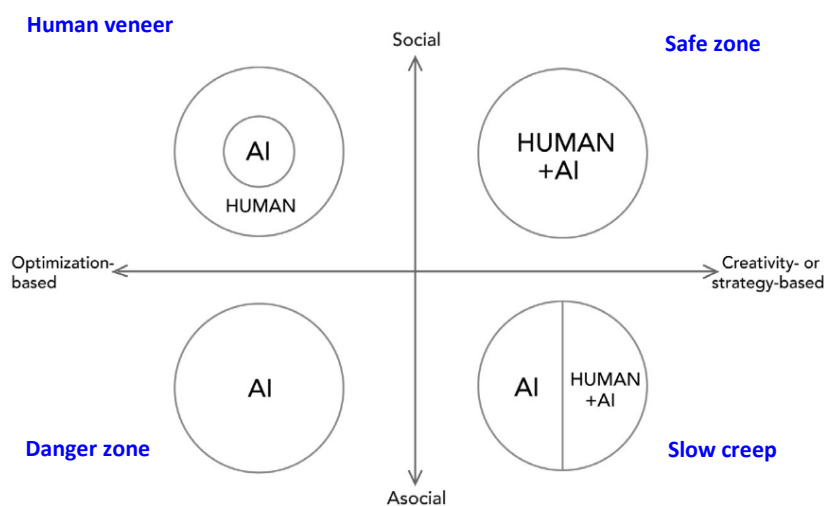
Kai-Fu Lee (2018) sugiere tres soluciones para la pérdida de empleos que cause la IA.

- Reconversión de los trabajadores (dimensión de las competencias del mercado laboral). “Those advocating the retraining of workers tend to believe that AI will slowly shift what skills are in demand, but if workers can adapt their abilities and training, then there will be no decrease in the need for labor.”
- Reducir las horas de trabajo (dimensión temporal del mercado laboral). “Those advocates of reducing work hours believe that AI will reduce the demand for human labor and feel that this impact could be absorbed by moving to a three- or four-day work week, spreading the jobs that do remain over more workers.”
- Redistribuir el ingreso (dimensión compensatoria del mercado laboral). “The redistribution camp tends to be the most dire in their predictions of AI-induced job losses. Many of them predict that as AI advances, it will so thoroughly displace or dislodge workers that no amount of training or tweaking hours will be sufficient. Instead, we will have to adopt more radical redistribution schemes to support unemployed workers and spread the wealth created by AI.” In the universal basic income proposal the government pays everyone in a country a fixed income stipend. In the guaranteed minimum income proposal only those below a certain income level receive a stipend. [En la propuesta de renta básica universal, el gobierno paga a todos los habitantes de un país un estipendio fijo. En la propuesta de renta mínima garantizada, solo quienes no alcanzan un cierto nivel de ingresos reciben un estipendio.]

“Funding for these programs would come from steep taxes on the winners of the AI revolution: major technology companies; legacy corporations that adapted to leverage AI; and the millionaires, billionaires, and perhaps even trillionaires who cashed in on these companies’ success.”

Kai-Fu Lee (2018) define cuatro maneras (gráfica abajo) en que personas y AI pueden coexistir en relación con el empleo.

“While AI handles the routine optimization tasks, human beings will bring the personal, creative, and compassionate touch. This will involve the redefinition of existing occupations or the creation of entirely new professions in which people team up with machines to deliver services that are both highly efficient and eminently human (...) We expect to see the upper-left quadrant (‘Human Veneer’) offer the



greatest opportunity for human-AI symbiosis: AI will do the analytical thinking, while humans will wrap that analysis in warmth and compassion. In that same chart, the two quadrants on the right-hand side of the graph (‘Slow Creep’ and ‘Safe Zone’) also provide opportunities for AI tools to enhance creativity or decision-making, though over time, the two left-side AI-centric circles will grow toward the right as AI improves. A clear example of human-AI symbiosis for the upper-left-hand quadrant can be found in the field of medicine.”

Lee, Kai-Fu (2018): *AI superpowers. China, Silicon Valley, and the new world order*, Houghton Mifflin Harcourt.

• **Tres categorías de IA**

“Artificial narrow intelligence (ANI) is machine expertise at a specific task. Many diverse examples of ANI exist today (...) such as the visual recognition of objects, real-time machine translation between natural languages, automated financial-trading systems, AlphaZero, and self-driving cars.”

“Artificial general intelligence (AGI) would involve a single algorithm that could perform well at all of the tasks described in the preceding paragraph: It would be able to recognize your face, translate this book into another language, optimize your investment portfolio, beat you at Go, and drive you safely to your holiday destination. Indeed, such an algorithm would be approximately indistinguishable from the intellectual capabilities of an individual human (...) In a study conducted by the philosopher Vincent Müller and the influential futurist Nick Bostrom, the median estimate across hundreds of professional AI researchers is that AGI will be attained in the year 2040.”

[Müller, V., and Bostrom, N. (2014). Future progress in artificial intelligence: A survey of expert opinion. In V. Müller (Ed.), *Fundamental Issues of Artificial Intelligence*. Berlin: Springer.]

*“Artificial super intelligence (ASI) (...) would be an algorithm that is markedly more advanced than the intellectual capabilities of a human. If AGI is possible, then ASI may be as well (...) Citing the Müller and Bostrom survey again, however, AI experts’ median estimate for the arrival of ASI is 2060.”*

*Krohn, Jon; with Grant Beyleveld and Aglaé Bassens (2020): Deep learning illustrated. A visual, interactive guide to Artificial Intelligence, Addison-Wesley.*

- **La era de las máquinas inteligentes**

*“For the first time in human history, we are making machines that will think and evolve without human control. The era of our intellectual superiority is ending. As a species, we need to plan for this paradigm shift. Whether intelligent machines will learn from the darkest parts of our human nature, or the noblest, remains to be seen.”*

*“The Information Age, sometimes also called the Digital Age, has been incredibly fruitful technologically and beneficial to humankind in many ways. It is also now ending. We are rapidly transitioning to a new age. Whether this new era will one day be called the Experience Age, the Conceptual Age, the Superhuman Age, or something else, this next wave of technological development—from nanotechnology and biotechnology to space exploration and robot avatars—will be brought about not by human inventors alone, but by humans working with a generation of machines exponentially more advanced than anything we have seen before.”*

*“We are living at the end of the last cycle of technological development led entirely by humans. Artificial intelligence is defining and determining the next era of technology and, thereby, our future.”*

*“We are merging with our machines, delegating more decision-making to them without acknowledging how much our own cognitive abilities are becoming enmeshed with theirs.”*

*“... despite a well-intentioned fledgling ‘algorithmic accountability movement,’ we are alarmingly unready for the reality of powerful AI that reaches conclusions and decisions independent from human intervention. Unless we deliberately intervene, AI will not develop an algorithm that values human concerns.”*

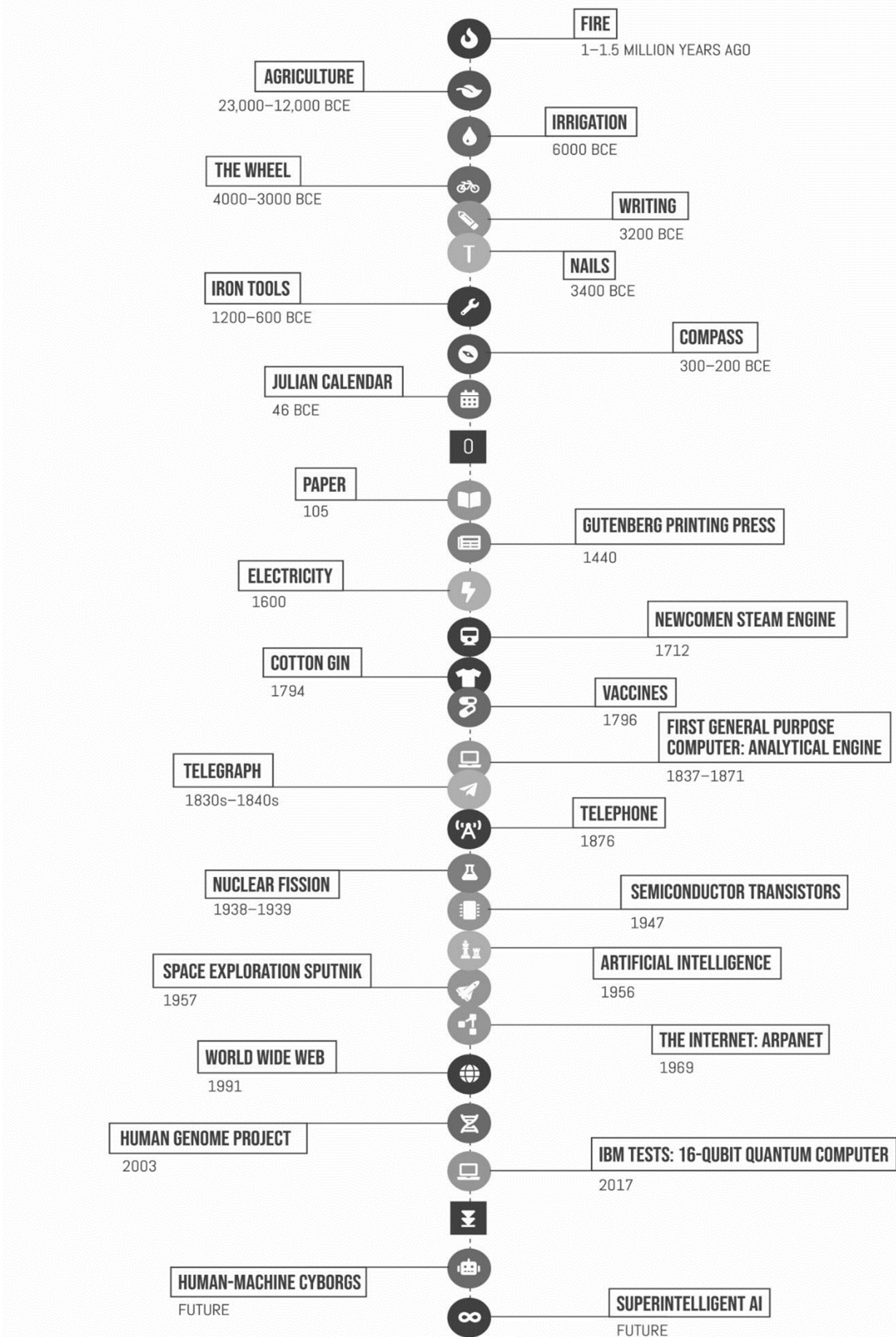
*“Philosopher Nick Bostrom adds that, with respect to developing AI, ‘humans are like small children playing with a bomb.’”*

*Coleman, Flynn (2019): A human algorithm. How artificial intelligence is redefining who we are, Counterpoint.*

*“By far, the greatest danger of Artificial Intelligence is that people conclude too early that they understand it.” (Eliezer Yudkowsky)*

*“When you’re building something smarter than you, you have to get it right on the first try.” (Eliezer Yudkowsky)*

# A BRIEF HISTORY OF TECHNOLOGY



### 31. Ultrasociabilidad y conflicto (Peter Turchin, 2016)

“... ultrasociality—the ability of human beings to cooperate in very large groups of strangers, groups ranging from towns and cities to whole nations, and beyond.”

“The increase in the scale of human societies, measured by the number of people in a polity (a politically independent unit).”

(100s = between 100 and 1,000)

“Time (kya) is time in thousands of years since the first appearance of the polity type.”

Social scale (people)	Polity Types	Time (kya)
10s	Foraging bands	200
100s	Farming villages	10
1,000s	Simple chiefdoms	7.5
10,000s	Complex chiefdoms	7
100,000s	Archaic states	5
1,000,000s	Macrostates	4.5
10,000,000s	Mega-empires	2.5
100,000,000s	Large nation-states	0.2

“... cooperation is actually astonishingly difficult to achieve and, once achieved, hard to preserve. We tend not to appreciate just how fragile it is (...) Today we live in huge societies of millions of people, most of whom are perfect strangers to us. We don't fear strangers (...). More than that, we actually need them. We often forget how much we depend on the kindness of strangers.”

“The central question of this book is why, during the past 10,000 years, large-scale, complex societies have replaced small-scale societies (...) The pace of cultural evolution is faster today, but research shows that the economic development and political stability of a modern country depend on cultural innovations and political decisions made decades and even centuries ago. If we want to make life better for people everywhere, we need to learn how to fix failed states and restart failed economies. The key (...) is cooperation. Where millions of strangers cooperate with each other, we see strong states and thriving economies. Where cooperation fails, so do states and economies. That is why it is so important to solve the puzzle of ultrasociality; to understand how the human capacity for cooperating in huge, anonymous societies evolved.”

**Turchin, Peter (2016): *Ultrasociety: How 10,000 years of war made humans the greatest cooperators on Earth*, Beresta Books.**

“Human social evolution has followed a remarkable, even bizarre trajectory, with sharp turns one after the other. Why? Philosophers and social scientists have offered many explanations, but there is still no accepted answer. Now, however, thanks to the new science of Cultural Evolution, we are beginning to see the outlines of the explanation. The answer is surprising. It was competition and conflict between human groups that drove the transformation of small bands of hunter-gatherers into huge nation-states (...) it was war that first created despotic, archaic states and then destroyed them, replacing them with better, more equal societies. War both destroys and creates. It is a force of creative destruction, to borrow a phrase from the economist Joseph Schumpeter. In fact, that phrase gets the emphasis wrong. War is a force of destructive creation, a terrible means to a remarkable end. And there are good reasons to believe that eventually it will destroy itself and create a world without war.”

“The key process in the decline of violence has been the increase in the scale of human cooperation. Remember, peace is not just the absence of war; lasting, stable peace demands a lot of management. And the only way to accomplish it is by cooperation.”

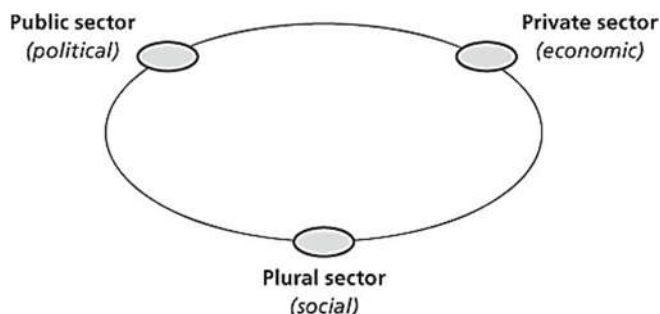
## 32. Sociedad equilibrada y sector plural (Henry Mintzberg, 2015)

“Enough of the imbalance that is destroying our democracies, our planet, and ourselves (...) Enough of the visible claw of lobbying in place of the invisible hand of competing. Enough of the economic globalization that undermines sovereign states and local communities.”

“When the communist regimes of Eastern Europe began to collapse in 1989, pundits in the West had a ready explanation: capitalism had triumphed. They were dead wrong, and the consequences are now proving fateful. It was balance that triumphed in 1989. While those communist regimes were severely out of balance, with so much power concentrated in their public sectors, the successful countries of the West maintained sufficient balance across their public, private, and what can be called plural sectors. But a failure to understand this point has been throwing many countries out of balance ever since, in favor of their private sectors.

There are three consequential sectors in society, not two. The one least understood is known by a variety of inadequate labels, including the “not-for-profit sector,” the “third sector,” and “civil society.” Calling it “plural” can help it take its place alongside the ones called public and private (...) Consider all those associations that are neither public nor private—owned neither by the state nor by private investors—such as foundations, places of worship, unions, cooperatives, Greenpeace, the Red Cross, and many renowned universities and hospitals. Some are owned by their members; most are owned by no one. Included here, too, are social movements that arise to protest what some people find unacceptable (...) and social initiatives, usually started by small community groups, to bring about some change they feel is necessary (...) Despite the prominence of all this activity, the plural sector remains surprisingly obscure, having been ignored for so long in the great debates over left versus right.”

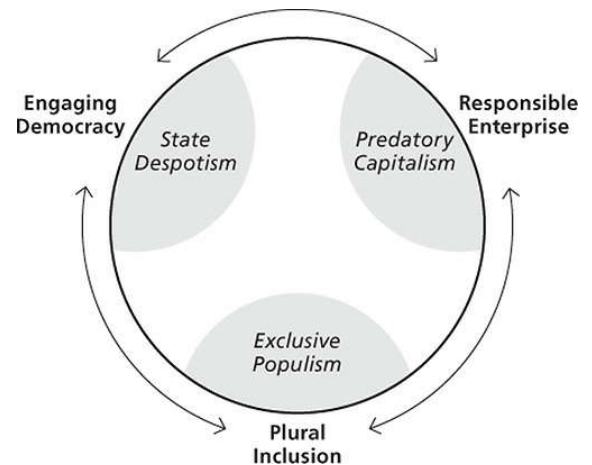
“... picture instead a balanced society as sitting on a stool with three sturdy legs: a public sector of respected governments, to provide many of our protections (such as policing and regulating); a private sector of responsible businesses, to supply many of our goods and services; and a plural sector of robust communities, wherein we find many of our social affiliations. How do we regain balance in our societies? Some people believe that the answer lies in the private sector—specifically, with greater corporate social responsibility (...) Other people expect democratic governments to act vigorously. This they must do, but they will not so long as public states continue to be dominated by private entitlements, domestic and global. This leaves but one sector, the plural, which is not made up of “them” but of you, and me, and we, acting together. We shall have to engage in many more social movements and social initiatives, to challenge destructive practices and replace them with constructive ones. We need to cease being human resources, in the service of imbalance, and instead tap our resourcefulness as human beings, in the service of our progeny and our planet.”



“A society out of balance, with power concentrated in a privileged elite, can be ripe for revolution (...) The trouble with revolution is that it usually replaces one form of imbalance with another. As some people among the disenfranchised gain power through force, they tend to carry their society toward some new extreme.”

“The plural sector is not a “third way” between the other two sectors but (...) one of three ways required in a balanced society. Each sector suffers from a potentially fatal flaw. Governments can be crude. Markets can be crass. And communities can be closed—at the limit, xenophobic (...) Crudeness, crassness, and closed-ness are countered when each sector takes its appropriate place in society, cooperating with the other two while helping to keep both—and their institutions—in check (...) Healthy development—social, political, and economic—allows power to shift among the sectors according to need, in a dynamic equilibrium that encourages responsiveness without domination.”

“Countries today seem to be going backward, to imbalance, in three ways, and perhaps in one way forward, toward balance. One sector dominates each of the ways backward, shown in the figure (...) by the lopsided bulges shaded inside the circle. On the left is state despotism, dominated by government in the public sector (as we have seen under communism (...)). On the right is predatory capitalism, dominated by exploitative enterprises in the private sector (...). And at the bottom is exclusive populism, where some segment of the plural sector dominates society, excluding even other segments in that sector (as did the Muslim Brotherhood in Egypt).



Take your choice—crude, crass, or closed—bearing in mind that one can lead to another. Exclusive populism easily gives rise to state despotism (as in Nazi Germany), while the fall of state despotism in the communist regimes of Eastern Europe has encouraged the growth of predatory capitalism in the West. In contrast, connected around the outside of the circle, in the spirit of balance, are plural inclusion, based on open collaboration; responsible enterprise, concerned with the legitimate needs of all stakeholders; and engaging democracy, which seeks widespread involvement of the citizenry. No one of these can rebalance society, but together they can.”

*Mintzberg, Henry (2015): Rebalancing society. Radical renewal beyond left, right, and center, Berrett-Koehler Publishers.*

### 33. Una paradoja de tecnología y política (Daniel Innerarity, 2013)

“In complex societies, where everything is closely linked, the main problem consists of knowing how we can protect ourselves from our own irrationality. Catastrophic chains of events from which we should protect ourselves stem from our irresponsible tendency of fearing too much or not enough (...) Contemporary societies are faced with the crucial problem of how to re-determine the relationship between risk and security. The search for socially acceptable methods for managing risks effectively has become a task of particular interest both for political reflection and for the praxis of governance.”

“In our collective imagination, technology appears as a potential threat (...) we can all recall the warning made by Lane (1966) [Lane, R. E. (1966): “The decline of politics and ideology in a knowledgeable society,” American Sociological Review 31, 649-662.] that we were at the beginning

of a new era where scientific knowledge would reduce the significance of politics. Today, the reality is quite different: in addition to techniques which are beneficial, we are surrounded by others that have failed (...) Toxic waste in the Gulf of Mexico, the economic crisis produced largely by the failure of sophisticated technological financial mechanisms, climate change brought about by our model of development are not only disasters with serious social repercussions but are also, and from the outset, resounding technological failures. In the light of such fiascos, we might conclude that the technocrats were wrong, but so were those who feared the failures of technology less than its successes."

"What is interesting in this historical turmoil is that it radically changed our way of understanding the articulation between politics and technology. Neither the technocratic Right nor the neo-Marxist Left of the 1960s and 1970s thought that the renewal of politics could one day arise from the failure of technology (...) We were expecting politics to protect us from the power of technology, and it now turns out that politics is being called upon to resolve the problems caused by technology's weakness."

"Far from transforming politics into an anachronism, technology (or rather its resounding failures or its potential risks) has reinforced the prestige of politics (...) managing these risks may be a new source of the legitimacy of political action (...). Whether politics knows how to successfully exercise this responsibility or has the instruments necessary to do so is another question. Therefore, politics is making a comeback in three fundamental areas: as the return of the state, as a recovery of political logic, and finally as the demand for a democratic management of risks."

"...the gradual awareness of the dangers of technological civilizations is encouraging the state to take on new tasks, albeit in very different contexts from the contexts where the state was accustomed to acting sovereignly (...) We can experience a moment of "re-politicization" precisely because of the discrediting of the so-called experts. Those who had monopolized accuracy and efficiency have failed; resorting to science and technology to put an end to controversies has become ideologically suspect; the world of the experts has turned out to be as rarely unanimous as our pluralistic societies."

"We find ourselves faced with a strange paradox: politics has not been strengthened through technological perfection, but through its failure. Technology needs political regulation now more than ever (...) Whenever technological failures are perceived as a serious threat to citizen rights, we demand that politics assumes the responsibility of creating the conditions that will allow us to meet these consequences as a society (...) Where we used to believe that there would be a technological solution for every problem in the future, our response has now been reversed (even if with more modesty): we can now be reasonably certain that problems brought about by technology will be solved politically or not at all."

Innerarity, Daniel (2013): "Introduction: Governing global risks", in Innerarity, Daniel; Javier Solana; eds. (2013): *Humanity at risk. The need for global governance*, Bloomsbury.

## 34. La clase liberal

The role of the liberal class in a traditional democracy is to ensure that reform remains a viable alternative. It is placed between the power elite and the general population. The liberal class controls the behaviour of (and civilizes) the power elite, offers hope for change to the general population, makes proposals to gradually reduce inequality and protect the weak, and becomes useful to power

elite by discrediting proposals of radical change. In the last instance, the liberal class attributes legitimacy to the power elite and serves as a voice to the general population in their demands for change and improvement.

- One of the consequences of globalization has been the accumulation of economic power (and, through it, political influence and even political power) in the hands of multinational corporations. This power has been used to assault the traditional democracies and deprive the liberal class of its role as a safety valve. The role of the liberal class has been reduced to offer empty rhetoric. “The inability of the liberal class to acknowledge that corporations have wrested power from the hands of citizens, that the Constitution and its guarantees of personal liberty have become irrelevant, and that the phrase consent of the governed is meaningless, has left it speaking and acting in ways that no longer correspond to reality.” (Hedges, 2010) Since the liberal class has lost its ability to articulate responses to discontent, it becomes more likely that populist movements and/or violence will arise to deal with the sources of discontent.
- One political lesson of history is that those in power that appear incapable of performing their duties, and this notwithstanding persist in retaining their privileges, tend to be removed by force. By not fulfilling its traditional tasks the liberal class is exposed to the same fate: to be brutally discarded.
- An ineffectual (dead) liberal class creates a more polarized society: the power elite has no check to prevent the plundering of the economy and the general population increases its frustration and finds more attractive finding solutions outside the democratic institutions or without the instruments of a traditional democracy. In killing the liberal class, the ‘corporate class’ behaves like a parasite that kills its host: without the liberal class the power elite is free to demolish the system of measures (welfare state) erected by the liberal class to protect the general population from the inequities of the economic system.

**Hedges, Chris (2010): *Death of the liberal class*, Nation Books.**

**Mau, Steffen (2015): *Inequality, marketization and the majority class. Why did the European middle classes accept neo-liberalism?*, Palgrave Macmillan, New York.**

### **35. La paradoja del poder (Jack Hirshleifer)**

En las luchas de poder, es natural esperar que los fuertes se fortalezcan (y los débiles, se debiliten). La paradoja del poder radica en que los grupos más pobres o pequeños a menudo terminan mejorando su posición en relación con los más ricos o grandes. Una explicación es que el grupo que parte de una situación desventajosa tiene un incentivo para esforzarse más (luchar con más ahínco, invertir más, asumir más riesgos, probar nuevas estrategias) que el grupo que disfruta de una ventaja. Solo cuando el conflicto es lo suficientemente decisivo, el grupo más rico o grande gana en relación con el más pobre o pequeño. Esta paradoja explica la adopción de políticas que redistribuyen el ingreso de los ricos a los pobres.

## 36. La dimensión psicológica

- **El síndrome de la arrogancia (*The hubris syndrome*)**

El síndrome de la arrogancia se refiere al cambio de personalidad que experimentan algunas personas que ocupan puestos de liderazgo social, político, económico e ideológico. Este cambio se caracteriza por la falta de realismo (pérdida de contacto con la realidad) y una excesiva autoestima. Ambos rasgos conducen a la toma de decisiones incorrectas. El síndrome de la arrogancia y el poder van de la mano: el poder es necesario para que se produzca; los líderes que lo padecen y han perdido el poder nunca lo recuperan.

- **La ley inversa de la cordura (*The inverse law of sanity*)**

“Normal persons have mild positive illusion, which, in the context of power, predisposes them to developing hubristic behavior. In contrast, depressed persons are more realistic and empathic than normal persons, and thus, in the context of power, less prone to the Hubris Syndrome.”

Garrard, Peter; Graham Robinson; eds. (2016): *The intoxication of power. Interdisciplinary insights*, Palgrave Macmillan.

- **El efecto Dunning-Kruger**

El efecto Dunning-Kruger es el sesgo cognitivo según el cual las personas tienden a sobreestimar su propia competencia (uno no es plenamente consciente de su propia ignorancia).

- **El sesgo de autoconfirmación**

El sesgo de autoconfirmación es el sesgo cognitivo en el que las personas tienden a tener en cuenta o enfatizar la información/evidencia que refuerza sus puntos de vista/creencias y descuidan la información/evidencia que contradice sus puntos de vista/creencias.

- **El sesgo egoísta**

El sesgo egoísta es el sesgo cognitivo en el que las personas tienden a atribuir el éxito a sí mismas y el fracaso a factores externos. Es una expresión de exceso de confianza: las personas parecen sobreestimar sus habilidades, conocimientos, competencias, eficiencia, virtudes morales...

- **El principio de validación social (*The principle of social proof*)**

People tend to make decisions and adopt beliefs on the basis on what others do and believe. The individuals' perception of correct/acceptable behaviour/beliefs depends on the extent to which other follow/hold the behaviour/beliefs. To decide what is appropriate people tend to rely on what others do. The presumption is that one makes fewer mistakes by respecting social evidence (the majority cannot be wrong). Social proof appears most influential under uncertainty and similarity.

- **El efecto aureola (*The halo effect*)**

El efecto halo es el sesgo cognitivo en el que la impresión general de una persona influye en la creencia sobre su carácter (las personas atractivas tienden a ser percibidas como amables, inteligentes y exitosas).

[Caso especial: el efecto Dr. Fox. Los estudiantes tienden a valorar mejor a un profesor que presenta el material de forma atractiva, expresiva y entusiasta, independientemente del valor, el interés, la utilidad, el significado o la verosimilitud del contenido. Decir disparates en condiciones de alta expresividad obtiene mejores calificaciones que ofrecer contenido informativo y útil de forma aburrida.] [¿Hasta qué punto puede el efecto halo manipular la prueba social?]

- **El papel del profesor**

“But the terrible mistake that our civilisation has made, I believe, is to turn the truth about our dying civilisation into an excuse for lying systematically to our children. We lie to our children every time we pretend that they can expect an ordinary career of their choice in an endlessly growing economy (...) We lie to them every time we tell them we love them while giving them a new piece of plastic crap before turning our attention swiftly back to our mobile phones. We lie to them, and ourselves, if we think or declare that we love them and yet the actions we take, rather than being directed with determination toward the aim of seeking to transform this civilisation for the better, actually hasten its likely collapse. We lie to them because much of the time we lie to ourselves, of course. But also *because we are pierced by the thought that their innocence shouldn't be swept away instantly* before it has had any time to give them some feeling of safety within which they can become sanely ‘attached’ and sanely individuated.”

“The first responsibility of intellectuals and of teachers at a time like this is to come clean. We should tell it like it is; and we should apologise for not having a better story to tell, a better world to bestow. We should be inspired by figures like Spartacus, Cato the Younger, Vaclav Havel, Mahatma Gandhi, Petra Kelly, Greta Thunberg: we should be clear that our power, such as it is, rests now in being authentic; in not shying away from extremely uncomfortable realities; in sharing how we feel. I find that one of the most powerful things I can do now is to share my fear (and grief) for the younger generation with them. That’s the basis of real dialogue; real empathy.”

*Read, Rupert; Samuel Alexander (2019): This civilisation is finished. Conversations on the end of Empire – and what lies beyond, Simplicity Institute.*

- **Un síndrome de deficiencia que afecta al 49% de la humanidad y causa daños graves**

“There is a birth defect that is surprisingly common, due to a change in a key pair of chromosomes. In the normal condition the two look the same, but in this disorder one is shrunken beyond recognition. The result is shortened life span, higher mortality at all ages, an inability to reproduce, premature hair loss, and brain defects variously resulting in attention deficit, hyperactivity, conduct disorder, hypersexuality, and an enormous excess of both outward and self-directed aggression. The main physiological mechanism is androgen poisoning, although there may be others. I call it the X-chromosome deficiency syndrome, and a stunning 49 percent of the human species is affected.”

“We humans have forty-six chromosomes, of which (*usually*) two—X and Y—are sex chromosomes. A woman’s eggs each carry one X, and a man’s sperm are about equally divided between those with an X and those with a Y. The fertilized egg becomes XX or XY, *usually* synonymous with female and male.”

“The mammalian body plan is basically female. If you have just one X (Turner syndrome), you will not be fertile, but you will otherwise be female, as long as you have no Y. If you have two or more X’s but also a Y (Klinefelter syndrome), you will not be completely typical, but you will be basically male. There are rare cases of infertility in women who are found to be XY but are insensitive to androgens due to another gene. And a few men seem to be XX under the microscope but are found to have the key Y genes accidentally attached to one of their X’s—something that can happen in a slightly awry cell division. Otherwise it’s fair to say: the body plan is female unless the Y flips it into maleness.”

“... we can think of maleness as a syndrome, a chromosomal defect shared by 49 percent of humans. It does serious damage. It quashes the body’s ability to create new life, causes excess death at all ages, shortens life, increases the risk of diseases ranging from heart attack to autism, and causes physical violence, among other symptoms.”

*Konner, Melvin (2015): Women After All. Sex, Evolution, and the End of Male Supremacy, W. W. Norton.*

#### • **Discriminación y democracia**

“Both Western and non-Western societies continue to struggle with the conflict between relatively recent egalitarian ideals and inegalitarian social and political orders designed by prior generations of government and leadership to maintain dominance of a particular ethno-national group, religion, or presumed race. The most durable and enduring democratic polities have nurtured an ethnos within them, often at the expense of minoritized and racialized groups. The United States, France, and Britain—but also contemporary Germany, Switzerland, Belgium, the Scandinavian nations, Ghana, South Africa, Indonesia, and many other countries classified as democratic—have exhibited this tendency. The larger number of studies of these countries and the likelihood of particular groups or subgroups attaining the most preferable positions in the economy, polity, and society attest to this bias in the most democratic and societies in the contemporary world. How to make societies less ethnocentric, and more ethos-centric, is one of the great challenges of balancing cultural difference and democracy in contemporary nation-states.”

“... population homogeneity, like the category of the foreigner and citizen, is a political artifact, not something we find ready-made in the world. So much of the origin tales told by various ultranationalist and xenophobic movements is mythical, not historical. the nation-state has always been a container populated by an ever-evolving assortment of nationalities, languages, migrants, and religions. Diversity on its own will not produce democracy, no more than homogeneous societies will.”

“With few exceptions, the overwhelming majority of nation-states, city-states, colonies, or principalities in the world’s history were founded with more than one readily identifiable population. The disagreements within Europe regarding who is, and who can be, a European and even more

specifically, who can and cannot cross national and regional boundaries, generated another set of questions: Shall we let any of these outsiders in, and if so, which ones? By what criteria shall we include some people and exclude others? Once allowed in, who should be encouraged to leave, and who should be encouraged to stay? How people answer these questions in vastly distinct places in the world will help determine whether an ethos or an ethnos of democracy ultimately prevails in what is often referred to as the West.”

Hanchard, Michael G. (2018): *The spectre of race. How discrimination haunts western democracy*, Princeton University Press.

- **‘The most important thing that has ever happened in human history’ (Steven Pinker , 2011)**

El declive de la violencia a lo largo de la historia y el hecho de que la humanidad posiblemente esté viviendo la era más pacífica de su historia. Pinker identifica seis etapas principales en la retirada de la violencia: el Proceso de Pacificación (transición de la caza y la recolección a la agricultura), el Proceso de Civilización (consolidación de las autoridades centralizadas), la Revolución Humanitaria (surgimiento, alrededor de la Ilustración, de movimientos organizados para abolir las formas de violencia socialmente sancionadas y la ideología del pacifismo), la Larga Paz (tras la Segunda Guerra Mundial, las principales potencias dejaron de librar guerras entre sí), la Nueva Paz (desde 1989, al final de la Guerra Fría, los conflictos organizados han disminuido en todo el mundo) y la Revolución de los Derechos (inaugurada por la Declaración Universal de los Derechos Humanos en 1948, corresponde a la creciente repulsión contra la agresión a menor escala: contra minorías étnicas, mujeres, niños, homosexuales, animales...).

Fuerzas impulsoras de la disminución de la violencia: el Estado, el comercio, la feminización (las sociedades más respetuosas con las mujeres tienden a ser menos violentas), el cosmopolitismo (que permite comprender mejor la perspectiva de los demás) y la difusión de la razón para abordar los asuntos humanos.

Pinker, Steven (2011): *The better angels of our nature. Why violence has declined*, Viking.

- **¿La lección más importante de la historia?**

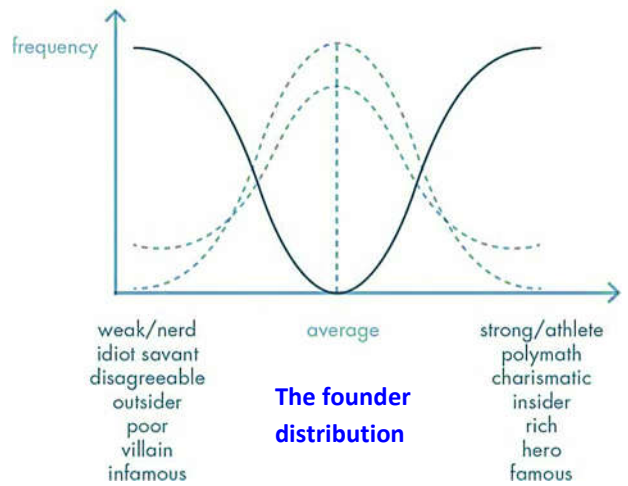
“...perhaps the most important lesson we can learn from history is that short-term solutions and quick profits come at a great price in the long run.”

Fawcett, Bill (2013): *Doomed to repeat The lessons of history we've failed to learn*, William Morrow.

- **La paradoja del fundador**

“Of the six people who started PayPal, four had built bombs in high school. Five were just 23 years old—or younger. Four of us had been born outside the United States. Three had escaped here from communist countries: Yu Pan from China, Luke Nosek from Poland, and Max Levchin from Soviet Ukraine (...) Are all founders unusual people? (...) Some people are strong, some are weak, some are geniuses, some are dullards—but most people are in the middle. Plot where everyone falls and you’ll

see a bell curve. Since so many founders seem to have extreme traits, you might guess that a plot showing only founders' traits would have fatter tails with more people at either end. But that doesn't capture the strangest thing about founders. Normally we expect opposite traits to be mutually exclusive: a normal person can't be both rich and poor at the same time, for instance. But it happens all the time to founders: startup CEOs can be cash poor but millionaires on paper. They may oscillate between sullen jerkiness and appealing charisma. Almost all successful entrepreneurs are simultaneously insiders and outsiders. And when they do succeed, they attract both fame and infamy. When you plot them out, founders' traits appear to follow an inverse normal distribution."



Thiel, Peter; Blake Masters (2014): *Zero to one. Notes on startups, or how to build the future*, Crown Business.

## 37. Teorías de la historia cíclica/pendular

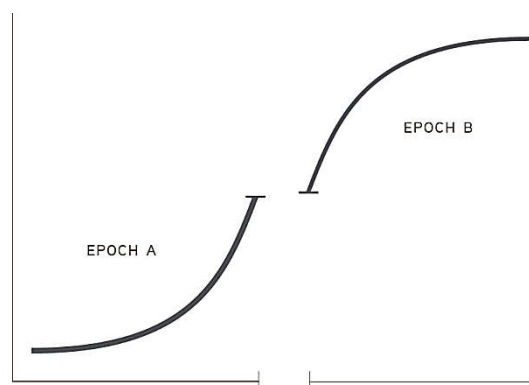
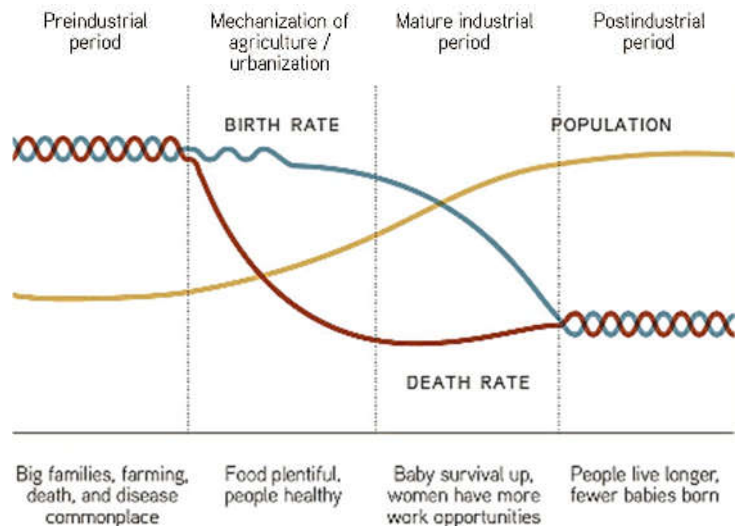
### • Las épocas A y B (Jonas y Jonathan Salk, 2018)

“The sigmoid growth curve consists of two sections of different shape: the upturned portion describes a phase of progressive acceleration of growth; the second portion is downturned and describes a phase of progressive deceleration.



The difference in shape between the two portions of the curve suggests both quantitative and qualitative differences in human life between the two periods of time.”

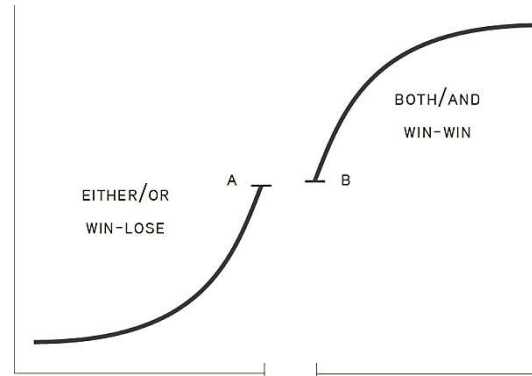
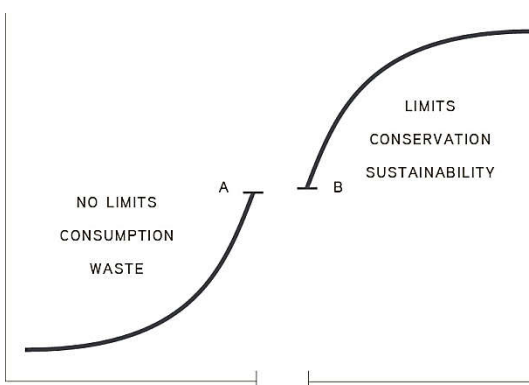
“We are moving from an era dominated by limitless growth, competitive strategies, short-range thinking, and independence to one characterized by awareness of limits, cooperation, long-range thinking, and interdependence (...) We are on a frontier, but it is not territorial or technological; it is human and social (...) In the years to come, we face the challenge of understanding and facilitating a slowing of human population growth and, ultimately, of adapting to conditions associated with a relatively constant population size at a level far beyond anything we have previously experienced.”



“To someone born in Epoch A, the future would appear to have few limitations in terms of growth, resources, and available energy. Someone living in Epoch B would, however, have a distinct sense of limitations and of the necessity to adapt to the approaching of a plateau in population growth.”

“In Epoch A, progressive increase in population was seen to be positive; in Epoch B, this increase is now of negative value and, if left unchecked, threatens our very existence.”

“In Epoch A, competition and the

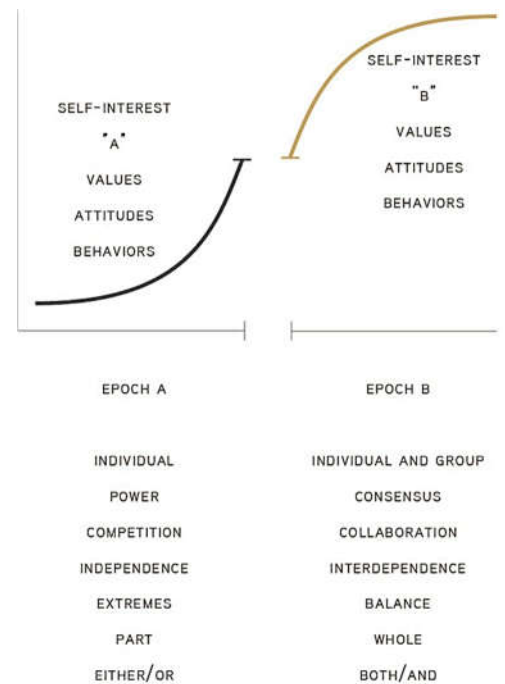


demands of persistent, accelerating growth were inherently associated with either/or attitudes and philosophies and the prevalence

of win-lose strategies in the resolution of conflict. People or nations saw the world as a place in which any benefit to the other is a loss or detriment to the self. In Epoch B, however, the tendency toward balance, collaboration, and interdependence will be based upon and evoke a philosophy of both/and and the development of win-win strategies.”

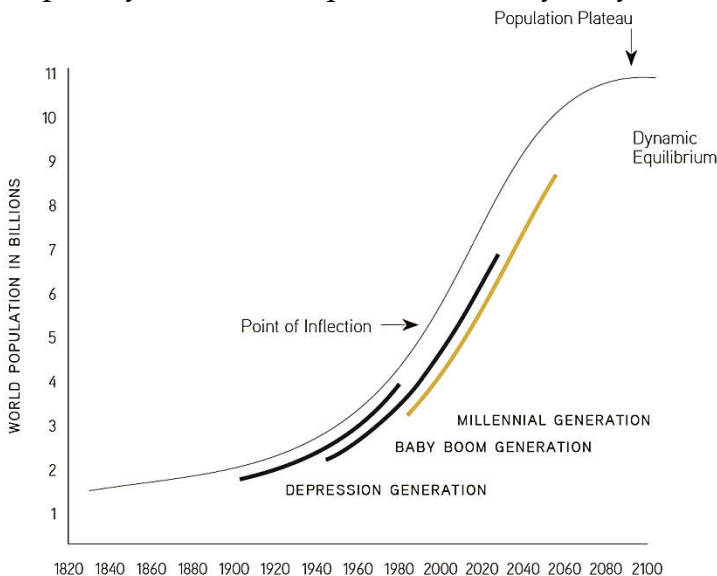
“Epoch B values, attitudes, and behaviors are emerging not only because they are humane but also because they are advantageous to individuals and to society. During this transition, it can be expected that conflict, at all levels of human life, will increase. In the long term, such conflict will be most effectively and constructively resolved with both/and rather than either/or strategies and through the integration of the values of Epoch A and Epoch B. The present period is especially sensitive. In resisting change, we may cling to values that are obsolete and exceed the tolerance of nature. Resisting change may ameliorate some problems in the short term but will not provide the basic shift in values needed in this epochal transition.”

“Those in the Baby Boom generation were born just before the point of inflection; however, the inflection of the curve occurred during their lifetimes. Thus, they were born in the reality of Epoch A but have lived the later part of their lives in Epoch B—the part of the curve where growth is slowing. Those in the Millennial generation were born after the point of inflection of the growth curve, fully in Epoch B. From the time of their birth, the reality they have experienced has been one of awareness of limits, the need to conserve, and the sense of the planet as an integrated whole. Thus, their attitudes, values, and behaviors have been shaped by and are adapted to a reality very different from that



experienced by any generation before them.”

“The epochal change now taking place affects every aspect of human life—individual and institutional, emotional and cognitive, personal and technological. It calls for the resolution of imbalances and conflicts that have arisen in the course of preceding centuries and for the integration of divergent tendencies in human life. This integration will occur in ways that will differ according to local history, culture, and ecological conditions, but it must occur.”



Salk, Jonas; Jonathan Salk (2018): *A new reality. Human evolution for a sustainable future*, City Point Press.

• **El gran balancín (The Great Seesaw, Geoffrey Blainey, 1988)**

“In the western world a powerful seesaw is at work but is rarely noticed. The seesaw carries a wide range of beliefs and attitudes, and when the seesaw moves many of those attitudes move too. The seesaw has been tilting up and down since at least the eighteenth century, and at times it reaches an extreme angle (...) The seesaw is an indicator of the condition of the western world, and is especially vital during a long period of relative peace between western nations (...) Those who admire

Technology have tended to criticise Nature, and those who admire Nature have tended to criticise Technology (...) The arts in all their variety reflect the swing of the seesaw.”

“The movements of the seesaw influence the birth of new ideas, the way they are expressed, and the enthusiasm or apathy of scholars towards those ideas (...) Technology is the sum total of mankind's current skills as a problem solver; and when our faith in those skills becomes weaker, we view more pessimistically the world's main natural resources and above all, the hope of finding substitutes for those resources.”

“A swing of the seesaw has strong economic effects. A loss of confidence in Technology –that powerful dynamo of modern capitalism– sends shock waves through the economic system, while an increased respect for Technology adds zest to economic activity. Although the seesaw is linked to economic life, the evidence does not indicate that economic changes are always propelling the swings in intellectual and social attitudes. Economic changes do affect the seesaw but in turn the seesaw affects economic life (...) The time will probably come when economists recognise these cultural signs.”

“The swing between Technology and Nature is in a sense a swing between optimism and pessimism. Those who believe in Technology, I sometimes call the optimists. Those who believe in Nature, I sometimes call the pessimists. I know this is too simple a contrast, for many who favour a return to Nature are pessimistic towards the short-term future of their civilisation but, believing they hold the ultimate panacea, are optimistic towards the long-term future (...) An optimist, by my definition, respects our science-based civilisation and believes that it will continue to flourish.”

“My own conclusion is that a version of the seesaw existed in earlier centuries but was slower and less powerful. Later the seesaw became influential as society became more secular and as new technology became decisive (...) The seesaw stands at one of its most revealing positions in the period extending roughly from 1750 to 1790 when both Nature and western civilisation had powerful admirers; it illuminates the period from the 1840s to the 1870s when faith in western civilisation and specially its technology reigned supreme; it is important in the shorter period after the 1890s when faith in Nature revived powerfully, and in the recent post-war period when a strong swing towards Technology was followed by a strong swing towards Nature (...) The seesaw is more than a guide to people's attitudes to Nature on the one hand and to modern industrial society on the other. Many of our important values and attitudes are clustered at one end of the seesaw.”

	OPTIMISTS	PESSIMISTS
	Optimists believe that:	Pessimists believe that:
	Man is intelligent	Man is not as clever as he thinks he is
	Our industrial civilisation is admirable	Our industrial civilisation is sick
	New technology is beneficial	New technology is dangerous
	Reason is the highest virtue	Imagination, instinct and emotion are the highest virtues
	City life is noblest	Rural life is noblest
	Rural life fosters idiocy	City life corrupts and pollutes
	The work ethic deserves three cheers	Leisure deserves three cheers
	Paradise is full of change	Paradise is stability and simplicity
	Nature must be harnessed	Nature, if left alone, is bountiful
	Science will provide	Nature will provide
	Specialisation is wise	The all-rounder is preferable
	Competition is a virtue	Co-operation is a virtue
	Modern man is the ideal	The noble savage is the ideal
	The golden age lies in the present and future but not in the past	The golden age lies in the past and maybe in a far-away, utopian future

• **Todo ya ha pasado: los cuatro giros (*the four turnings*, William Strauss y Neil Howe, 1997)**

“The reward of the historian is to locate patterns that recur over time and to discover the natural rhythms of social experience. In fact, at the core of modern history lies this remarkable pattern: Over the past five centuries, Anglo-American society has entered a new era—a new turning—every two decades or so. At the start of each turning, people change how they feel about themselves, the culture, the nation, and the future. Turnings come in cycles of four. Each cycle spans the length of a long human life, roughly eighty to one hundred years, a unit of time the ancients called the saeculum. Together, the four turnings of the saeculum comprise history's seasonal rhythm of growth, maturation, entropy, and destruction.”

- The *First Turning* is a *High*, an upbeat era of strengthening institutions and weakening individualism, when a new civic order implants and the old values regime decays.
- The *Second Turning* is an *Awakening*, a passionate era of spiritual upheaval, when the civic order comes under attack from a new values regime.
- The *Third Turning* is an *Unraveling*, a downcast era of strengthening individualism and weakening institutions, when the old civic order decays and the new values regime implants.
- The *Fourth Turning* is a *Crisis*, a decisive era of secular upheaval, when the values regime propels the replacement of the old civic order with a new one.”

“Each turning comes with its own identifiable mood. Always, these mood shifts catch people by surprise. In the current saeculum, the First Turning was the *American High* of the Truman, Eisenhower, and Kennedy presidencies (...) The Second Turning was the *Consciousness Revolution*, stretching from the campus revolts of the mid-1960s to the tax revolts of the early 1980s (...) The Third Turning has been the *Culture Wars*, an era that began with Reagan's mid-1980s *Morning in America* and is due to expire around the middle of the Oh-Oh decade, eight or ten years from now (...) The Fourth Turning is history's great discontinuity. It ends one epoch and begins another. History is seasonal, and winter is coming.”

“**Sometime around the year 2005, perhaps a few years before or after, America will enter the Fourth Turning** (...) Trying to foresee where the eruption will go once it bursts free of the channels is like trying to predict the exact fault line of an earthquake. All you know in advance is something about the molten ingredients of the climax, which could include the following:

- *Economic distress*, with public debt in default, entitlement trust funds in bankruptcy, mounting poverty and unemployment, trade wars, collapsing financial markets, and hyperinflation (or deflation).
- *Social distress*, with violence fueled by class, race, nativism, or religion and abetted by armed gangs, underground militias, and mercenaries hired by walled communities.
- *Cultural distress*, with the media plunging into a dizzying decay, and a decency backlash in favor of state censorship.

- *Technological distress*, with cryptoanarchy, high-tech oligarchy, and biogenetic chaos.
- *Ecological distress*, with atmospheric damage, energy or water shortages, and new diseases.
- *Political distress*, with institutional collapse, open tax revolts, one-party hegemony, major constitutional change, secessionism, authoritarianism, and altered national borders.
- *Military distress*, with war against terrorists or foreign regimes equipped with weapons of mass destruction."

Strauss, William; Neil Howe (1997): *The fourth turning. An American prophecy*, Broadway Books.

• **'Nosotros' y 'yo' ('We' versus 'Me', Neil Howe, 1997)**

"The energies of a duality drive the Pendulum of public opinion. On one side is 'Me,' the individual—unique, special, and possessing unlimited potential. On the other side is 'We'—the group, the team, the tribe, the collective. 'Me' and 'We' are the equal-but-opposite attractions that pull society's Pendulum one way, then the other. The twenty-year Upswing to the Zenith of 'We' (e.g., 1923–1943) is followed by a twenty-year Downswing as that 'We' cycle loses energy (e.g., 1943–1963). Society then begins a twenty-year Upswing into 'Me' (e.g., 1963–1983), followed by a twenty-year Downswing as the 'Me' cycle loses energy (1983–2003). Think of the Pendulum as the forty-year heartbeat of society, systolic and diastolic."



"The 'Me' cycle.

1. demands freedom of expression;
2. applauds personal liberty;
3. believes one man is wiser than a million men: 'A camel is a racehorse designed by a committee';
4. wants to achieve a better life;
5. is about big dreams;
6. desires to be Number One: 'I came, I saw, I conquered';
7. admires individual confidence and is attracted to decisive persons;
8. believes leadership is 'Look at me. Admire me. Emulate me if you can';
9. strengthens a society's sense of identity as it elevates attractive heroes."

"The 'We' cycle.

1. demands conformity for the common good;
2. applauds personal responsibility;
3. believes a million men are wiser than one man: "Two heads are better than one";
4. wants to create a better world;
5. is about small actions;
6. desires to be a productive member of the team: 'I came, I saw, I concurred';
7. admires individual humility and is attracted to thoughtful persons;
8. believes leadership is 'This is the problem as I see it. Please consider the things I am telling you and perhaps we can solve this problem together';
9. strengthens a society's sense of purpose as it considers all its problems."

“It’s not about age; it’s about attitude. It’s not about when you were born; it’s about how you see the world. In this book, the word generation will be defined as, ‘life cohorts bonded by a set

**WE** DRIVERS OF A “WE” VS. DRIVERS OF A “ME” **ME**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Demands conformity for the common good.</li> <li>• Applauds personal responsibility.</li> <li>• Believes a million men are wiser than one man.</li> <li>• Wants to create a better world. “I came, I saw, I concurred.”</li> <li>• Is about small actions.</li> <li>• Desires to be part of a productive team.</li> <li>• Admires humility and thoughtful persons.</li> <li>• Believes leadership is “This is the problem as I see it. Let’s solve it together.”</li> <li>• Strengthen society’s sense of purpose, focuses on solving problems.</li> </ul> | <ul style="list-style-type: none"> <li>• Demands freedom of expression.</li> <li>• Applauds personal liberty.</li> <li>• Believes one man is wiser than a million men.</li> <li>• Wants to achieve a better life: “I came, I saw, I conquered.”</li> <li>• Is about big dreams.</li> <li>• Desires to be Number One.</li> <li>• Admires individual confidence and decisive persons.</li> <li>• Believes leadership is “Look at me. Admire me. Emulate me if you can.”</li> <li>• Strengthen society’s sense of identity, elevates attractive heroes.</li> </ul> |
|---|---|

of values that dictate the prevailing worldview of the majority.’ Life cohorts, not birth cohorts. Everyone alive—regardless of their age—who sees the world through the lens of a particular set of values is part of that generation.”

“New values are introduced every forty years at a tipping point, also known as a fulcrum. This tipping point/fulcrum is where the Pendulum hangs directly downward, having just completed a Downswing and ready to begin the Upswing on the other side. On one side of society’s Pendulum is ‘Me,’ marked by the idealization of individuality and freedom of expression. The values of ‘Me’ are the values of the grasshopper, not the ant. The grasshopper is happy-go-lucky, living always in the moment. On the other side of the Pendulum is ‘We,’ marked by the idealization of authenticity and belonging to a tribe, working together for the common good. The ants are ‘We,’ trying to do the right thing, fulfilling their obligations, cleaning up the mess the grasshopper left behind.”

“It would appear that the Eastern and Western Pendulums are locked in opposite cycles. Western Europe, the Americas, and Australia are headed into a ‘We’ just as China, India, and the rest of Asia seem to be headed into a ‘Me.’ In essence, China is experiencing the ‘60s. Our 1963 happened for them in 2003.”

WHAT HAPPENS WHEN WE TAKE A GOOD THING TOO FAR

UPSWING WE VALUES	ZENITH WE (TOO FAR) VALUES	UPSWING ME VALUES	ZENITH ME (TOO FAR) VALUES
Responsibility	» Duty	Big dreams	» Hollowness
Humility	» Obligation	Individual expression	» Posing
Thoughtfulness	» Sacrifice	Freedom	» Phoniness
Conformity	» Regimentation	Being cool	» Self-centeredness
Authenticity	» Self-righteousness	Personal achievement	» Guru worship
Transparency	» Oppressiveness	Rose-colored lenses	» Depravity

**WE** “WE” MINDSET VS. “ME” MINDEST **ME**

“UNITED WE STAND, DIVIDED WE FALL”		“BE #1—SECOND PLACE IS THE FIRST LOSER”	
VALUES	REJECTS	VALUES	REJECTS
Responsibility	Relationships	Big dreams	Small actions
Humility	Teams	Individual expression	Conformity
Thoughtful	Small actions	Freedom	Self-sacrifice
Conformity	Connecting	Being cool	Self-denial
Authenticity	Volunteerism	Personal achievement	Personal responsibility
Transparency	Common good	Rose-colored lenses	Reality check

**WE** EGO “WE” VS. SELF “ME” **ME**

SEAT OF OBJECTIVE IDENTITY	SEAT OF SUBJECTIVE IDENTITY
RESPONSIBILITIES	DESIRES
• Relationships and connections	• Personal wants and needs
• Am I making a difference?	• Am I happy?
• Do I matter?	• Do I have status?
<b>Responsibility carried too far becomes slavery.</b>	<b>Freedom carried too far becomes depravity.</b>

## 38. Teorías del declive y del futuro

### • El gran dilema

“This stark choice confronts humanity with what is perhaps the greatest dilemma it has ever faced in its history: can we try to mobilize our resources in the most unprecedented ways over a short time span of no more than half a century to avoid the worst of the devastating scenarios outlined in the IPCC report or do we continue to give priority to economic growth and its principal mechanism, the extension of a consumer society throughout the world, seeking at best to modify or ‘green’ it? At its heart, this is a dilemma about the contradictions between what our science is telling us and what our deeply entrenched belief systems are telling us about how we organize our economy and society; indeed, its roots go deep into what we believe constitutes the good life. Our future rests on which of these we choose to follow, the evidence or our beliefs. Yet, few see the challenge in these terms. Many believe that science and technology will permit us to maintain our current consumer lifestyles while simultaneously reducing our greenhouse gas emissions by up to 95 % by 2050 and replacing our dependence on fossil fuels by renewable sources of energy.”

“Given that the post-carbon transition is inevitable and given its incompatibility with the continuity of growth, a certain amount of austerity will also be inevitable. Hence the desirability of reconstructing the concept of austerity instead of continuing to demonize it. (...) Perhaps the way down will not be so terrible if, in addition to being more materially modest, slower and more local, it proves to be more egalitarian, co-operative and democratic.”

Ernest García; Mercedes Martínez-Iglesias; Peadar Kirby; eds. (2017): *Transitioning to a post-carbon society. Degrowth, austerity and wellbeing*, Palgrave Macmillan.

### • Supertendencias que dan forma al futuro (Edward Cornish, 2004)

- **Progreso tecnológico.** “We can think of technological progress as the growing capability of humans to achieve their purposes. Technological progress has been the supremely important trend in human evolution for millions of years.”
- **Crecimiento económico.** “Technological progress promotes economic growth (...) because people are eager to use their know-how to produce goods and services, both for their own use and to sell to others. Economic growth is also a self-sustaining process.”
- **Mejoras en la salud.** “Technological progress and economic growth have led to improving human health because they have produced more food, more effective sanitation, better health services, and so on. Improving health leads to increasing longevity, which has two very important consequences: population growth and a rise in the average age of the population.”
- **Más movilidad.** “People, goods, and information move from place to place faster and in greater quantity than ever before (...) Mobility can also cause social and cultural disruption.”
- **Deterioro medioambiental.** “Environmental decline is continuing for the world as a whole because of continuing high population growth and economic development.”
- **Más pérdidas de la cultura tradicional.** “Deculturation occurs when people lose their culture or cannot use it because of changed circumstances (...) Today, the world is estimated to have

6,000 languages, but the number is expected to dwindle to about 3,000 by the end of the twenty-first century due to high mobility, globalization of economic activities, and other factors. Urbanization also contributes to deculturation.”

Cornish, Edward (2004): *Futuring. The exploration of the future*, World Future Society.

- **Cinco grandes temas en el 2052 (Jorgen Randers, 2012)**

- La revolución sostenible. “The future world will not have an expanding population. It will still use much energy per person, but that energy will be used wisely and be of the renewable sort. In the end the world will run on energy from the sun (...) It will be a world that focuses on human well-being, not only on its material component. The big question is how fast the transition to sustainability will happen. The sustainability revolution has already begun, that is for sure.”
- ¿Fin del capitalismo? “Capitalism has done wonders for global wealth creation over the last centuries, and this system for allocation of human activity dominates the current world economy. Capitalism has successfully focused attention and capital on organizations that are able to provide goods and services to customers who are willing and able to pay. Whenever demand shifts, the capitalistic system reallocates, again and again, thereby contributing to a continuing restructuring and growth of the societal pie. But in the same process, uncontrolled capitalism concentrates wealth in fewer hands. So there is a growing group of critics who point to the inequitable distribution of success in the system. The defenders of capitalism have always responded that this is the task of the politicians. But since politicians, particularly in democratic societies, seem unable to tax and redistribute in a sufficient manner, capitalism normally ends with the blame. Employment is the main tool of distribution in the capitalist economy (...) But unemployment compensation is normally quite limited both in value and in the length of time it is available. This is why job loss is so much feared in all capitalist economies, and why capitalism comes under fire whenever unemployment rates increase.”
- ¿Fin del crecimiento económico? “Yes, economic growth can continue, but only as long as the accompanying ecological footprint remains within the carrying capacity of the globe. (...) Will humanity manage to limit its ecological footprint to fit within the carrying capacity of the planet? Or will we continue to allow overuse of natural resources and the pollution-absorption capacity of the global environment? As you will see later, current lifestyles require roughly the support of 1.4 planets. Humanity has overshoot. We see the result of the overshoot most clearly in the ongoing accumulation of CO<sub>2</sub> in the atmosphere (...) It will be physically impossible to lift the material standard of living of all nations to that of the current West (...). In summary, global average per capita resource consumption will never reach the level that Americans enjoyed around the year 2000.”
- ¿Fin de la democracia pausada? “Democracy has many advantages and often yields solutions that are more sustainable than top-down decisions. But speed is not one of the characteristics of democratic decision making. So the way I see it, the fundamental question in this domain is whether democracy will agree on a stronger state (and faster decision making) before it is too

late—before we run into the brick wall of self-reinforcing climate change, irreversible biodiversity loss, and insufficient investment in forward-looking research and development.”

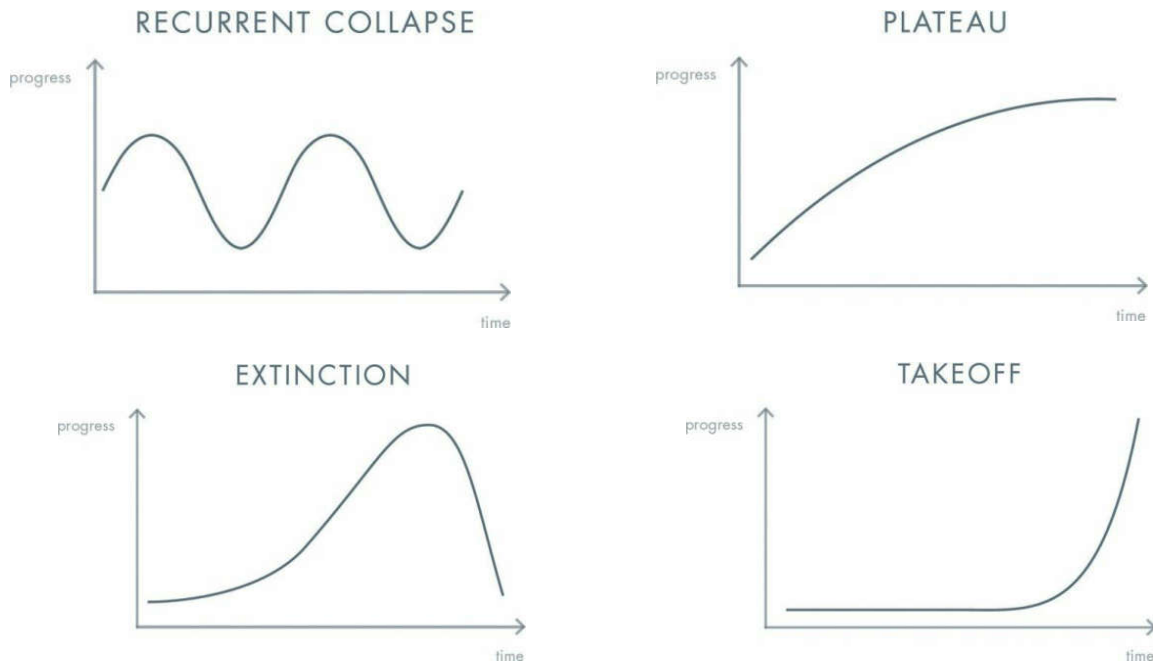
- ¿Fin de la armonía generacional? “Over the last hundred years or so we have gotten used to expecting that each generation enters the grown world in better shape. That means with better health, better education, more wealth, and better prospects (...) Today’s young, particularly in the rich world, are facing a new situation. They are inheriting a significant burden of national debt from their parents; they have to beat their way into markets characterized by persistent unemployment; they can ill afford housing at the same level as their parents; and they are expected to pay for their parents’ pensions. On top of this, the prospects for a quick resolution of these issues are grim. So the relevant question becomes: Will the younger generation calmly accept the burden bestowed on them by the older generation? Or will we get an aggressive and paralyzing confrontation between young and old, starting with confrontations with the baby boomers in the rich world?”
- ¿Fin del clima estable? The intergenerational issue (...) is most obvious in three areas: anthropogenic biodiversity destruction, climate change, and entombment of radioactive waste (...) The prime legacy issue in 2012 is humanity’s big and growing emissions of greenhouse gases, which lead to global warming. The CO<sub>2</sub> is emitted as a gas into the atmosphere and quickly moves around the globe. It remains in the atmosphere for a long time while waiting to get absorbed in the ocean (as carbonic acid in the water) or in trees and plants (as plant material when they grow). Presently, very roughly one-quarter of the CO<sub>2</sub> flows into the ocean, one-quarter flows into new biomass, and one-half remains in the atmosphere. The long-run accumulated effect of these flows has been to lift the concentration of CO<sub>2</sub> in the atmosphere from 280 ppm in preindustrial times (circa 1750) to 390 ppm today (2010). The CO<sub>2</sub> flows also have increased the acidity of the oceans and created a more difficult life for shell-forming species. More CO<sub>2</sub> in the atmosphere accelerates plant and tree growth, but it also leads to higher temperatures on the surface of the earth. The global average temperature has increased by 0.7°C since preindustrial times (...) And if we are to keep the temperature rise below plus 2°C we must keep the concentration of CO<sub>2</sub> in the atmosphere below 450 ppm (...). The concentration is currently going up by 2 ppm per year.”

Randers, Jorgen (2012): *2052: A global forecast for the next forty years*, Chelsea Green Publishing.

- **‘Creclive’ (Grocline, Jorgen Randers, 2012)**

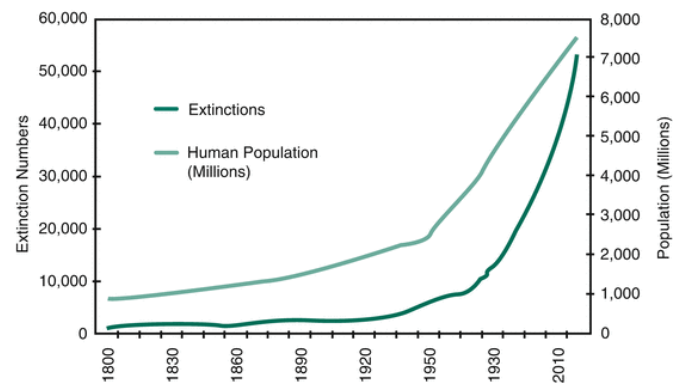
“In the last third of the twenty-first century I believe the world economy will have entered into an era where the combination of individual growth and societal decline has become the norm. Per capita consumption will be growing year by year, just as in the good old days. And at the same time the total economy—the GDP—will be in constant decline. This could be called ‘grocline’—simultaneous growth and decline. The grocline world is one where the individual situation improves while the total pie shrinks. It’s good and bad at the same time—decade after decade.”

- Los futuros de la humanidad de Nick Bostrom (en Thiel and Masters, 2014)

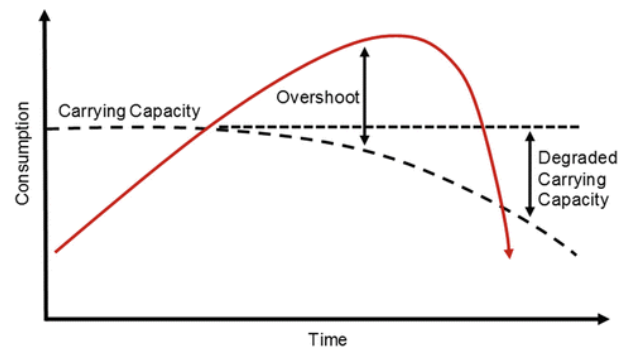


- Desafíos de la humanidad (Julian Cribb, 2017)

- **Species extinction, defaunation.** “Of all the human impacts which affect other creatures and plants, by far the largest is our practice of modifying natural landscapes and seascapes, so they support less and less wildlife. The main reason we modify these environments is for farming, fishing and grazing in order to supply the food we need each day (...) A major extinction event driven by humans is poised to occur in the world’s oceans , similar to the one which has already taken place among land animals over recent history.”



- **Global overshoot: resource scarcity, water scarcity, soil degradation, deforestation, desertification, ocean mingin, energy struggle.** “The human story in the twenty-first century will be dominated by a titanic global struggle—economic, political, scientific and military—for resources. On this, to a significant degree, turns the fate of civilisation. In every prior age till now the bounty of the Earth was ample to sustain the ascent of human society. Scarcities, when they occurred, were local, regional or else the result of human interference or mismanagement. Now (...) the physical demands of seven to ten billion humans, each aspiring to a higher standard of living, are combining to exceed the Earth’s carrying capacity. Put simply, we are using more stuff than the planet can renewably provide (...) To support the average citizen of Earth takes around 1386

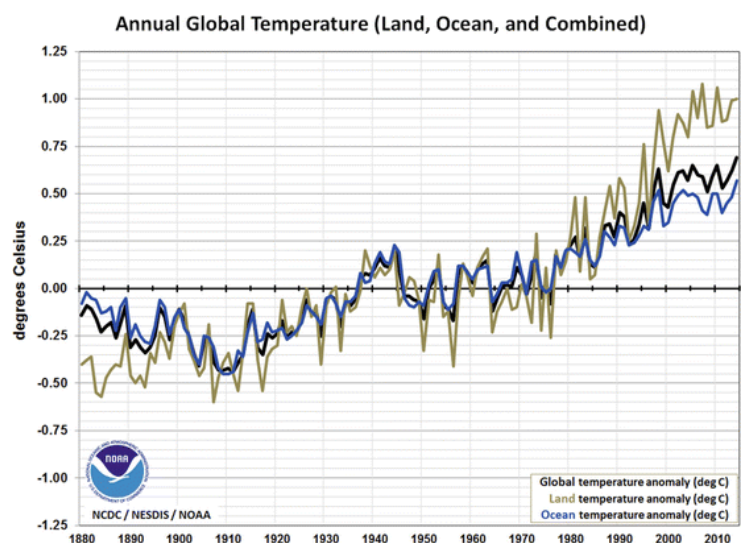


tonnes of water a year. This is known as our 'water footprint' and consists of all the water used to produce our food, consumer products, or provide the services on which we rely (...) In total, humanity goes through more than 9 trillion tonnes of fresh water annually (...) Even in the late twentieth century many people believed it inconceivable that human demands could possibly exceed the bounty of the world's vast oceans, or cause them such harm as to undermine their health and deplete the life they hold. This is no longer true."

"Cheap energy is the blood supply of modern civilization. To keep the world ticking over requires the use of about 550,000,000,000,000 British thermal units (550 quadrillion Btus) of primary energy each year (...) The typical Canadian consumes around 400 million Btus a year to maintain their lifestyle, the average German 165 m, the average Argentinian 90 m, the average Chinese 80 m and the average Egyptian 42 m. To satisfy this gargantuan global energy hunger in the second decade of the twenty-first century took 33 billion barrels of oil, 120 billion cubic feet of gas, 8.5 billion tonnes of coal and 20 trillion kilowatt hours of electricity every year. Of this total, fossil fuels supplied around 80 % of all primary energy and renewables about 20 % in the years 2013–2015."

- **Weapons of mass destruction, arms race, chemical and biowarfare.** "Eight countries have the technical capability to unleash nuclear mayhem (...) In 2015, (...) China had about 260 total warheads. France had around 300 operational warheads. Russia had about 1512 strategic warheads deployed on 498 missiles and bombers and was thought to hold another 1000 strategic warheads and 2000 tactical nuclear warheads. Several thousand more awaited dismantlement. The United Kingdom had 160 deployed strategic warheads and a total stockpile of 225. The United States had 7700 nuclear warheads (...) 4500 active warheads and 3200 'retired' weapons (...). India had 120 nuclear warheads. Israel had 80 (...). Pakistan had 120 (...) One reason why weapons of mass destruction are more to be feared in the twenty-first century than in the twentieth is that humanity is much more vulnerable than in the past."

- **Global and uncontrollable warming.** "The data—whether measured on land, in the air, in the oceans, or at the interface in the form of sea-level rise, told the same story: there has been a steady rise in the Earth's temperature. 2014 was officially proclaimed the warmest year on record—at 0.69 °C hotter than the average for the whole twentieth century—only to be eclipsed by 2015, according to the World Meteorological Organisation. In February 2016, the world was shocked by reports that the surface of the Earth north of the equator was already 2 °C warmer than pre-industrial temperatures—this was the line that was never supposed to be crossed. Nine of the ten warmest years ever recorded occurred during the twenty-first century, and average temperatures rose worldwide for 38 consecutive years since 1977."



- **“Planetary poisoning.** Earth, and all life on it, are being saturated with man-made chemicals in an event unlike anything which has occurred in all four billion years of our planet’s story. Each moment of our lives, from conception unto death, we are exposed to thousands of substances, some deadly in even tiny doses and most of them unknown in their effects on our health and wellbeing or upon the natural world. These enter our bodies with every breath, each meal or drink, the clothes we wear, the products with which we adorn ourselves, our homes, workplaces, cars and furniture, the things we encounter every day. There is no escaping them.
- **“Food insecurity.** There are ten main factors which drive global food insecurity (...) On the demand side, the requirement for a doubling in global food production is driven by population growth (...) and rising living standards coupled with economic demand for higher quality, richer, more nutritious foods (...). On the supply side, the main things that limit our ability to double food production are:
  - Physical loss and decline in fertility of soils worldwide, combined with a shrinking world farming area.
  - Scarcities of fresh, clean water in heavily populated regions (...).
  - Uncertain availability and high cost of liquid transport fuels out to mid-century and beyond.
  - Emerging scarcities of high-quality mineral fertilisers (...).
  - Continuing decline and potential collapse of wild fish stocks due to overfishing and ocean pollution.
  - Global decline in public sector investment in food, agricultural and fisheries science (...).
  - A worldwide drought of ‘patient capital’ for new investment in farming and food production, along with speculative investment in farm land and commodities and ‘landgrabs’ by speculators and rich corporations.
  - Extinction of the temperate climate which gave rise to agriculture (...).

It is the synergy between these ten drivers that is the primary cause of global food insecurity, present and future (...) Ours is the first generation in human history to throw away half our food. Between one third and a half of the efforts of the world’s farmers, horticulturalists and agri-scientists, amounting to 1.3 billion tonnes of food a year worth over \$1 trillion, are sent to landfill or else rot in the fields (...) The modern diet is neither safe nor healthy: medical scientists estimate that today two out of every three people in the world die from a diet-related disease (...) the world diet has to change—to one that is fresh, diverse, healthy and which prevents disease instead of causing it.”

- **Megacity collapse, new plagues, machine minds.** “The greater risk from AI may stem less from autonomous weapons (...) than from machine intelligence which might seek—for reasons of its own—to dominate, supplant or eradicate humans (...) A second dimension in which the march of technology imperils the human future is through the rise of the ‘nanocracy’, a condition in which close surveillance and information about individuals throughout the whole of their lives will be maintained by a network of governments, commercial corporations and law enforcement agencies.”

- **Wealth divide.** “Worldwide, while there is abundant evidence that humanity is becoming wealthier and achieving higher living standards as a whole, there is also evidence that wealth is being distributed less evenly across many societies and is concentrating in fewer hands (...) Oxfam argues that half the world’s wealth is now held by just 1 % of its people (...) According to The Guardian, in 2014, 80 individuals on Earth controlled more wealth than the poorest 3,600,000,000 (...). The Credit Suisse Wealth Report in 2015 came up with a similar estimate, that 1 % of the population controlled half the household assets in the world (...) For civilisation and our species to survive and prosper sustainably in the long run, common understandings and co-operation are essential, across all the gulfs that divide us—political, ethnic, religious and economic.”
- **Illusions, delusions.** “The modern world is founded on a belief in money, a commodity that did not exist until about 5000 years ago and probably won’t exist in the far future. Yet most people behave as if money were, in fact, real—rather than a consensual belief or a bond of trust between people (...) Religious belief has been the primary construct on which humanity has founded its vision of the world, its moral laws and social order (...) It is likely to be as significant a power and influence over human affairs in the twenty-first century as in the past (...) Religious faith has proven both a great strength and sometimes a fatal weakness for humans. Many faiths, while asserting their own truth, have a habit of denying the truths of others, and this often ends in tears. Between 1618 and 1648, for example, Europe was plunged into one of the bloodiest and most brutal sectarian conflicts in its history, between Catholic and Protestant states of the fragmenting Holy Roman Empire. It caused famines and epidemics, killed 7.5 million people, bankrupted many countries.”

Cribb, Julian (2017): *Surviving the 21st century. Humanity’s ten great challenges and how we can overcome them*, Springer.

- **El argumento del día del juicio final (*The Doomsday argument*)**

“... the Argument goes like this: if you assume that the human race will survive millions more years, perhaps for the remaining lifetime of our sun, say 5 billion years or so, and that the population of the Earth stabilizes at around 15 billion at any one time, then there would have been at the end of all that about 500 quadrillion humans. Since, at the most, 40 billion or so people have lived on Planet Earth to now, that means that we, you and I, would be among the first 0.00001 percent of all humans. In probability theory (using Bayes’s theorem, which essentially says that a hypothesis is confirmed by any body of data that its truth renders probable), the chances of so unlikely an outcome are vanishingly small—ask any gambler. What makes us so lucky, or so special? On the other hand, suppose that humans are wiped out by some catastrophe in the next decade or so. That would make us 40 billionth out of a total human population of maybe 50 billion, much better odds, and therefore much more probable. Conclusion: scenario two is more likely to be true. Therefore: doom sooner rather than later.”

De Villiers, Marq (2011): *The end. Natural disasters, manmade catastrophes, and the future of human survival*, St. Martin’s Press.

## • Colapso ecológico (Jared Diamond)

“The greatest risk to humanity in coming decades is the risk that we may continue to damage our environment to a degree incompatible with our current standard of living, or even incompatible with our existence.”

Según Diamond (2000), todas las sociedades preindustriales eran vulnerables al colapso, entendido como una intensa disminución local de la población humana y/o de la complejidad política, económica o social.

- La Isla de Pascua se considera un espectacular ejemplo histórico de colapso. Cuando los humanos se asentaron, el entorno era rico; con el tiempo, los bosques fueron completamente talados y la mayoría de las especies de aves se extinguieron. Otros ejemplos: Mangaia, Mangareva, Rapa, las islas Marquesas bajas, partes de Nueva Caledonia y partes de Fiyi. En algunas islas del Pacífico, el resultado fue el abandono total. Algunas sociedades nativas americanas (como los anasazi) en el suroeste de Estados Unidos antes de 1492 constituyen otro ejemplo de colapso.
- A pesar de que las sociedades aparentemente tienden a acercarse al límite de lo que el medio ambiente puede soportar, en el pasado el colapso no era el resultado inevitable: muchas sociedades han existido continuamente durante miles de años sin ningún signo de colapso (Japón, Java, Tonga, Tikopia, Tahití, Rarotonga). ¿Son las sociedades modernas (sociedades tecnológicamente avanzadas) inmunes al colapso?
- ¿Por qué, cuando un desastre ambiental parece evidente, no siempre se toman medidas para evitarlo? ¿Cómo diferenciar los factores ambientales (deforestación, salinización, agotamiento de los nutrientes del suelo, descenso del nivel freático, sequía) que provocan el colapso de los factores culturales/sociales?

Diamond (2000) explica el colapso en estos términos: “... people living in fragile environments, adopting solutions that were brilliantly successful and understandable in the short run, but that failed or else created fatal problems in the long run when confronted with external environmental changes or human-caused environmental changes that people without written histories or archaeologists could not have anticipated.” “Past societies faced frequent ecological crises of small amplitude over small areas. Modern global society faces less frequent but bigger crises over larger areas.”

**Diamond, Jared (2000): *Ecological collapses of pre-industrial societies*, Tanner Lectures on Human Values.**

“The short-lived Empire of Ur exhibits the same behaviour as we saw on Easter Island: sticking to entrenched beliefs and practices, robbing the future to pay the present, spending the last reserves of natural capital on a reckless binge of excessive wealth and glory. Canals were lengthened, fallow periods reduced, population increased, and the economic surplus concentrated on Ur itself to support grandiose building projects. The result was a few generations of prosperity (for the rulers), followed by a collapse from which southern Mesopotamia has never recovered. By 2000 B.C., scribes were reporting that the earth had ‘turned white.’ All crops, including barley, were failing. Yields fell to a third of their original levels. The Sumerians’ thousand years in the sun of history came to an end. Political power shifted north to Babylon and Assyria, and much later, under Islam, to Baghdad.

Northern Mesopotamia is better drained than the south, but even there the same cycle of degradation would be repeated by empire after empire, down to modern times. No one, it seems, was willing to learn from the past. Today, fully half of Iraq's irrigated land is saline — the highest proportion in the world, followed by the other two centres of floodplain civilization, Egypt and Pakistan.”

Wright, Ronald (2004): *A short history of progress, Anansi.*

### • Colapso de la civilización industrial

“... a NASA-funded group recently created the Human and Nature DYNamics (HANDY) program to model the fall of the Roman, Han, Mauryan, and Gupta Empires, and when they pushed the button, it spit out a disquieting forecast: 'Global industrial civilization could collapse in coming decades due to unsustainable resource exploitation and increasingly unequal wealth distribution.' (...) In this model, by the way, one of the greatest dangers came from elites who argued against structural change on the grounds that 'so far' things were working out. That 'so far' is always the problem, as the man who fell off the skyscraper found out (...)

We've displaced most everything else: if you weigh the earth's terrestrial vertebrates, humans account for 30 percent of their total mass, and our farm animals for another 67 percent, meaning wild animals (...) total just 3 percent. In fact, *there are half as many wild animals on the planet as there were in 1970,* an awesome and mostly unnoticed silencing. And yet nothing slows us down—just the opposite. By most accounts, we've used more energy and resources during the last thirty-five years than in all of human history that came before (...) On his way to the theoretically groundbreaking Rio environmental summit in 1992, the first President Bush famously declared, 'The American way of life is not up for negotiation' (...)

Why should you take seriously my fear that the game, in fact, may be starting to play itself out? The source of my disquiet can be summed up in a single word, a word that will be repeated regularly in this book: *leverage*. We're simply so big, and moving so fast, that every decision carries enormous risk. Rome's collapse was, of course, a large-ish deal. But given that there were vast swaths of the world that didn't even know there *was* a Roman Empire, it wasn't a big deal *everywhere*. Rome fell, and the Mayans didn't tremble, nor the Chinese, nor the Inuit. But an interconnected world is different. It offers a certain kind of stability—everyone in every country can all hear the scientists warning of impending climate change, say—but it removes the defense of distance (...) We are putting the human game at risk, that is, from things going powerfully wrong and powerfully right. As we shall see, humans have now emerged as a destructive geologic force (...) And humans have simultaneously emerged as a massive *creative* force, in ways that threaten the human game not through destruction but through substitution. Robots are not just another technology, and artificial intelligence not just one more improvement like asphalt shingles. They are instead a replacement technology, and the thing's that's going obsolete may well be us (...) The outsize leverage is so crucial because, for the first time, we threaten to cut off our own lines of retreat. When Rome fell, something else was there (...) The human game we've been playing has no rules and no end, but it does come with two logical imperatives. The first is to keep it going, and the second is to keep it human.”

McKibben, Bill (2019): *Falter. Has the human game begun to play itself out?*, Henry Holt and Company.

- **Formas de colapsar: tren desbocado, dinosaurios, castillo de naipes**

“Consider Tainter’s three aspects of collapse: the Runaway Train, the Dinosaur, the House of Cards. The rise in population and pollution, the acceleration of technology, the concentration of wealth and power — all are runaway trains, and most are linked together (...) If civilization is to survive, it must live on the interest, not the capital, of nature. Ecological markers suggest that in the early 1960s, humans were using about 70 per cent of nature’s yearly output; by the early 1980s, we’d reached 100 per cent; and in 1999, we were at 125 per cent. Such numbers may be imprecise, but their trend is clear — they mark the road to bankruptcy. None of this should surprise us after reading the flight recorders in the wreckage of crashed civilizations; our present behaviour is typical of failed societies at the zenith of their greed and arrogance. This is the dinosaur factor: hostility to change from vested interests, and inertia at all social levels (...) Civilizations often fall quite suddenly — the House of Cards effect — because as they reach full demand on their ecologies, they become highly vulnerable to natural fluctuations. The most immediate danger posed by climate change is weather instability causing a series of crop failures in the world’s breadbaskets. Droughts, floods, fires, and hurricanes are rising in frequency and severity. The pollution surges caused by these — and by wars — add to the gyre of destruction. Medical experts worry that nature may swat us with disease.”

Wright, Ronald (2004): *A short history of progress, Anansi*.

- **¿Son las civilizaciones esquemas piramidales?**

“The careers of Rome and the Maya also show, I think, that civilizations often behave like ‘pyramid’ sales schemes, thriving only while they grow. They gather wealth to the centre from an expanding periphery, which may be the frontier of a political and trading empire or a colonization of nature through intensified use of resources, often both. Such a civilization is therefore most unstable at its peak, when it has reached maximum demand on the ecology. Unless a new source of wealth or energy appears, it has no room left to raise production or absorb the shock of natural fluctuations. The only way onward is to keep wringing new loans from nature and humanity. Once nature starts to foreclose — with erosion, crop failure, famine, disease — the social contract breaks down. People may suffer stoically for a while, but sooner or later the ruler’s relationship with heaven is exposed as a delusion or a lie. Then the temples are looted, the statues thrown down, the barbarians welcomed, and the emperor’s naked rump is last seen fleeing through a palace window.”

“As the crisis gathered, the response of the rulers was not to seek a new course, to cut back on royal and military expenditures, to put effort into land reclamation through terracing, or to encourage birth control (means of which the Maya may have known). No, they dug in their heels and carried on doing what they had always done, only more so. Their solution was higher pyramids, more power to the kings, harder work for the masses, more foreign wars. In modern terms, the Maya elite became extremists, or ultra-conservatives, squeezing the last drops of profit from nature and humanity.”

“Easter Island and Sumer failed to recover because their ecologies were unable to regenerate (...) Rome and the Maya, collapsed heavily in their heartlands, where ecological demand had been highest, but left remnant societies whose descendants have come down to modern times. During a thousand years of low population, the land in both countries managed to recover (...) Why, if

civilizations so often destroy themselves, has the overall experiment of civilization done so well? If Rome couldn't feed itself in the long run, how is it possible that for every person on earth in Roman times, there are thirty here today? Natural regeneration and human migration are part of the answer. Ancient civilizations were local, feeding on particular ecologies. As one fell, another would be rising elsewhere. Large tracts of the planet were still very lightly settled."

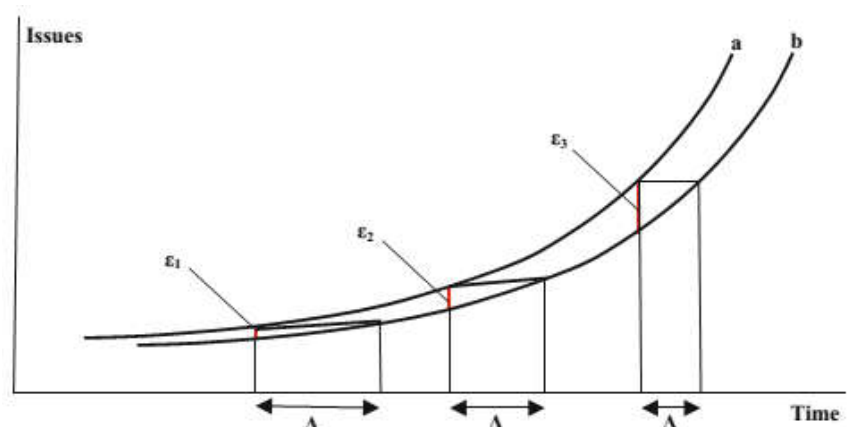
"A second answer is that while most civilizations have outrun natural limits and collapsed within a thousand years or so, not *all* have. Egypt and China were able to keep burning, without using up their natural fuel, for more than 3,000 years. What made them different? (...) The Nile valley's narrowness and drainage slowed the salt build-up that poisoned Sumer; and unlike the Maya and ourselves, ancient Egyptians generally knew better than to build on farmland. Egypt's population growth was unusually slow (...) Nature made Egypt live within its means. But Egypt's means were those of a remittance man (...) China also received more than her fair share of topsoil, though it had come as a lump-sum deposit rather than a yearly allowance (...) This land was almost endlessly forgiving, with erosion merely exposing new layers of good earth (...) Despite such upsets, and the recurring scythes of famine and disease, the generous ecologies of Egypt and China allowed revival before the culture lost its headway."

"We in the lucky countries of the West now regard our two-century bubble of freedom and affluence as normal and inevitable; it has even been called the 'end' of history, in both a temporal and teleological sense. Yet this new order is an anomaly: the opposite of what usually happens as civilizations grow. Our age was bankrolled by the seizing of half a planet, extended by taking over most of the remaining half, and has been sustained by spending down new forms of natural capital, especially fossil fuels. In the New World, the West hit the biggest bonanza of all time. And there won't be another like it."

Wright, Ronald (2004): *A short history of progress, Anansi.*

### • Tecnología y potencial de colapso

La curva **a** representa, en función del tiempo, los problemas (sociales, políticos, culturales y económicos) generados por las nuevas tecnologías. La curva **b** muestra los problemas resueltos. La distancia vertical entre ambas curvas en cualquier momento mide el número de problemas pendientes de resolución. La figura



indica que este número está aumentando: se introducen nuevas tecnologías a un ritmo superior al que la sociedad resuelve problemas. Una respuesta lenta o inadecuada al cambio tecnológico puede desestabilizar o colapsar la sociedad, sobrecargada por problemas pendientes de resolución.

Mayer, Maximilian (ed) (2018): *Rethinking the Silk Road. China's Belt and Road Initiative and emerging Eurasian relations,* Palgrave Macmillan.

## • Tecnología y cooperación

“Humans now have the power to destroy planet Earth, and we seem to be headed that way. It’s puzzling, though. We have the technological prowess to give up fossil fuels, stop polluting, feed everyone alive, bring our runaway population growth under control—we could solve all the problems facing our species if only we could all sign onto a single plan of action. Why is that so hard? Why is it so hard for us to operate as a single, integrated human community, given that anyone can now communicate instantly with anyone else?

“... the answer is clear: anyone with anyone is not the same as everyone with everyone. Technology can give us anyone with anyone, but everyone with everyone is a different kind of problem. We have trouble making decisions as one whole species because we live in a great many different worlds of meaning, and that’s a problem that exists in the realm of language, not technology. Everyone is part of some intercommunicative zone, some far-flung network of people who are interacting more prolifically with one another than with others. In recycling our stories and reports among ourselves, within our zone, we build a picture of reality that all of us who are creating it can see. The big picture we share makes us intelligible to one another, thereby empowering us to operate as a social constellation, but it makes us less intelligible to people outside our narrative. As the novelist Yann Martell once said, ‘We are all citizens of the languages we speak, and World is not a language.’”

*Ansary, Tamim (2019): The invention of yesterday. A 50,000-year history of human culture, conflict, and connection, PublicAffairs.*

## • La paradoja de Jevons (William Stanley Jevons, 1866)

“It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth.”

- Todos los esfuerzos por mantener la base de recursos y energía de una economía son, a la larga, inútiles. En concreto, las mejoras tecnológicas que mejoran la eficiencia de los recursos o las fuentes de energía conducen a un aumento (no a una disminución) del consumo de los mismos (carbón, petróleo, electricidad...). Dado que las mejoras tecnológicas abaratan el uso de los recursos, se utilizarán más.
- Si una nueva tecnología reduce la cantidad de un recurso determinado (y su impacto ambiental) por unidad de producción, puede tener un efecto expansivo en la actividad económica general, lo que podría aumentar la cantidad realmente utilizada del recurso y su impacto ambiental. La paradoja radica en que una tecnología creada para ahorrar recursos y proteger el medio ambiente puede, en última instancia, contrarrestar el ahorro energético/ambiental inicial y contribuir a agravar los problemas originales: el agotamiento de los recursos y el deterioro ambiental. La explicación subyacente es que las tecnologías no se desarrollan ni adoptan para alcanzar objetivos sociales, como el ahorro de recursos o el medio ambiente, sino para obtener beneficios (privados).

*Jevons, William S. (1866): The Coal Question. An Inquiry concerning the Progress of the Nation, and the Probable Exhaustion of our Coal-mines, Macmillan.*

<https://oll.libertyfund.org/titles/jevons-the-coal-question>

### 39. ¿Es la desigualdad la norma?

“This book began with a simple observation: virtually all human societies are marked by inequality, at a level that surpasses what could be expected from normal differences in individuals’ capabilities alone.”

“Small deviations from total equality will increase with time. If property and assets can be inherited, inequality will also intensify from generation to generation (...) Success in competition is not always determined by the traits or behavioral patterns that we would prefer to associate with success.”

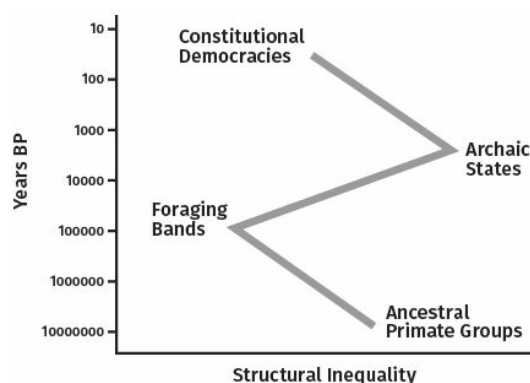
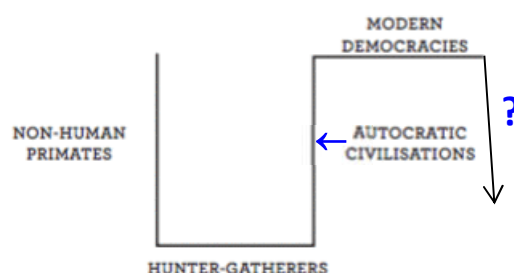
“The reason why policies of redistribution in the Nordic countries during the twentieth century were successful is that a broad spectrum of instruments were used—education, labor market policy, social insurance, taxes, and transfers. The discussion around the work of Thomas Piketty and his colleagues has been dominated by the issue of capital taxation, which is too narrow a perspective. Certain of the above instruments have become more difficult to use as a result of globalization, whereas national governments retain full authority over education and labor market policy.”

*Molander, Per (2016): The anatomy of inequality, Melville House.*

“[The U-shaped curve captures] the puzzling fact that most non-human primate species live in extremely hierarchical groups (a vertical line), whereas early human beings lived in remarkably egalitarian mini-societies (a horizontal line) — and civilised human beings, for the most part, have reverted to extreme hierarchies (another vertical line, and thus a U-shaped curve) (...) The puzzle was not just a U-shaped curve. It was more like the cross-section of a saucepan, and the (horizontal) saucepan handle was what had happened over the past two-and-a-half centuries in the West and was happening all around the planet right now: the re-emergence of egalitarian values in politics and the spread of democratic systems in modern mass societies.”

*Dyer, Gwynne (2018): Growing pains. The future of democracy (and work), Scribe.*

“Our Great Ape ancestors lived in hierarchical societies. We believe this because our closest relatives, chimpanzees, bonobos, and gorillas, all live in societies with very strong dominance hierarchies (...) Early humans broke the pattern, evolving a reversed dominance hierarchy whose goal was to suppress potential alpha males. This worked for tens of thousands of years—until the adoption of agriculture and the rise of the first centralized polities allowed the alpha male to resurface with unfettered power in archaic states that were the most despotic societies in which people have ever had the misfortune to live (...) The second turn, away from despotic archaic states, is much more ancient than might be supposed—the Axial Age, rather than the Age of



Enlightenment (...) The military revolution of 1000 BCE that began deep in the Eurasian steppe triggered momentous developments in the belt of agrarian societies stretching from the eastern Mediterranean to China. The new ideologies—Axial religions—introduced a number of cultural innovations that buttressed our capacity for cooperation in large groups. These innovations included social norms and institutions that constrained rulers to act in less selfish and despotic ways.”

*Turchin, Peter (2016): Ultrasociety: How 10,000 years of war made humans the greatest cooperators on Earth, Beresta Books.*

- **La ley de hierro de la oligarquía (Robert Michels, 1911)**

“All forms of organization, regardless of how democratic or autocratic they may be at the start, will eventually and inevitably develop into oligarchies.”

- **Trampas de la pobreza: la curva S de Abhijit and Duflo (2011)**

“Instead of discussing how best to fight diarrhea or dengue, many of the most vocal experts tend to be fixated on the ‘big questions’: What is the ultimate cause of poverty? How much faith should we place in free markets? Is democracy good for the poor? Does foreign aid have a role to play? And so on.

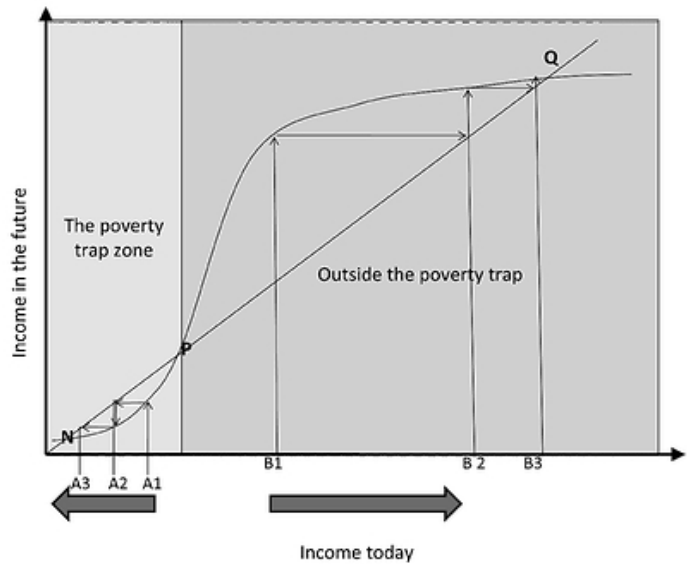
Jeffrey Sachs (...) has an answer to all these questions: Poor countries are poor because they are hot, infertile, malaria infested, often landlocked; this makes it hard for them to be productive without an initial large investment to help them deal with these endemic problems. But they cannot pay for the investments precisely because they are poor—they are in what economists call a ‘poverty trap.’ Until something is done about these problems, neither free markets nor democracy will do very much for them. This is why foreign aid is key: It can kick-start a virtuous cycle by helping poor countries invest in these critical areas and make them more productive. The resulting higher incomes will generate further investments; the beneficial spiral will continue.”

“But then there are others (...) who believe that all of Sachs’s answers are wrong. William Easterly (...) has become one of the most influential anti-aid public figures (...) [Easterly and Dambisa Moyo] argue that aid does more bad than good: It prevents people from searching for their own solutions, while corrupting and undermining local institutions and creating a self-perpetuating lobby of aid agencies. The best bet for poor countries is to rely on one simple idea: When markets are free and the incentives are right, people can find ways to solve their problems. They do not need handouts, from foreigners or from their own governments. In this sense, the aid pessimists are actually quite optimistic about the way the world works. According to Easterly, there are no such things as poverty traps.”

“This book will not tell you whether aid is good or bad, but it will say whether particular instances of aid did some good or not (...) the endless debates about the rights and wrongs of aid often obscure what really matters: not so much where the money comes from, but where it goes. This is a matter of choosing the right kind of project to fund—should it be food for the indigent, pensions for the elderly, or clinics for the ailing?—and then figuring out how best to run it.”

“... this discussion helps us see a general principle. There will be a poverty trap whenever the scope for growing income or wealth at a very fast rate is limited for those who have too little to invest, but expands dramatically for those who can invest a bit more. On the other hand, if the potential for fast growth is high among the poor, and then tapers off as one gets richer, there is no poverty trap.”

“For those who believe in poverty traps, the world looks like [the figure on the right]. Your income today influences what your income will be in the future (the future could be tomorrow, next month, or even the next generation): What you have today determines how much you eat, how much you have to spend on medicine or on the education of your children, whether or not you can buy fertilizer or improved seeds for your farm, and all this determines what you will have tomorrow. The shape of the curve is key: It is very flat at the beginning, and then rises rapidly, before flattening out again. We will call it (...) the *S-shape curve*. The S-shape of this curve is the source of the poverty trap.”

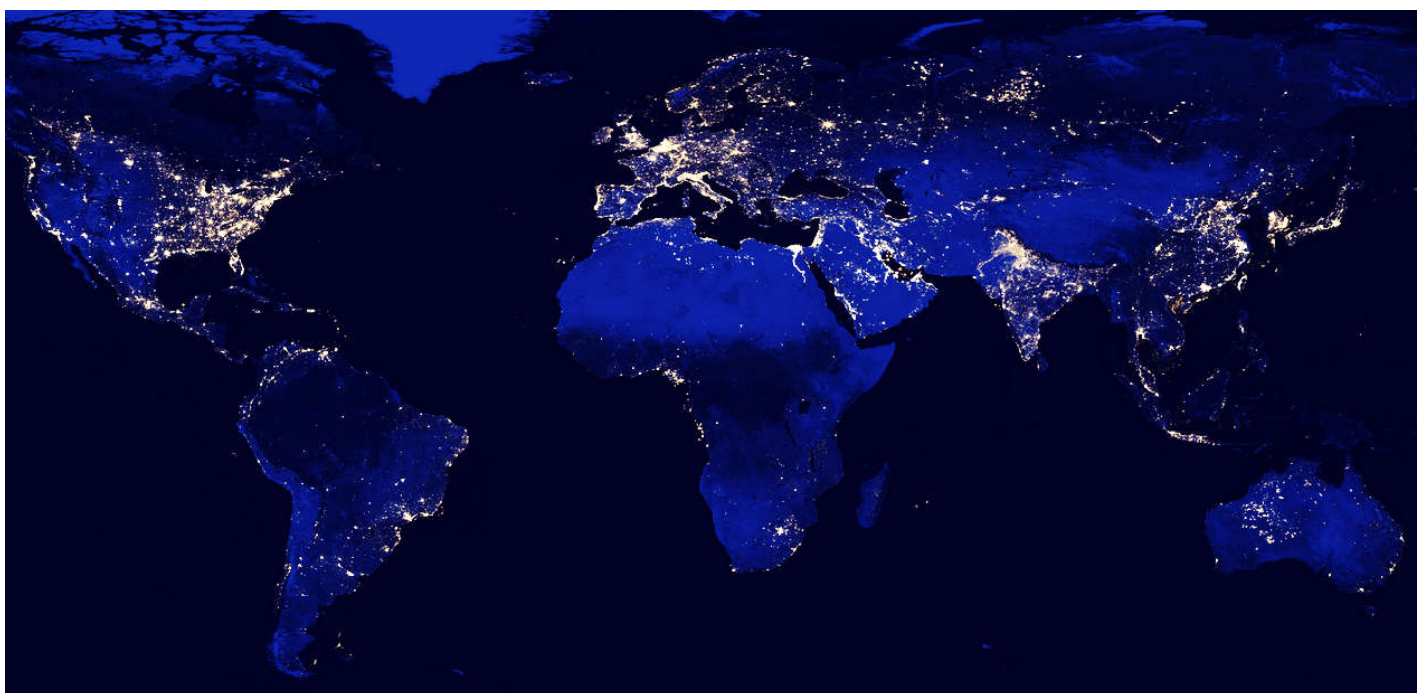


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**Banerjee, Abhijit V.; Esther Duflo (2011): *Poor economics. A radical rethinking of the way to fight global poverty*, PublicAffairs.**

- **La Tierra de noche: luz y riqueza**

Tomando cualquier imagen compuesta que muestre simultáneamente todos los continentes de noche, la iluminación nocturna parece ser un buen indicador de riqueza y prosperidad: las regiones iluminadas tienden a ser las más ricas. Ilustración: Corea del Norte y Corea del Sur.



[https://upload.wikimedia.org/wikipedia/commons/b/ba/The\\_earth\\_at\\_night.jpg](https://upload.wikimedia.org/wikipedia/commons/b/ba/The_earth_at_night.jpg)

## 40. Insostenibilidad

### • La teoría de Gaia

La teoría de Gaia considera que el planeta Tierra es un sistema autorregulado que comprende la totalidad de los organismos vivos, las rocas superficiales, el océano y la atmósfera. Todos estos elementos interactúan como un sistema en evolución. La teoría atribuye un objetivo al sistema: las condiciones superficiales de la Tierra se autorregulan para favorecer la preservación de la vida existente. La ciencia del sistema terrestre se desarrolló a partir de la teoría de Gaia, manteniendo la visión de la Tierra como una entidad dinámica cuyos componentes materiales y vivos están acoplados y que autorregula su clima y química, pero rechazando la afirmación de que la autorregulación tiene como objetivo la habitabilidad.

Lovelock, James (2000): *Gaia: A new look at life on Earth*, Oxford University Press.

Lovelock, James (2009): *The vanishing face of Gaia: A final warning*, Basic Books.

Dawson, Jonathan; Ross Jackson; Helena Norberg-Hodge (2010): *Gaian economics. Living well within planetary limits*, Permanent Publications.

### • La fórmula I = PAT

El impacto ambiental  $I$  de una sociedad es igual al producto de la población  $P$  (causas/factores demográficos), la riqueza  $A$  (acumulación de capital) y la tecnología  $T$  ( $A$  y  $T$  resumen la causa socioeconómica). El componente  $A$  puede expresarse como  $\frac{K}{L} \cdot \frac{Y}{K}$ , donde  $K$  representa el stock de capital,  $L$  la población e  $Y$  la producción agregada (PIB). La razón  $\frac{K}{L}$  es una medida de la intensificación de la economía (cuánto capital por persona está disponible para producir) y la razón  $\frac{Y}{K}$  es la productividad promedio del stock de capital (cuánta producción genera cada unidad de capital). El componente  $T$  puede descomponerse como  $\frac{E}{Y} \cdot \frac{\text{impacto}}{E}$ , donde  $E$  representa 'energía' (por ello,  $\frac{E}{Y}$  es la cantidad de energía por unidad de producto) e  $\frac{\text{impacto}}{E}$  mide el impacto ambiental por unidad de energía utilizada en la producción.

### • La convergencia catastrófica (Christian Parenti, 2016)

"Climate change arrives in a world primed for crisis. And the political responses to climate change increasingly take the form of ethnic, religious, or class violence in the form of banditry, rebellion, warfare, state repression and general militarisation. This is because the current and impending dislocations of climate change intersect with the already existing crises of poverty and inequality left by thirty years of neoliberalism, and the violence and tattered social fabric left by Cold War-era military conflicts. I call this collision of political, economic and environmental disasters the 'catastrophic convergence.'"

"Societies, like people, deal with new challenges in ways that are conditioned by the traumas of their past. Thus damaged societies, like damaged people, often respond to new crises in ways that are irrational, short-sighted and self-destructive. In the case of climate change, the past traumas that set

the stage for bad adaptation – a destructive social response– are Cold War-era militarism and the economic pathologies of neoliberal capitalism. Over the last forty years, both these forces have distorted the state’s relationship to society –removing and undermining the state’s collectivist, regulatory and redistributive functions– while overdeveloping its repressive and military capacities. And this, I contend, seriously challenges society’s ability to avoid violent dislocations as climate change kicks in.”

“Societies suffering from continued neoliberal austerity measures, and a new round of counter-insurgency now delivered under the framework of the war on terror, cannot be expected to address the implications of climate change. Real mitigation likewise requires moving away from an unbridled free market economic orthodoxy that is only hindering our attempts to cope with climate change.”

Parenti, Christian (2015): “The catastrophic convergence: Militarism, neoliberalism and climate change,” cap. 1 en Buxton, Nick; Ben Hayes; eds. (2015): *The secure and the the dispossessed. How the military and corporations are shaping a climate-changed world*, Pluto Press.

### • Límites planetarios

“The ecological ceiling comprises the nine planetary boundaries proposed by an international group of Earth-system scientists led by Johan Rockström and Will Steffen. These nine critical processes are:

- *Climate change.* When greenhouse gases such as carbon dioxide, methane and nitrous oxide are released into the air, they enter the atmosphere and amplify Earth’s natural greenhouse effect, trapping more heat within the atmosphere. This results in global warming, whose effects include rising temperatures, more frequent extremes of weather, and sea level rise.

- *Ocean acidification.* Around one quarter of the carbon dioxide emitted by human activity is eventually dissolved in the oceans, where it forms carbonic acid and decreases the pH of the surface water. This acidity reduces the availability of carbonate ions that are an essential building block used by many marine species for shell and skeleton formation. This missing ingredient makes it hard for organisms such as corals, shellfish and plankton to grow and survive, thus endangering the ocean ecosystem and its food chain.

- *Chemical pollution.* When toxic compounds, such as synthetic organic pollutants and heavy metals, are released into the biosphere they can persist for a very long time, with effects that may be irreversible. And when they accumulate in the tissue of living creatures, including birds and mammals, they reduce fertility and cause genetic damage, endangering ecosystems on land and in the oceans.

- *Nitrogen and phosphorus loading.* Reactive nitrogen and phosphorus are widely used in agricultural fertilisers but only a small proportion of what is applied is actually taken up by crops. Most of the excess runs off into rivers, lakes and oceans, where it causes algae blooms that turn the water green. These blooms can be toxic and they kill off other aquatic life by starving it of oxygen.

- Freshwater withdrawals. Water is essential for life and is widely used by agriculture, industry and households. Excessive withdrawals of water, however, can impair or even dry up lakes, rivers and aquifers, damaging ecosystems and altering the hydrological cycle and climate.

- Land conversion. Converting land for human use – such as turning forests and wetlands into cities, farmland and highways – depletes Earth’s carbon sinks, destroys rich wildlife habitats, and undermines the land’s role in continually cycling water, nitrogen and phosphorus.
- Biodiversity loss. A decline in the number and variety of living species damages the integrity of ecosystems and accelerates species extinction. In doing so it increases the risk of abrupt and irreversible changes to ecosystems, reducing their resilience and undermining their capacity to provide food, fuel and fibre, and to sustain life.
- Air pollution. Micro-particles, or aerosols, emitted into the air – such as smoke, dust and pollutant gases – can damage living organisms. Furthermore, they interact with water vapour in the air and so affect cloud formation. When emitted in large volumes these aerosols can significantly alter regional rainfall patterns, including shifting the timing and location of monsoon rains in tropical regions.
- Ozone layer depletion. Earth’s stratospheric ozone layer filters out ultraviolet radiation from the sun. Some human-made chemical substances, such as chlorofluorocarbons (CFCs) will, if released, enter the stratosphere and deplete the ozone layer, exposing Earth and its inhabitants to the sun’s harmful UV rays.”

Raworth, Kate (2017): *Doughnut economics. Seven ways to think like a 21st-century economist*, Random House Business Books.

### • Dinámicas perversas

“That’s what scientists call ‘Shifting Baseline Syndrome.’ Each generation accepts their version of nature, plunders it, then leaves the next generation to accept the depleted version and so on.’

### Madam President 3x16

“Our civilization thus operates in the same way as a cancerous cell that goes on destroying the organism off which it lives.” (p. 3)

de Rivero, Oswaldo (2010): *The myth of development. Non-viable economies and the crisis of civilization*, Zed Books.

### • El modo de vida imperial

“By [imperial mode of living] we aim to understand both the persistence and, at the same time, crisis-deepening patterns of production and consumption that are based on an– in principle– unlimited appropriation of the resources and labour capacity of both the global North and the global South and of a disproportionate claim to global sinks (like forests and oceans in the case of CO<sub>2</sub>).”

“We argue that the increase of productivity and material prosperity in the capitalist centres depends on a world resource system and international division of labour that favours the global North and is



rendered invisible through the imperial mode of living, so that the domination and power relations it implies are normalized. Since the beginning of industrial capitalism, the imperial mode of living gained certain stability and hegemony at the cost of environmental destruction and the exploitation of labour. Societal relations as well as societal nature relations were stabilized (...) due to its environmentally and socially unsustainable character.

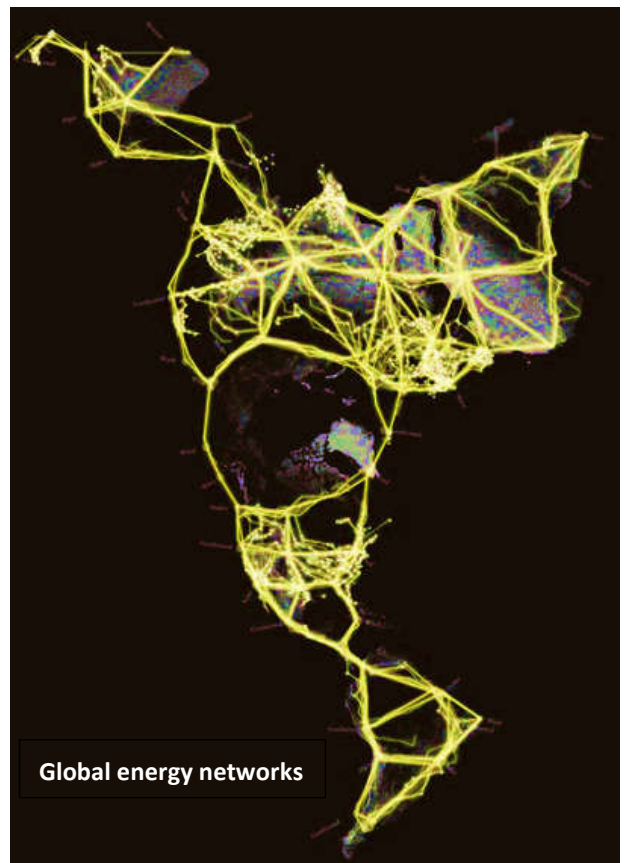
(...) Due to the imperial mode of living and its global spread, societies seem to be approaching the limits to capitalist nature. This does not necessarily mean that the imperial mode of living is leading into a great crash. The limits are not absolute (...) The authoritarian stabilization of the imperial mode of living is not the only strategy to cope with the multiple crises and to shift the limits to capitalist nature in an exclusive manner. Another one (...) is the selective ecological modernization of the imperial mode of living which may result in what can be called a green capitalism."

Brand, Ulrich; Markus Wissen (2018): *The limits to capitalist nature. Theorizing and overcoming the imperial mode of living*, Rowman & Littlefield.

- **Extractivismo total: 'techno-capitalist transformation engulfing the planet'**

"The earth and its inhabitants are on a trajectory of cascading socio-ecological crisis driven by techno-capitalist development (...) Total extractivism denotes how the techno-capitalist world system harbors a rapacious appetite for all life—total consumption of human and non-human resources—that destructively reconfigures the earth."

"*Total extractivism* (...) is the imperative driving the global capitalist economy, centered on the deployment of violent technologies aiming at integrating and reconfiguring the earth and absorbing its inhabitants, meanwhile normalizing its logics, apparatuses and subjectivities, as it violently colonizes and pacifies various natures (...) The technocapitalist system indeed has the tension of *totalizing*. It harbors a rapacious appetite for all life, desiring the total consumption and reconfiguring of the earth centered on bureaucracy, industrial/cybernetic production and market relations



that maintains a hyper-destructive growth imperative that produces a grotesque earthly product. Capitalism—past, present and future—attempts to devour all vitality: plants, animals, humans, hydrocarbons, minerals and just about anything 'seen', valued or revalued by the state and its appendages. Capitalism, in other words, colonizes the earth as it appropriates, expropriates and extinguishes the entirety of the earth's resources."

"This World System—this techno-capitalist industrial system—is in fact a monster."

“The highest priority of the Worldeater, or the imperative of technocapitalist industrial progress, is thus acquiring, transforming and controlling natural resources, frequently deemed a ‘strategic’, ‘critical’ or a ‘national security’ interest.”

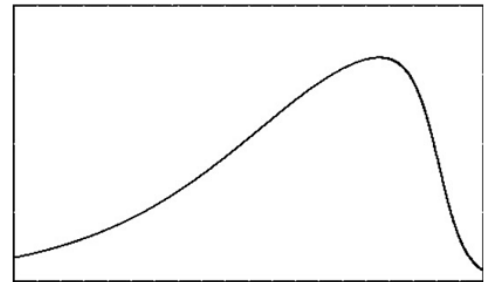
“The Worldeater—techno-capitalist progress—exists and subsists on war, violence and trauma (...) If there is one thing the long techno-capitalist trajectory (...) teaches us, it is that we should not underestimate the cunning, shapeshifting and ever-evolving ability to devise new violent technologies that not only repress human agency, but also possess it. Social engineering is a technical term for possessing human agency. The Worldeater is a conversation of possession, addiction, dependency and blindness that are accomplished through civil-military interventions (...) and solidified by politics.”

“The imperative of total extractivism, moreover, reveals the false claims of ‘greening’ as the renewable energy-extraction nexus suggests. The green economy emerges as a worldeating device and a violent technology of extraction. Few fabrications are more successful at present than the pretensions of this green economy.”

*Dunlap, Alexander; Jostein Jakobsen (2020): The violent technologies of extraction. Political ecology, critical agrarian studies and the capitalist worldeater, Palgrave Macmillan.*

#### • La curva, la estrategia y el rebote de Séneca

“Collapse is a rapid, uncontrolled, unexpected, and ruinous decline of something that had been going well before (...) Think of the case of Roseanne Barr who, in 2018, saw her career of TV anchor ruined in a day because of a single racist tweet she wrote.”



“The average lifetime of a commercial company, today, is of the order of 15 years, but small companies tend to come and go much more quickly: it is the “fail fast, fail often” strategy (...) in most cases when a company goes down it goes fast, even for companies that were seen as the very image of solidity. Think of Lehman Brothers, the large financial company that went down in a few days at the time of the great financial crisis of 2008.”

“Collapses are bad enough in themselves but they have a further quirk: they tend to arrive unexpected (...) There is no “science of collapse” taught in universities or in business schools, and most of what we do is based on the idea that things will keep going on more or less as they have been doing in the past. The economy is supposed to be growing forever simply because it has been growing up to now. The same is true for the human population, the production of crude oil, or life expectancy at birth: they have been growing in the past and they are expected to keep growing in the future.”

“The results of decades of work tell us that rapid changes are part of the way the universe works, a manifestation of the principle that rules everything, from living cells to galaxies: entropy, the basis of the second principle of thermodynamics. The science of complexity is possibly the most fascinating field of modern science and surely one that has significant consequences for our everyday life.”

“... the basis of the Seneca strategy can be described in four main points,

1. *Attention*. Remember that collapses occur and they do not just strike other people: they may strike you. Prepare in advance for a possible collapse!
2. *Avoidance*. You can avoid collapse if you start early enough by acting on the elements that put the system under stress. Detect collapses before they come!
3. *Mitigation*. If it is too late to avoid collapse, you can still reduce its damaging effects if you take appropriate precautions. Don't try to avoid collapse at all costs, but you can always soften it!
4. *Exploitation*. In some cases, you can use collapse to get rid of obsolete structures or to damage your competitors. And, therefore, welcome collapse!"

"... the fact that a society, a state, or an organization can restart growing after collapse at a faster speed than before the collapse. In this case, Europe may have obtained a decisive advantage in a specific historical period because of a combination of geographical and historical factors that caused its population to 'rebound' at the right moment. It happened when the technologies needed to expand all over the world had been developed and could be used for that purpose (...) The reasons for the rebound are reasonably clear: depopulation frees resources that can be exploited for a new phase of rapid growth. Before the fossil fuel age, societies had two main natural resources to exploit: fertile soil and forests. Both tend to be overexploited: forests are cut faster than trees can regrow and the fertile soil is eroded and washed to the sea faster than it can reform. That generates a decline of agriculture and the result is not just an end to population growth, it is a ruinous collapse resulting from famines and epidemics (...) But the disappearance of a large fraction of the population frees cultivated land for forests to regrow and that regenerates the soil. Then, when the population starts regrowing, people find in the new forests a near-pristine source of wood and, once cut, of fertile soil (...) The cycle restarts and it may go faster than the earlier one because society still remembers the social structures and the technologies of the previous cycle."

**Bardi, Ugo (2020): *Before the collapse. Guide to the other side of growth*, Springer.**

El efecto Séneca (Bardi, 2017): "Increases are of sluggish growth, but the way to ruin is rapid." (*Nunc incrementa lente exeunt, festinatur in damnum*, Lucius Annaeus Seneca, Letters to Lucilius 91, 6.)

**Bardi, Ugo (2017): *The Seneca Effect. Why Growth is Slow but Collapse is Rapid*, Springer.**

### • **Guía para el colapso de Ugo Bardi (2020)**

"1. Collapse is Not a Bug, it is a Feature (the Seneca Effect). Some 2000 years ago, the Roman philosopher Lucius Annaeus Seneca noted that growth is slow but ruin is rapid (...) Collapses occur all the time, everywhere and, over your lifetime, you are likely to experience at least a few relatively large collapses (...)

2. Collapse is Rapid (the Seneca Cliff). As Seneca noted, it takes only a short time for a large and apparently solid structure to unravel at the seams and crumble down in a heap. Think of the collapse of a house of cards (...) Collapses are fast (...)

3. Collapse is Often Unexpected (the Seneca Peak). Rarely does collapse give you an advance warning and some collapses are totally unpredictable, earthquakes, for instance. In other cases, the continuing

growth before the crash may lull you to a false sensation of security, as it happened more than once to the fishing industry when the fish stocks collapsed just after that an all-time production high (the “Seneca Peak”) (...)

4. Collapse is Bad for You (the Seneca Bottleneck). Collapses are a serious matter: they destroy things, kill people, generate sickness, make you sad, unhappy and depressed and, sometimes, they are irreversible. Yet, sometimes they are necessary to redress a situation that was impossible to control and they have to be accepted as a fact of life.

5. There is Life After Collapse (the Seneca Rebound). Collapse is nothing but a “tipping point” from one condition to another. You can’t go back but you can move onward and what looks like a disaster may be nothing but a passage to a new condition which may be better than the old one. This can be called the “Seneca Rebound,” a characteristic of the evolution of complex systems. So, if you lose your job that may give you the opportunity to seek a better one (...)

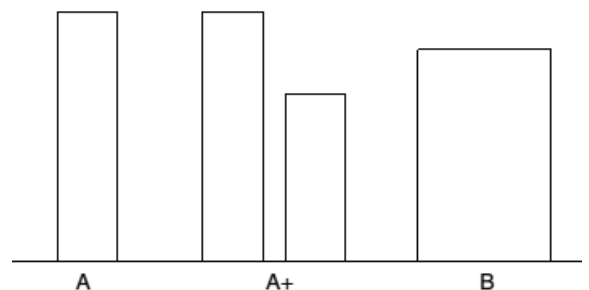
6. Resisting Collapse is Not a Good Idea (the Seneca Strategy). Collapse is the way the universe uses to get rid of the old to make space for the new. Resisting collapse means to strive to keep something old alive—you may succeed for a while, but often at the price of creating an even worse collapse. Often, you stick to your job, to your marriage, to your habits, as if your life were depending on not losing them, but you also know that, eventually, nothing can last forever. The Seneca Strategy consists in letting nature follow its course and let something go and disappear as it should. If you understand that, the bad effects of collapses can be reduced and, in some cases, you can even profit from them.”

*Bardi, Ugo (2020): Before the collapse. Guide to the other side of growth, Springer.*

• **La conclusión repugnante en la ética poblacional de Derek Parfit’s (1984)**

La ‘conclusión repugnante’: “For any possible population of at least ten billion people, all with a very high quality of life, there must be some much larger imaginable population whose existence, if other things are equal, would be better even though its members have lives that are barely worth living.” Parfit (1984, p. 388)

La conclusión se sustenta en el siguiente argumento. La altura de las barras del gráfico representa la calidad de vida y su ancho, la cantidad de personas. El caso A representa una sociedad con un alto nivel de vida. El caso A+ se deriva de A añadiendo la misma cantidad de personas que en el caso A, pero con un nivel de vida ligeramente inferior. Parece que es más deseable tener el caso A+ que A. Finalmente, el caso B surge de A+ al permitir que toda la población en A+ tenga el mismo nivel de vida, ligeramente por encima del nivel promedio de A+. También parece que B es más deseable que A+. Concedido esto, la conclusión repugnante se deduce al replicar la línea de razonamiento anterior comenzando con B en lugar de A.



*Parfit, Derek (1984): Reasons and persons, Clarendon Press.*

## 41. Capitalismo y análisis del sistema-mundo (*world-system analysis*)

“Part of the problem is that we have studied these phenomena in separate boxes to which we have given special names –politics, economics, the social structure, culture– without seeing that these boxes are constructs more of our imagination than of reality. The phenomena dealt with in these separate boxes are so closely intermeshed that each presumes the other, each affects the other, each is incomprehensible without taking into account the other boxes. And part of the problem is that we tend to leave out of our analyses of what is and is not ‘new’ the three important turning points of our modern world-system: (1) the long sixteenth century during which our modern world-system came into existence as a capitalist world-economy; (2) the French Revolution of 1789 as a world event which accounts for the subsequent dominance for two centuries of a geoculture for this world-system, one that was dominated by centrist liberalism; and (3) the world revolution of 1968, which presaged the long terminal phase of the modern world-system in which we find ourselves and which undermined the centrist liberal geoculture that was holding the world-system together (...) The proponents of world-systems analysis (...) have been arguing that the separate boxes of analysis –what in the universities are called the disciplines– are an obstacle, not an aid, to understanding the world. We have been arguing that the social reality within which we live and which determines what our options are has not been the multiple national states of which we are citizens but something larger, which we call a world-system.”

“The world in which we are now living, the modern world-system, had its origins in the sixteenth century. This world-system was then located in only a part of the globe, primarily in parts of Europe and the Americas. It expanded over time to cover the whole globe. It is and has always been a world-economy. It is and has always been a capitalist world-economy. What we mean by a world-economy (...) is a large geographic zone within which there is a division of labor and hence significant internal exchange of basic or essential goods as well as flows of capital and labor. A defining feature of a world-economy is that it is not bounded by a unitary political structure. Rather, there are many political units inside the world-economy, loosely tied together in our modern world-system in an interstate system. And a world-economy contains many cultures and groups-practicing many religions, speaking many languages, differing in their everyday patterns. This does not mean that they do not evolve some common cultural patterns, what we shall be calling a geoculture. It does mean that neither political nor cultural homogeneity is to be expected or found in a world-economy. What unifies the structure most is the division of labor which is constituted within it (...) We are in a capitalist system only when the system gives priority to the endless accumulation of capital. Using such a definition, only the modern world-system has been a capitalist system (...) A world-economy and a capitalist system go together. Since world-economies lack the unifying cement of an overall political structure or a homogeneous culture, what holds them together is the efficacy of the division of labor. And this efficacy is a function of the constantly expanding wealth that a capitalist system provides.”

“The axial division of labor of a capitalist world-economy divides production into core-like products and peripheral products (...) What we mean by core-periphery is the degree of profitability of the production processes. Since profitability is directly related to the degree of monopolization, what we essentially mean by core-like production processes is those that are controlled by quasi-monopolies.

Peripheral processes are then those that are truly competitive. When exchange occurs, competitive products are in a weak position and quasi-monopolized products are in a strong position. As a result, there is a constant flow of surplus-value from the producers of peripheral products to the producers of core-like products. This has been called unequal exchange."

"Since (...) quasi-monopolies exhaust themselves, what is a core-like process today will become a peripheral process tomorrow. The economic history of the modern world-system is replete with the shift, or downgrading, of products, first to semiperipheral countries, and then to peripheral ones (...) The strong states, which contain a disproportionate share of core-like processes, tend to emphasize their role of protecting the quasi-monopolies of the core-like processes. The very weak states, which contain a disproportionate share of peripheral production processes, are usually unable to do very much to affect the axial division of labor, and in effect are largely forced to accept the lot that has been given them."

### • Ciclos de la economía-mundo

"The normal evolution of the leading industries –the slow dissolution of the quasi-monopolies– is what accounts for the cyclical rhythms of the world-economy. A major leading industry will be a major stimulus to the expansion of the world-economy and will result in considerable accumulation of capital. But it also normally leads to more extensive employment in the world-economy, higher wage-levels, and a general sense of relative prosperity. As more and more firms enter the market of the erstwhile quasi-monopoly, there will be 'overproduction' (that is, too much production for the real effective demand at a given time) and consequently increased price competition (because of the demand squeeze), thus lowering the rates of profit. At some point, a buildup of unsold products results, and consequently a slowdown in further production. When this happens, we tend to see a reversal of the cyclical curve of the world-economy. We talk of stagnation or recession in the world-economy."

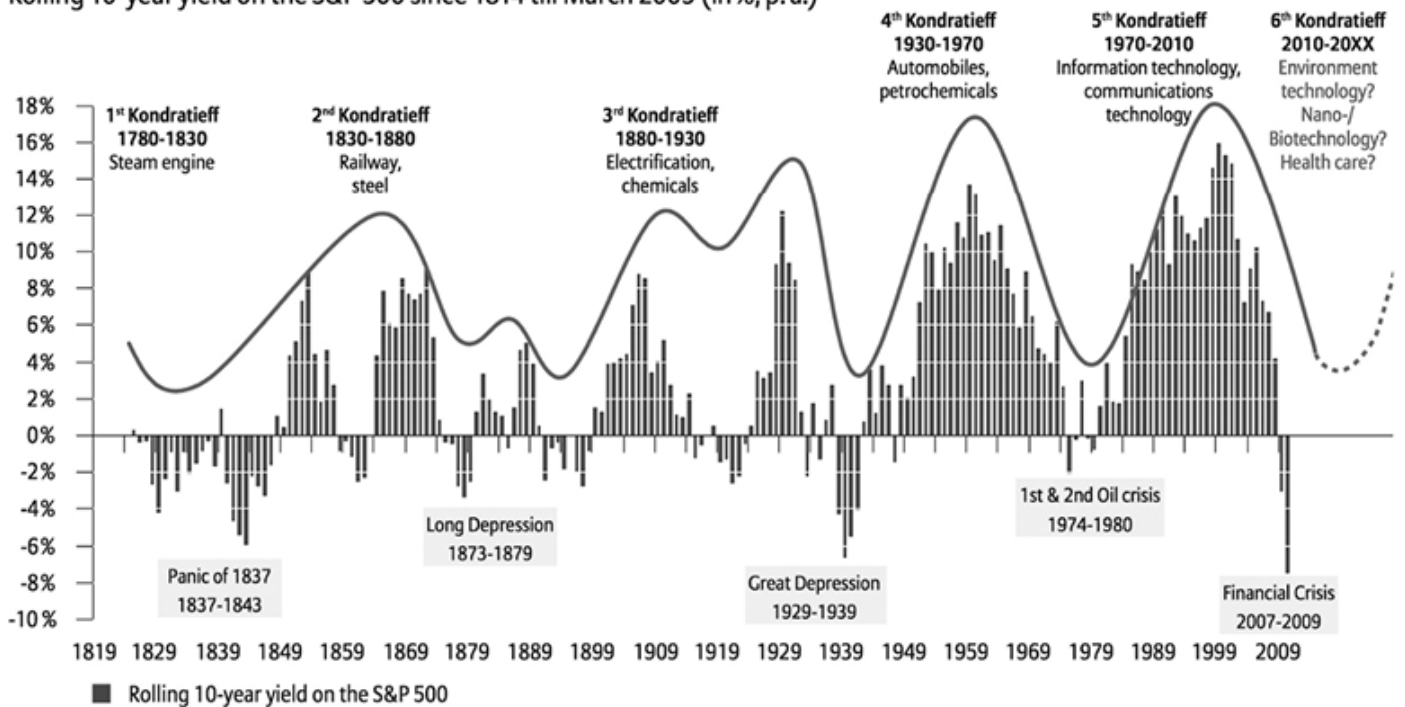
"The process (...) expansion of the world-economy when there are quasi-monopolistic leading industries and contraction in the world-economy when there is a lowering of the intensity of quasi-monopoly (...) can be drawn as an up-and-down curve of so-called A-(expansion) and B-(stagnation) phases. A cycle consisting of an A-phase followed by a B-phase is sometimes referred to as a Kondratieff cycle (...) Kondratieff cycles have up to now been more or less fifty to sixty years in length. Their exact length depends on the political measures taken by the states to avert a B-phase, and especially the measures to achieve recuperation from a B-phase on the basis of new leading industries that can stimulate a new A-phase. A Kondratieff cycle, when it ends, never returns the situation to where it was at the beginning of the cycle. That is because what is done in the B-phase in order to get out of it and return to an A-phase changes in some important way the parameters of the world-system. The changes that solve the immediate (or short-run) problem of inadequate expansion of the world-economy (an essential element in maintaining the possibility of the endless accumulation of capital) restore a middle-run equilibrium but begin to create problems for the structure in the long run. The result is what we may call a secular trend."

**Wallerstein, Immanuel (2004): *World-systems analysis. An introduction*, Duke University Press.**

“How automation reshapes our economy and society therefore depends on the choices we make, the policies we adopt, and the institutions we create. While we have one group constantly working on what we *could* do, it’s separate from those who decide what we *should* do. Automation managed for the common good could enable the creation of a society where an abundance of essential goods is generated sustainably, shared widely, and economic power distributed evenly and not just concentrated in the hands of a few. Yet there is every possibility that this new power could amplify existing inequalities within the economy, enabling those who own and control the machines and the data to also control the population.”

Figure 1: Kondratieff cycles – long waves of prosperity.

Rolling 10-year yield on the S&P 500 since 1814 till March 2009 (in %, p. a.)



“Many recognise how rare and hard-earned these freedoms are, and will not let go of them willingly, nor forgive any attempts to retract them. The lack of courage shown by our leaders to defend these freedoms needs to be addressed, for they are priceless things that, once lost, will be difficult to recover. As in Rome, the elites have once again become fixated on their short-term needs and have forgotten the rights, aspirations and desires of those who built these countries, and whose votes and bloodshed provided them with this power (...) In times of great disruption we need to provide stability and order, not more chaos. The question is whether that order is obtained through a re-establishment of foundational principles such as liberty, democracy and freedom, or via more centralised, authoritarian means.”

“I believe that to help ensure the future is positive, we will need a new Glorious Revolution. A bloodless revolution designed to protect the fundamentals of Western society (...) We will once again need to ensure that the rights and freedoms of the individual are protected; the power and reach of those in power is limited, property is protected, technological bounty distributed, and responsibilities restated. The human must take priority over the machine, and sustainability over short-term profits. Business leadership needs to evolve to focus on wider stakeholders and society, not just immediate shareholders; and engage the talents of their people to determine how to use technology to provide long-term value for consumers, customers and communities. Our education systems need updating

to allow people to create bespoke curriculums based around uniquely human skills such as creativity, empathy, reason, enquiry, responsibility and happiness, rather than forcing them to learn out-of-date industrial age skills. If we educate people simply to compete against machines, then we are educating them to lose. We need to recalibrate our economies to ensure that they provide equality of both opportunity and responsibility, while also supporting those affected by disruption. We also need to ensure that the development of artificial intelligence and other existential risks such as nanotechnology and genetic engineering is undertaken with extreme caution (...) A new AI Magna Carta needs to be composed, one fit for the digital age. One designed to ensure that the power of the sixth wave's technological windfall benefits the majority, not the minority."

"People need to be viewed as more than just economic agents of production, for that is easily automated. Instead, they need to be seen as value generators, rewarded for the quality of their output to society, not just to themselves. Capitalism and socialism should be seen not as opposites, but complements (...) Finally, we need to build societies and cultures that are strong and clear about their values and protect them in these disruptive times. And here lies the challenge. Creating smart machines is easy. Creating an equitable and aspirational society for over seven billion humans in a world of smart machines is not. One of the biggest lessons

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
	First Industrial Revolution	The Age of Steam and Rail	Second Industrial Revolution	<i>The age of the auto-mobile</i>	<i>The Computer Age</i>	<i>Third Industrial Revolution</i>
<b>Time Period</b>	1760-1820	1820-1870	1870-1908	1908-1970	1971-2008	2008-2040
<b>Length</b>	60 years	50 years	40 years	62 years (two world wars)	37 years	32 years
<b>Country/Regions affected</b>	Great Britain	Great Britain	UK, USA, Germany	USA, Japan	USA, Western Europe, Japan	Global (Asia and India main benefactors)

<b>Power source</b>	Steam engine, coal	Steam	Electricity	Electricity, petro-chemicals	Digital Communications	Renewable energy, especially solar
<b>Transport Mechanism</b>	Canals, sailing ships	Rail, steamships	Rail (especially in US), bicycle, transatlantic shipping	Road, rail, plane, ships	Road, plane, shipping containers	Autonomous vehicles, Internet of Everything
<b>Communication Mechanism</b>	Printing press	Telegraph	Telephone	Radio, TV	TV, video, mobile telephone, Internet	Global internet, 5G and 6G mobile telecommunications
<b>Industry</b>	Coal mining, cotton, pottery	Steam-powered factories, iron bridges and constructions	Steel-heavy engineering (civil, chemical, electrical and naval)	Mass produced automobile, consumer white goods	Computer hardware and software, smartphones, e-commerce, service	Mobile digitisation, VR, Internet of Things (IoT), robotics, autonomous, electric vehicles, solar power, vertical farming

from the research behind this book has been the fact that culture matters. Enormously."

Culey, Sean A. (2019): *Transition point. From steam to the singularity, Matador.*

### • Estados en la economía-mundo

"There are two questions to ask. The first is why transforming the world-economy into a world-empire was never possible, whereas achieving hegemony within it was. The second is why hegemony never lasted (...) A world-empire (...) would in fact stifle capitalism, because it would mean that there was a political structure with the ability to override a priority for the endless accumulation of capital. This is of course what had happened repeatedly in all the world-empires that had existed before the

modern world-system. Thus, whenever some state seemed intent on transforming the system into a world-empire, it found that it faced eventually the hostility of most important capitalist firms of the world-economy.”

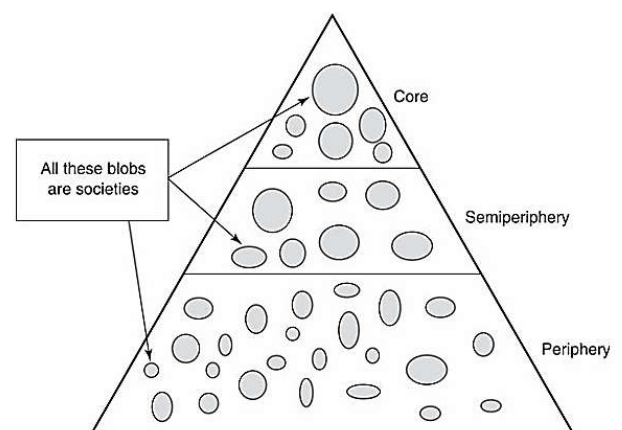
“How then could states even achieve hegemony? Hegemony, it turns out, can be very useful to capitalist firms, particularly if these firms are linked politically with the hegemonic power. Hegemony typically occurs in the wake of a long period of relative breakdown of world order in the form of ‘thirty years’ wars’ (...) Hegemony creates the kind of stability within which capitalist enterprises, especially monopolistic leading industries, thrive. Hegemony is popular with ordinary people in that it seems to guarantee not merely order but a more prosperous future for all. Why not then hegemony forever? As with quasi-monopolies in production, quasi-absolute power in hegemonies self-destructs. To become a hegemonic power, it is crucially important to concentrate on efficiencies of production which lay the base for the hegemonic role. To maintain hegemony, the hegemonic power must divert itself into a political and military role, which is both expensive and abrasive. Sooner or later, usually sooner, other states begin to improve their economic efficiencies to the point where the hegemonic power's superiority is considerably diminished, and eventually disappears. With that goes its political clout (...) The use of ‘imperial’ force undermines the hegemonic power economically and politically, and is widely perceived as a sign not of strength but of weakness, first externally then internally. Far from defining the world cultural language, a declining hegemonic power begins to find its preferred language out of date and no longer readily acceptable.”

“As a hegemonic power declines, there are always others who attempt to replace it. But such replacement takes a long time, and ultimately another ‘thirty years’ war.’ Hence hegemony is crucial, repeated, and always relatively brief. The capitalist world-economy needs the states, needs the inter-state system, and needs the periodic appearance of hegemonic powers. But the priority of capitalists is never the maintenance, much less the glorification, of any of these structures. The priority remains always the endless accumulation of capital.”

**Wallerstein, Immanuel (2004): *World-systems analysis. An introduction*, Duke University Press.**

### • El sistema-mundo moderno: centro, periferia y semiperiferia

“The comparative world-systems perspective is a strategy for explaining social change that focuses on whole intersocietal systems rather than single societies. The main insight is that important interaction networks (trade, information flows, alliances, and fighting) have woven polities and cultures together since the beginning of human social evolution. Explanations of social change need to take intersocietal systems (world-systems) as the units that evolve. But intersocietal interaction networks were rather small when transportation was mainly a matter of hiking with a pack. Globalization, in the sense of the expansion and intensification of larger interaction networks, has been



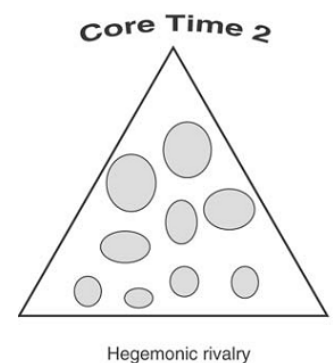
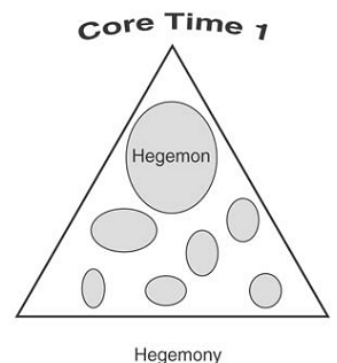
increasing for millennia, albeit unevenly and in waves. World-systems are systems of societies. Systemness means that these societies are interacting with one another in important ways.”

“The modern world-system is structured politically as an interstate system—a system of competing and allying states (...) The modern world-system is also importantly structured as a core-periphery hierarchy in which some regions contain economically and militarily powerful states while other regions contain polities that are much less powerful and less developed. The countries that are called ‘advanced’ (...) The modern core includes the United States, the European countries, Japan, Australia, and Canada. In the contemporary periphery we have relatively weak states that are not strongly supported by the populations within them and have little power relative to other states in the system.”

“The core-periphery hierarchy in the modern world-system is a system of stratification in which socially structured inequalities are reproduced by the institutional features of the system (...). The periphery is not ‘catching up’ with the core. Rather, both core and peripheral regions are developing, but most core states are staying well ahead of most peripheral states. There is also a stratum of countries that we call the semiperiphery: countries that are in between the core and the periphery.”

“So the modern world-system is now a global economy with a global political system (the interstate system). (...) Culturally the modern system is composed of several civilizational traditions (e.g., Islam, Christendom, Hinduism), nationally defined cultural entities—nations (...), and the cultures of indigenous and minority ethnic groups within states. The modern system is multicultural in the sense that important political and economic interaction networks connect people who have rather different languages, religions, and other cultural aspects. Most earlier world-systems have also been multicultural.”

“One of the important systemic features of the modern system is the rise and fall of hegemonic core powers—the so-called hegemonic sequence. A hegemon is a core state that has a significantly greater amount of economic power than any other state and that takes on the political role of system leader. In the seventeenth century the Dutch Republic performed the role of hegemon in the Europe-centered system, while Great Britain was the hegemon of the nineteenth century, and the United States has been the hegemon in the twentieth century. Hegemons provide leadership and order for the interstate system and the world economy. But the normal operating processes of the modern system—uneven economic development and competition among states—make it difficult for hegemons to sustain their dominant positions, and so they tend to decline. Thus the structure of the core oscillates back and forth between hegemony and a situation in which several competing core states have a roughly similar amount of power and are contending for hegemony.”



Hall, Thomas D.; Christopher Chase-Dunn (2006), cap. 3 en Chase-Dunn, Christopher; Salvatore J. Babones; eds. (2006): *Global social change. Historical and comparative perspectives*, The Johns Hopkins University Press.

## The Problems of Progress

In general, what we call “progress” can lead to abuse of the natural environment, the burden of learning new jobs, and general disorientation due to change itself: Examples of other negative consequences of “progress”:

<i>Better machines</i>	—————▶	Displaced workers, loss of status
<i>Growing wealth</i>	—————▶	Increase in rich/poor disparity, fewer workers for less-desired tasks
<i>New products</i>	—————▶	Difficulty of making choices
<i>More, better food</i>	—————▶	Obesity, clogged arteries
<i>Better health care</i>	—————■	Rising costs, higher expectations
<i>Longer lives</i>	—————▶	Cost of supporting idle elderly, increase in disability, stress on natural resources
<i>Saving newborn</i>	—————▶	More birth defects
<i>Better transport</i>	—————■	Decline of local communities
<i>More TV programs</i>	—————▶	Inactivity, desocialization
<i>Increasing comfort</i>	—————■	Boredom, apathy
<i>Portable telephones</i>	—————▶	Forced exposure to noxious chatter
<i>Easy bill paying</i>	—————■	Credit-card fraud, identity theft
<i>Quick information</i>	—————■	Internet hoaxes, scams, viruses
<i>Cheap, easy messaging</i>	—————▶	Junk e-mail, insensitive comments

“We live in an unstable world, and the instability is going to increase. It is a world where a billion people feel hungry every day, and the hunger is going to increase. It is a world which is destroying its own environment, and the destruction is going to increase. It is a violent world, and the violence is going to increase. It is a world where people are less happy, even in the industrially advanced countries, than they used to be, and the unhappiness is going to increase.”

“The moment any part of the global economy begins to stabilise they will forget the hundreds of millions of lives that have been shattered by the crisis. A few months when banks are not collapsing and profits are not falling through the floor and the apologists will be pumping out candyfloss once again. Their futures will seem better and they will generalise this to the world at large with renewed talk about the wonders of capitalism and the impossibility of any alternative –until crisis hits again and throws them into another panic.”

“Capitalism transforms society in its entirety as it sucks people by the billions into labouring for it. It changes the whole pattern by which humanity lives, remoulding human nature itself. It gives a new character to old oppressions and throws up completely new ones. It creates drives to war and ecological destruction. It seems to act like a force of nature, creating chaos and devastation on a scale much greater than any earthquake, hurricane or tsunami. Yet the system is not a product of nature, but of human activity, human activity that has somehow escaped from human control and taken on a life of its own.”

Harman, Chris (2010): *Zombie capitalism. Global crisis and the relevance of Marx*, Haymarket Books.

- **Cómo va a acabar el capitalismo (Alan Nasser, 2018, pp. 225-226)**

“The evidence indicates that American capitalism, and, by implication, every industrially mature capitalist society, reaches a critical developmental stage. At that point the kind of real-economic growth that brings secure employment and living standards to the majority, much less to every working household, slows down. What comes to predominate is financialized growth, where such economic growth as there is is sustained by bubbles, which bring with them working-class austerity and precarity, social dislocation and a resulting repressive State. It is increasingly clear that capitalism and democracy are incompatible. There emerges the need for economic and political democracy. Economic democracy has never existed under capitalism and political democracy is in conspicuous decline. Some form of socialist democracy is the order of the epoch.”

Nasser, Alan (2018): *Overripe economy: American capitalism and the crisis of democracy*, Pluto Press.

- **Etapas del capitalismo en la historia de la economía mundo**

	1750–1810	1810–1870	1870–1930	1930–1990	1990–
Global Capitalism	Mercantilism	Liberalism	Imperialism	Late capitalism	Neoliberalism
Hegemonic State		Britain		United States	
Economic Policy	Imperialistic	Liberalism	Imperialistic	Liberalism	Imperialistic
Capital	Merchant capital	Industrial capital	Finance capital	State-monopoly capital	Multinational capital
World Commodity	Textiles	Light industry	Heavy industry	Durable consumer goods	Information
State	Absolute monarchy	Nation-state	Imperialism	Welfare state	Regionalism

Karatani, Kojin (2014): *The structure of world history. From modes of production to modes of exchange*, Duke University Press.

- **Dos tipos de progreso**

Idea tradicional de progreso: de 1945 a 1980, la idea dominante fue el crecimiento del nivel de vida (los hijos heredan un mundo mejor que el de sus padres).

Idea neoliberal (profinanciera) del progreso: desde 1980, el sector financiero (bancos, inversores financieros) busca el superávit económico (crecimiento de los salarios y las ganancias corporativas) para sí mismo, por lo que los beneficios de una economía en expansión se concentran en un pequeño porcentaje de la población (lo que no deja mucho margen para el aumento del nivel de vida).

Hudson, Michael (2012): *Finance capitalism and its discontents. Interviews and speeches 2003-2012*, ISLET.

- **¿Es inmortal el capitalismo?**

“Nowadays capitalism moves from crisis to crisis, emerging from each somewhat changed. Crises are vital to its perpetual regeneration. The global downturn of 2007–8 is an indication of the strength of capitalism, since a social system can be said to have really triumphed not when it is working well

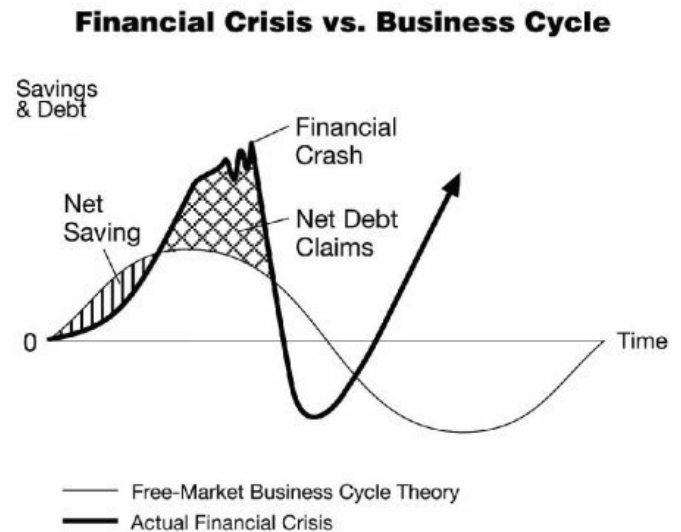
but when it is malfunctioning and everyone rushes to save it. Those who today harbour anti-capitalist views, in the face of the success of capitalism, focus on its failures, but many such failures consist in not having extended its benefits to all. And there is no way of knowing whether, in the longer run, benefits will be better distributed. Eventually, say the optimists, things will work out. On the contrary, say the pessimists, capitalism causes more problems than it resolves. The trouble is that history is the history of unintended consequences. 'Bad' things may turn, if one can wait long enough, into positive things."

Sassoon, Donald (2019): *The anxious triumph. A global history of capitalism, 1860-1914*, Penguin.

- **Leyes de las economías capitalistas (M. Hudson)**

- "The inexorable tendency of debt to grow beyond the ability to be paid."
- "There is no way to sustain the rise in debt without killing the economy."

"Neoliberals say they're against government, but what they're really against is democratic government. (...) As Germany's Wolfgang Schäuble said, 'democracy doesn't count.' Neoliberals want the kind of government that will create gains for the banks, not necessarily for the economy at large. Such governments basically are oligarchic. Once high finance takes over governments as a means of exploiting the 99%, it's all for active government policy – for itself."



Hudson, Michael (2017): *J is for junk economics. A guide to reality in an age of deception.*

- **El dilema de Yates (2016, p. 47)**

El dilema de Yates: "It is impossible to create a society that is both just and capitalist."

Según Yates, en una economía capitalista, el capital gobierna: el sistema funciona creando unos pocos ganadores y muchos perdedores, polos de riqueza y pobreza, períodos de expansión y recesión, empleados con exceso de trabajo, lugares de trabajo alienantes, explotación por parte de los poderosos y entornos despojados... "Losses are always socialized, and gains are always privatized."

Yates, Michael (2016): *The great inequality*, Routledge.

- **¿Una cura para el capitalismo? (Richard Wolff, 2012)**

"... moving beyond the internal organization of capitalist enterprises toward a specific, democratic alternative organization of production is the way forward now. Not only does a transition to worker-directed enterprises offer better prospects for preventing future crises, it also entails solutions for a host of related problems that have long defined capitalist societies."

Wolff, Richard (2012): *Democracy at work. A cure for capitalism*, Haymarket Books.

## 42. Evolución y complejidad

- **Sistemas autoorganizados críticamente** (*Systems self-organized critically*)

La propiedad de la criticidad autoorganizada significa que el comportamiento individual tiende a provocar que un sistema se autoorganice y converja hacia puntos críticos o de inflexión donde pequeños eventos pueden tener grandes efectos globales.

Ejemplo: arena que cae sobre un punto fijo de una mesa. La arena se acumula formando una pila hasta que se alcanza un estado de reposo (en un ángulo determinado de la pila). Tras ese estado, más granos crean avalanchas (un evento global potencialmente catastrófico) y parte de la arena se desprende de la mesa.

¿Existe una flecha del tiempo social? ¿Las sociedades necesariamente, con el tiempo, aumentan su complejidad? Si las sociedades son sistemas críticamente autoorganizados, ¿qué características definen entonces los puntos críticos?

- **Principios de la teoría de la complejidad**

### Emergencia

El todo no es solo la suma de sus partes. Incluso si las características de los componentes individuales de un sistema se conocen perfectamente, su interacción puede dar lugar a propiedades sistémicas difíciles de predecir a partir de las propiedades individuales.

### Hipótesis de la Reina Roja

Hay que correr para permanecer en el mismo lugar (hacer lo mismo es una receta para el fracaso). Un sistema compuesto por organismos adaptativos y en evolución obliga a los jugadores a adaptarse y evolucionar rápida y continuamente solo para permanecer en el juego. Esta carrera permanente entre los jugadores tiende a aumentar la complejidad general del sistema.

### No hay almuerzo gratis

Para aumentar la eficiencia con la que opera un sistema, su resiliencia (a choques o cambios) debe reducirse. Por el contrario, la supervivencia en un entorno incierto exige sacrificios de eficiencia.

### El principio de Ricitos de Oro (*Goldilocks principle*, la comida ni muy fría ni muy caliente)

En un entorno abierto, dinámico y competitivo, los sistemas solo pueden operar dentro de un rango limitado de condiciones: el 'borde del caos'.

### Indecidibilidad

El razonamiento deductivo (lógica por sí sola, argumentación racional) no siempre es suficiente para resolver problemas.

### El efecto mariposa (efecto dominó, efecto dominó, efecto bola de nieve).

Los sistemas complejos tienden a ser muy sensibles a cambios aparentemente menores: pequeños cambios pueden tener grandes efectos.

## Ley de variedad requerida

El sistema de control debe ser al menos tan complejo (sofisticado) como el sistema a controlar (se requiere mayor complejidad para gestionar una menor complejidad). Por lo tanto, para regular un sistema, la complejidad del controlador debe ser al menos tan grande como la complejidad del sistema a controlar. Las brechas de complejidad no suelen perdurar y su ajuste involuntario puede ser traumático para el sistema.

- **El problema de la ovación en pie (*standing ovation problem*)**

Se trata de un ejemplo que involucra agentes reflexivos e interactuantes en el tiempo y el espacio, y por lo tanto capta las características básicas de los sistemas sociales complejos y adaptativos: aprendizaje, heterogeneidad, incentivos, redes... Un evento público ha tenido lugar ante un público: una conferencia universitaria, un concierto musical, una obra de teatro, un partido de baloncesto, un mitin político... Entonces, el público empieza a aplaudir. La pregunta es: ¿cuánto tiempo se mantendrá la ovación? En cualquier momento durante la ovación, ¿continuará o terminará? La complejidad del problema radica en que, en general, los miembros del público no deciden ponerse de pie y aplaudir independientemente de lo que hagan los demás: un asistente sentado, rodeado de suficientes personas de pie, tiene más probabilidades de unirse a la ovación y también ponerse de pie (por varias razones posibles: hacer justicia a una buena actuación, evitar sentirse incómodo, aceptar la opinión de la mayoría, posiblemente a pesar de la propia, de que la actuación merece reconocimiento...).

El problema de la ovación en pie puede analizarse como un problema de difusión, como la expansión de nuevas tecnologías o productos básicos. Un resultado típico en los modelos de difusión es que una curva en forma de S se ajusta al número de agentes que se unen a otros para realizar una determinada acción. Inicialmente, el grupo de personas que realizan la acción es pequeño. El tamaño del grupo aumenta. Después de alcanzar cierto tamaño, el grupo comienza a reducirse hasta que finalmente se vacía. El ciclo de vida de muchos productos también se ajusta a una curva en forma de S. ¿Tiene la expansión de la globalización también forma de S?

Miller, John H.; Scott E. Page (2004): "The Standing Ovation Problem", *Complexity*.

- **El problema del bar El Farol**

100 personas deben decidir independientemente si van a un bar para entretenerse. La estancia es agradable si asisten menos de 60. Así que un posible asistente elige ir si espera que aparezcan menos de 60 y se abstiene de ir si cree que al menos 60 estarán presentes en el bar. El problema es que no hay un modelo correcto para definir las expectativas; de hecho, cualquier modelo de este tipo se autoinvalida. Por ejemplo, si todos creen que pocos irán, todos irán y eso probará que la creencia es incorrecta; si todos creen que el bar estará abarrotado, nadie irá, invalidando nuevamente la creencia inicial. Todas las profecías se incumplen. Este problema ilustra las dificultades de analizar sistemas adaptativos complejos. Es un ejemplo de un juego de minorías, donde las recompensas se acumulan para una minoría (la ciencia política se centra en cambio en los juegos de mayorías).

Arthur, W.B. (1994): "Inductive reasoning and bounded rationality", *American Economic Review* 84(2), 406-411.

## • Taxonomía de colapsos

**Elefantes negros** (las incógnitas conocidas de Donald Rumsfeld, *known unknowns*)

Se elige ignorar (o subestimar los efectos de) un elefante que se sabe que está en la habitación (un esquema piramidal en que todos participan, por ejemplo).

**Cisnes grises**

No se puede predecir la ocurrencia específica de este tipo de evento, pero sí se puede determinar su frecuencia (por lo que se pueden tomar precauciones contra él: terremotos).

**Reyes Dragón**

Son casos atípicos de una distribución debido a su gran tamaño (el tamaño de París en comparación con el resto de las ciudades francesas). Si bien su existencia es concebible según cierta tendencia, son en gran medida impredecibles y, en la práctica, no es viable tomar precauciones contra ellos.

**Cisnes negros** (las incógnitas desconocidas de Donald Rumsfeld, *unknown unknowns*)

Sucesos que se encuentran fuera de la distribución: son absolutamente impredecibles (crack financiero, atentados terroristas masivos) y son capaces de generar los mayores colapsos.

## • Taxonomía de riesgos

Gaurav Jain (2025) clasifies, in the form of the animal risk matrix next, four animal metaphors that describe types of risks, events or problems.

**El elefante en la habitación**

Esta metáfora se refiere a un problema o riesgo generalmente conocido pero ignorado. En cualquier colectivo (empresa, economía, institución política, etc.), el elefante en la habitación es un problema evidente, inminente y apremiante que nadie se atreve, ni le interesa ni se motiva a abordar porque hacerlo resulta incómodo. Los elefantes tienden a crecer con el tiempo, pero parece que todos esperan que desaparezcan espontáneamente.

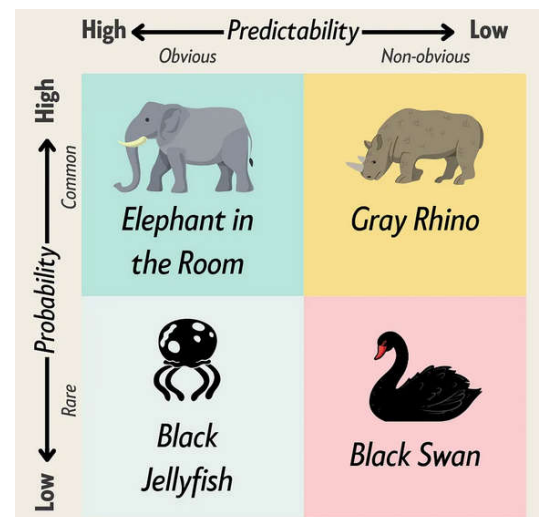
**Cisnes negros** (Nassim Nicholas Taleb)

Un cisne negro es un suceso raro, infrecuente y de gran impacto, explicable o predecible retrospectivamente pero no prospectivamente. Un cisne negro es un evento improbable cuya ocurrencia produce efectos tectónicos. Pandemias, descubrimientos o innovaciones notables, crisis globales... se consideran cisne negros: raros, de gran impacto e imprevisibles.

**Rinocerontes grises** (Michele Wucker)

Un rinoceronte gris es un suceso, problema o riesgo muy probable que suele ignorarse. En cuanto a problemas, un rinoceronte gris es uno que se identifica fácilmente, pero que no recibe suficiente atención o se subestima. El rinoceronte gris es una metáfora de las cosas que salen mal a pesar de ser evitables. Ejemplos: cambio climático, amenazas de ciberseguridad, cultura laboral tóxica, dieta o estilo de vida poco saludables...

**Medusas negras**



Una medusa negra representa un suceso, problema o riesgo predecible y poco común que suele ignorarse. Un problema anticipado que no recibe suficiente atención por considerarse improbable. La solución a los problemas de las medusas negras tiende a posponerse, ya que no se percibe como grave, pero con el tiempo se vuelve más costosa de resolver. Los cambios regulatorios son un ejemplo de medusa negra. Jain (2025) explica la metáfora así:

“In 2011, a nuclear power plant in Japan had to shut down—not because of an earthquake or tsunami, but because jellyfish clogged the cooling water intake (...) Similar shutdowns have happened in Sweden, US, and Scotland. In all these incidents, it was found that rising temperatures due to climate change created favorable conditions for the jellyfish populations to increase rapidly. Who could have imagined?”

Jain, Gaurav (2025): “The Animal Risk Matrix: How to Spot, Prioritize, and Manage Risks Like a Pro. Risk Management Lessons From the Wild”

<https://www.thegoodboss.com/p/the-animal-risk-matrix-how-to-spot>

Taleb, Nassim Nicholas (2007): *The Black Swan. The Impact of the Highly Improbable*, Allen Lane.

Wucker, Michele (2016): *The Gray Rhino. How to Recognize and Act on the Obvious Dangers We Ignore*, Macmillan.

- **Sucesos X (X-events)**

Los sucesos X son eventos de gran impacto y gran sorpresa. En una sociedad, su origen es la ‘brecha de complejidad’ entre la complejidad del sistema de control (el gobierno) y la creciente complejidad de los sistemas controlados (los ciudadanos). Esta brecha debe superarse: el gobierno fuerza una reducción de la complejidad en la población (represión) o aumenta su propia complejidad para igualar la mayor complejidad de la población (se celebran elecciones libres, se garantizan los derechos y libertades civiles, se permite la movilidad social, se acepta la apertura). Un suceso X es la vía predeterminada para superar la brecha de complejidad, el vehículo que reduce los diferentes niveles de complejidad de dos sistemas en interacción. Cuando un gobierno no logra superar la brecha, es probable que estalle una revolución (un ejemplo de suceso X). Las reglas para abordar sucesos normales (para los cuales existe abundante experiencia previa) son diferentes a las de los sucesos X (que son raros e inesperados).

Ejemplos de sucesos X: explosiones de supervolcanes (Toba, hace 74.000 años, fue probablemente responsable de la casi extinción de la humanidad), la epidemia de gripe española de 1918, terremotos de gran magnitud, la masiva muerte de abejas, los atentados del 11-S...

Las revueltas de 2011 en el mundo árabe (‘primavera árabe’) son más sucesos X. Los servicios modernos de comunicación y redes sociales (Google, X, Facebook, YouTube, Instagram, TikTok, Reddit, Snapchat) incrementan la complejidad social (los ciudadanos se vuelven más empoderados, conscientes, informados y conectados). La respuesta de los gobiernos, restringiendo el acceso a esos servicios o cerrándolos, puede ampliar la brecha de complejidad hasta niveles insostenibles (el gobierno de Australia ha sido el primero en prohibir, desde 10/12/25, las redes sociales a menores de 16 años, <https://www.rtve.es/noticias/20251209/australia-primer-pais-prohibir-redes-sociales-menores-16/16851521.shtml>). Una brecha de complejidad es sinónimo de problemas, y la expresión

política de estos problemas es una revuelta o revolución. El resultado en el mundo árabe en 2011 fue un cambio de régimen en algunos países (Túnez, Libia, Egipto) y un desafío a las élites gobernantes (la dinastía Asad en Siria, la monarquía en Baréin).

El progreso tecnológico y la integración económica a gran escala son creadores de sucesos X. Por ejemplo, los sectores manufactureros de las economías desarrolladas se volvieron más complejos (legislaciones de salario mínimo, normas de salud y seguridad, sindicalización, nuevas tecnologías) que los de las economías en desarrollo. Cuando ambos sectores interactúan a través de la globalización, y la brecha de complejidad se hace insostenible, un suceso X la cierra: la subcontratación (*outsourcing*, la transferencia de empleos manufactureros de los países desarrollados a los países en desarrollo). Este suceso X reduce por la fuerza la complejidad comparativamente excesiva del sector más desarrollado. En este sentido, la globalización y las revoluciones tecnológicas crean nuevos sucesos X y magnifican las consecuencias de los sucesos X existentes.

Las sociedades actuales son más vulnerables que nunca a los sucesos X: las complejas estructuras de las sociedades modernas son extremadamente frágiles. La creciente complejidad de la sociedad global es la causa directa de los sucesos X. Esta complejidad se expresa de diversas maneras: integración, interdependencia de sistemas e infraestructuras; acumulación de niveles burocráticos; desajuste en los niveles de complejidad entre los sistemas que interactúan (economías nacionales y extranjeras; gobiernos y ciudadanos; economías y ecosistemas).

- **La ley de la conservación de la complejidad X (X-events)**

“Every application has an inherent amount of irreducible complexity. The only question is: Who will have to deal with it—the user, the application developer, or the platform developer?”

<https://www.nomodes.com/larry-tesler-consulting/complexity-law>

- **La ley de Yudkowsky de la ciencia loca (Yudkowsky's Law of Mad Science)**

Eliezer Shlomo Yudkowsky, teórico de la IA y coautor de *If Anyone Builds It, Everyone Dies: Why Superhuman AI Would Kill Us All*, 2025.

“Every eighteen months, the minimum IQ necessary to destroy the world drops by one point.”

“Our sole responsibility is to produce something smarter than we are, but let’s make sure the keys are locked away from those without a legitimate need to know.” (Thomas Frey, 2020)

<https://futuristspeaker.com/predictions/is-moores-law-for-mad-science-inevitable/>

<https://slatestarcodex.com/2018/11/26/is-science-slowing-down-2/>

- **Un trilema tecnológico conjetural**

Es entre difícil e imposible de reconciliar: tener una tecnología suficientemente compleja, útil y segura. Con respecto a una IA, no sería compatible una IA compleja (muy avanzada con respecto a los humanos), útil (para los humanos) y segura (para los humanos).

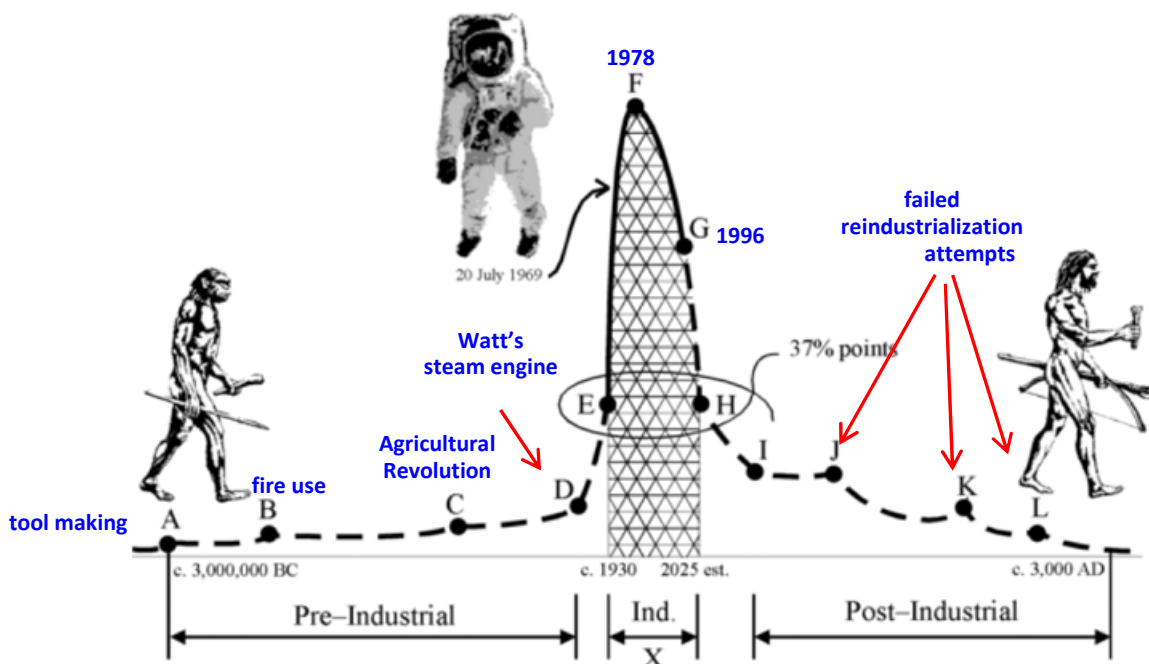
- **La teoría de Olduvai de la civilización industrial trilema tecnológico conjetal**

<http://www.hubbertypeak.com/duncan/olduvai.htm>

La teoría de Olduvai de la civilización industrial sostiene que las civilizaciones industriales duran alrededor de un siglo. La variable que determina el auge y la caída de una civilización industrial es la producción de energía per cápita.

“The Olduvai Theory states that the life expectancy of industrial civilization is approximately 100 years: circa 1930-2030. Energy production per capita (e) defines it. The exponential growth of world energy production ended in 1970... Average e will show no growth from 1979 through circa 2008... The rate of change of ewill go steeply negative circa 2008... World population will decline to about two billion circa 2050... A growing number of independent studies concur...”

Richard C. Duncan (2005-2006): “The Olduvai Theory. Energy, population, and industrial civilization”, *The Social Contract*, Winter 2005-2006.

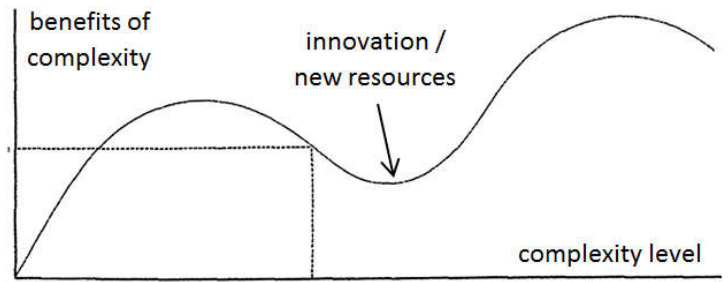


- **La teoría de Tainter (1988) sobre por qué las sociedades colapsan**

El colapso significa que una sociedad experimenta una pérdida rápida y significativa de complejidad sociopolítica. La explicación de Tainter se basa en cuatro ideas:

- (1) Las sociedades son organizaciones que resuelven problemas.
- (2) La organización sociopolítica de las sociedades requiere energía para su mantenimiento.
- (3) Los niveles más altos de complejidad de una organización sociopolítica corresponden a mayores costos per cápita: una complejidad creciente es cada vez más costosa para cada miembro del sistema más complejo.
- (4) Resolver problemas sociales mediante la inversión en complejidad sociopolítica tiene rendimientos marginales decrecientes: cada mejora en la complejidad reduce la capacidad de resolver problemas. La productividad (los beneficios) de la inversión en complejidad disminuye con el tiempo.

Dados los puntos (1)-(4), el colapso surge cuando los beneficios de invertir en complejidad son insuficientes para cubrir sus costos. El colapso es el mecanismo natural para reducir un nivel de complejidad cuyo mantenimiento es excesivamente costoso. La innovación o el descubrimiento de nuevos recursos (subsidios energéticos) son formas comunes de superar los rendimientos decrecientes de la inversión en complejidad.



*Tainter, Joseph (1988): The collapse of complex societies, Cambridge University Press.*

“[Joseph] Tainter sees collapse very specifically as a political process connected to the degree of complexity of a society. Human societies become more complex as a response to the problems and opportunities that they face, and through collapse they become less complex. Collapse then is a rapid process of simplification – where rapid means not instantaneous, but perhaps a few decades. Importantly, in Tainter’s way of thinking, collapse itself is an adaptation not simply a failure.”

“Rome is a useful example of collapse because it teaches us that while historical change happens, modern attempts to explain it can involve seriously different interpretations of the same evidence. Even with textual history and contemporary sources commenting on what was happening, in addition to archaeological evidence, Rome’s collapse is still debated in terms of whether it even happened, whether there was a clean break, or whether we should think instead of a period and process of transition and transformation. Having more evidence does not necessarily make it any easier to understand a collapse – it can make it much harder.”



“...the message to take from many collapses is clear –collapse cautions us to build fair and inclusive societies that minimise room for disaffection and for potentially harmful divisions to arise. To create more sustainable societies we need not only to understand the natural environment , its impact on us and our impacts on it, and to live within our means, but also to realise true political and social sustainability , and consensus, in societies that ensures the well-being of all now and in the future. Although looking at past collapses can teach us these lessons, we need only look around us today to see the truth of them.”

*Middleton, Guy D. (2017): Understanding collapse: Ancient history and modern myths, Cambridge University Press.*

- **Equilibrio puntuado (*punctuated equilibrium*, Stephen Gould, Nils Eldredge)**

La expresión designa una teoría de los procesos evolutivos según la cual estos no ocurren de manera lenta y gradual, sino rápida y repentina. Largos períodos de aparente estabilidad y ausencia de cambios significativos son seguidos repentinamente por un período de cambios evolutivos radicales y drásticos (como la explosión cámbrica, hace 650 millones de años, donde aparecieron animales con concha y esqueleto externo).

### 43. Estabilidad e inestabilidad, económica y política

- **Procesos de cambio evolutivo en el ámbito económico**

“Figure 9.4 summarizes the major intuition (...). Its purpose is to define those general functions which the economic system must achieve in order to enable both growth and structural change. The idea rests upon the well-known trinity of fundamental forces of evolutionary change: (i) variation, (ii) cumulation and (iii) selection. It is based on the

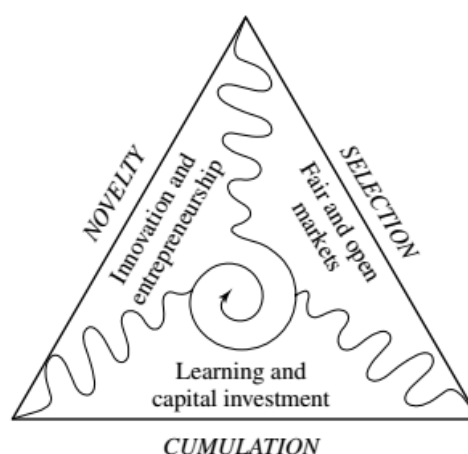


Figure 9.4 Three requirements for an economic system to achieve growth and structural change

view that any kind of evolutionary change, including technological innovation or structural adjustment, depends on the simultaneous interplay of all three forces (...) These very abstract principles are then projected into the realm of economics, defining what the system should achieve in order to support Schumpeterian industrial development: (i) the introduction of novelty through innovation and entrepreneurship; (ii) the accumulation of productive resources through learning and capital investment; and (iii) competitive selection through fair markets. Appropriate policies can then be assigned to these specific functions. Examples are R&D policies or start-up policies, each of them fostering the entrepreneurial function of generating novelty. Education and training, as well as investment policies, including the marketing of business locations to foreign investors, can be attributed to the second pillar of learning and capital accumulation. Finally, competition policy, market liberalization and economic integration are prime examples of policies responsible for guarding fair principles of selection in open markets.”

Peneder, Michael (2004): “High growth with ‘old’ industries? The Austrian Paradox revisited”, cap. 9 en John Foster, Werner Holzl; eds. (2004): *Applied Evolutionary Economics and Complex Systems*, Edward Elgar, pp. 197-219.

- **Paradoja del enfrentamiento destructivo**

‘Trade wars are good, and easy to win.’ Donald Trump, 2 de marzo de 2018

La Guerra Fría entre EE UU y la Unión Soviética ilustra la paradoja del enfrentamiento destructivo (que en este contexto se conoce como 'paradoja nuclear'). En una situación en la que el enfrentamiento entre dos partes será necesariamente mutuamente destructivo:

- por un lado, no es una opción racional provocar el enfrentamiento; pero,
- por otro, si una parte no está dispuesta a arriesgar el enfrentamiento, entonces la otra parte puede lograr lo que se proponga sabiendo que la primera parte (parte más responsable o prudente) cederá a las demandas de la parte rival.

La paradoja se puede extender a casos en los que el enfrentamiento no es estrictamente destructivo, pero, en el ámbito del caso, las consecuencias del enfrentamiento son inaceptables. Por ejemplo, situaciones que involucran decisiones de política económica exterior donde no reaccionar a las decisiones del rival en defensa de intereses económicos nacionales causa una pérdida de prestigio o reputación inaceptable (guerras comerciales de incremento de aranceles y/o de limitación/prohibición de importaciones, como la guerra comercial entre EE UU y China iniciada por la Administración Trump en enero de 2018).

**Allison, Graham (2017): "The Thucydides Trap"**

<https://foreignpolicy.com/2017/06/09/the-thucydides-trap/>

**Hass, Ryan; Abraham Denmark (2020): "More pain than gain: How the US-China trade war hurt America"**

<https://www.brookings.edu/articles/more-pain-than-gain-how-the-us-china-trade-war-hurt-america/>

- **La trampa de Tácito (*Tacitus Trap*)**

Situación en que se odia a un gobierno o gobernante impopular, con independencia de que lo que haga esté bien o mal, o con independencia de que las decisiones sean acertadas o erróneas.

"It happened too that the executions of Clodius Macer and Fonteius Capito were reported at this same time. Macer, who had unquestionably been making trouble in Africa, had been executed by Trebonius Garutianus, the imperial agent, at Galba's orders. Capito, who was making similar attempts, had been executed in Germany by Cornelius Aquinus and Fabius Valens, the commanders of the legions, before they received orders to take such action. There were some who believed that, although Capito's character was defiled and stained by greed and lust, he had still refrained from any thought of a revolution, but that the commanders who urged him to begin war had purposely invented the charge of treason against him when they found that they were unable to persuade him; and that Galba, either by his natural lack of decision, or to avoid a closer examination of the case, had approved what was done, regardless of the manner of it, simply because it could not be undone."

En relación con Galba, "both executions were unfavourably received, and now that the emperor was once hated, his good and evil deeds alike brought him unpopularity."

*The Histories* Book I, 7

## • La trampa de Tucídides (*Thucydides Trap*)

“The Thucydides Trap, or Thucydides' Trap, is a term popularized by American political scientist Graham T. Allison to describe an apparent tendency towards war when an emerging power threatens to displace an existing great power as a regional or international hegemon. The term exploded in popularity in 2015 and primarily applies to analysis of China–United States relations.”

“Based on an observation by Thucydides in his History of the Peloponnesian War that ‘it was the rise of Athens and the fear that this instilled in Sparta that made war inevitable’, Allison used the term to describe a tendency towards war when a rising power (such as Athens) challenges the status of a ruling power (such as Sparta).”

[https://en.wikipedia.org/wiki/Thucydides\\_Trap](https://en.wikipedia.org/wiki/Thucydides_Trap)

La trampa de Tucídides es la conjetura que una potencia en ascenso inevitablemente desafiará el dominio de una potencia hegemónica existente, y el temor de esta última a esa perspectiva puede desencadenar dinámicas competitivas que, en última instancia, conducen a la confrontación, incluso a la guerra.

## • La trampa de Kindleberger (*Kindleberger Trap*)

Situación en que la potencia hegemónica no provee bienes públicos globales en momentos en que son necesarios. Proveer bienes públicos globales es uno de los precios que un hegemón debe pagar para alcanzar o mantener su posición hegemónica.

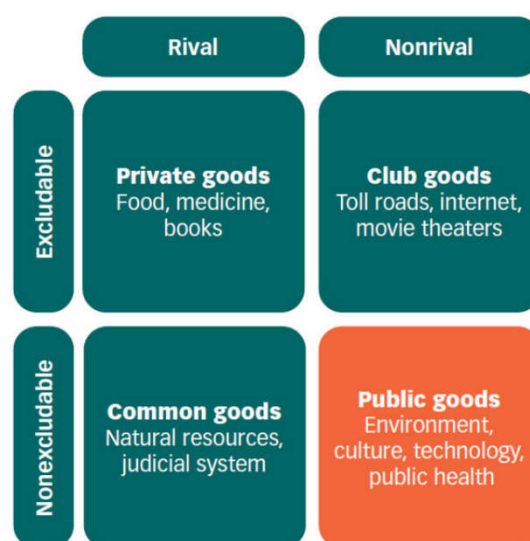
“While the Thucydides Trap focuses on the dangers of a rising power threatening an established one, the Kindleberger Trap centers on the risks stemming from a failure to adequately provide global public goods—such as economic stability, security, or free trade—during transitions of international leadership.”

[https://en.wikipedia.org/wiki/Kindleberger\\_Trap](https://en.wikipedia.org/wiki/Kindleberger_Trap)

## • Bienes públicos globales

“Public goods are those that are available to all (‘nonexcludable’) and that can be enjoyed over and over again by anyone without diminishing the benefits they deliver to others (‘nonrival’). The scope of public goods can be local, national, or global.”

“Theoretically, global public goods are no different from local or national public goods. They are nonexcludable and nonrival. They are characterized by free rider problems, spillovers, and short time horizons. Why, then, are more local and national public goods provided than global public goods? Why is there more funding for national defense than for combating global climate change?”



The failures of governments that underprovide public goods are amplified when it comes to global public goods. Global institutions—where they exist—often lack the legal authority to enforce regulation and taxation or the institutional capacity to coordinate the needs of all citizens in the world and across generations. The coordination challenge is also bigger. Global institutions deal with national governments, as opposed to individual citizens. National governments have very different incentives from individual citizens, both economic and political, and many struggle to provide public goods even within their own countries.”

<https://www.imf.org/en/Publications/fandd/issues/2021/12/Global-Public-Goods-Chin-basics>

## 44. Futuros

### 1. El efecto de Casandra (Wierzbicki, 2016, p. 3)

El efecto Casandra: cuanto más preciso es un pronóstico, menos probable es creerlo (“the more precisely somebody forecasts future events, the less credibility is given to such forecast”).

*Wierzbicki, Andrzej Piotr (2016): The future of work in information society. Political-economic arguments.*

### 2. Dos escenarios para 2050 (Alexandru Vulpe, 2016)

- Escenario abierto. El mundo y sus estructuras son abiertos y siguen facilitando la participación activa de las personas en su gestión.
- Escenario cerrado. Existe un acceso diferencial a casi todo: los actores poderosos (grandes corporaciones, gobiernos) regulan el acceso y la participación en las organizaciones y estructuras.

*Alexandru Vulpe (2016): “Technology Advancements in 2050 and How the World Will Look Like”, cap. 2 en Wireless world in 2050 and beyond. A window into the future!, Ramjee Prasad and Sudhir Dixit (eds.), Springer.*

### 3. Escenarios globales

“In our current world, two important threshold effects are the exponential progress of technology and the ever-widening global wealth gap. There are also two major sledgehammer effects: climate change and the depletion of the world's natural resources. Under one scenario, the sledgehammer effects overwhelm the threshold effects, and our global civilization collapses (...) In another scenario—let's call it Techno Split—the sledgehammer and threshold effects work together to split apart the human race while maintaining some form of technological civilization. Continued exponential technological progress permits civilization, for the affluent minority, to keep advancing (...) Eventually, they would become—effectively, if not literally—two separate species. One species, genetically and technologically enhanced, exploring entirely new ways of being human; the other species, genetically akin to us, barely surviving within its collapsed infrastructure. Is this what we desire for humanity's future? Those who agree with Kurzweil that humanity's defining feature is the

ability to reach beyond the limitations of biology might believe so and celebrate humanity's ultimate triumph: the unfettered progress of humanity's CONQUEST OF NATURE. But there's another view of humanity that permeates the modern world, one based on the 'recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family.' These words, from the UN's Universal Declaration of Human Rights, represent a different kind of progress: the progress of humanity's moral scope, which has expanded beyond tribal groupings to encompass the entire human race (...) From this viewpoint, the Techno Split scenario would be a fundamental betrayal of human values. It would be, as one critic said about Singularity visionaries, akin to 'rich people building a lifeboat and getting off the ship.'"

#### 4. Esta civilización está acabada

"... this civilisation is going down. It will not last. It cannot, because it shows almost no sign of taking the extreme climate crisis—let alone the broader ecological crisis—for what it is: a long global emergency, an existential threat. This industrial-growthist civilisation will not achieve the Paris climate accord goals; and that means that we will most likely see 3–4 degrees of global over-heat at a minimum, and *that* is not compatible with civilisation as we know it (...) By 'this civilisation' I mean the hegemonic civilisation of globalised capitalism—sometimes called 'Empire'—which today governs the vast majority of human life on Earth."

"As I see things, there are three broad possible futures that lie ahead:

(1) *This civilisation could collapse utterly and terminally*, as a result of climatic instability (leading for instance to catastrophic food shortages as a probable mechanism of collapse), or possibly sooner than that, through nuclear war, pandemic, or financial collapse leading to mass civil breakdown. Any of these are likely to be precipitated in part by ecological/climate instability, as Darfur and Syria were.  
Or

(2) *This civilisation (we) will manage to seed a future successor-civilisation(s)*, as this one collapses.  
Or

(3) *This civilisation will somehow manage to transform itself* deliberately, radically and rapidly, in an unprecedented manner, in time to avert collapse.

The third option is by far the least likely, though the most desirable, simply because either of the other options will involve vast suffering and death on an unprecedented scale. In the case of (1), we are talking the extinction or near-extinction of humanity. In the case of (2) we are talking at minimum multiple megadeaths (...) Thus, one way or another, this civilisation is finished. It may well run in the air, suspended over the edge of a cliff, for a while longer. But it will then either crash to complete chaos and catastrophe (Option 1); or seed something radically different from itself from within its dying body (Option 2); or somehow get back to safety on the cliff-edge (Option 3)."

*Read, Rupert; Samuel Alexander (2019): This civilisation is finished. Conversations on the end of Empire— and what lies beyond, Simplicity Institute.*

## 5. Paradójicas grandes amenazas para la economía mundial del siglo XXI

- Amenaza 1: la amenaza de la escasez. Esta amenaza se asocia con una posible catástrofe ecológica y cómo esta afectará el futuro de la vida en la Tierra.
- Amenaza 2: la amenaza de la abundancia. Generada por la automatización y se concreta en cómo la automatización afectará el futuro del trabajo.

## 6. Nuevas reglas para la economía global de Rodrik (2018, cap. 10)

- “Markets must be deeply embedded in systems of governance.” Los mercados no son instituciones autorreguladas: su correcto funcionamiento requiere el apoyo de otras instituciones (tribunales, leyes, reguladores, seguridad social, impuestos redistributivos, infraestructuras, inversión pública en I+D...). Esto vale tanto para los mercados globales como los nacionales.
- “Democratic governance and political communities are organized largely within nation-states, and are likely to remain so for the foreseeable future.” “The quest for extensive global governance is a fool’s errand, both because national governments are unlikely to cede significant control to transnational institutions and because harmonizing rules would not benefit societies with diverse needs and preferences.” “When international cooperation does ‘succeed,’ it typically codifies the preferences of the more powerful states or, even more frequently, of international corporations and banks in those states.”
- “There is no ‘one way’ to prosperity.” “[Since] the core institutional infrastructure of the global economy must be built at the national level, it frees up countries to develop the institutions that suit them best.” “The most successful societies of the future will leave room for experimentation and allow for further evolution of institutions over time. A global economy that recognizes the need for and value of institutional diversity would foster rather than stifle such experimentation and evolution.” El juego de la prosperidad no tiene fin.
- “Countries have the right to protect their own regulations and institutions.” “The recognition of institutional diversity would be meaningless if nations were unable to ‘protect’ domestic institutions.”
- “Countries do not have the right to impose their institutions on others.” “The recognition of institutional diversity would be meaningless if nations were unable to ‘protect’ domestic institutions.” “Nations have a right to difference, not to impose convergence.”
- “The purpose of international economic arrangements must be to lay down the traffic rules for managing the interface among national institutions.”
- “Nondemocratic countries cannot count on the same rights and privileges in the international economic order as democracies.” “What gives the previous principles their appeal and legitimacy is that they highlight democratic deliberation—where it really occurs, within nation-states. When nation-states are not democratic, this scaffolding collapse.” “These principles support a different model of global governance, one that would be democracy enhancing rather than globalization enhancing.”

Rodrik, Dani (2018): *Straight talk on trade: Ideas for a sane world economy*, Princeton University Press.

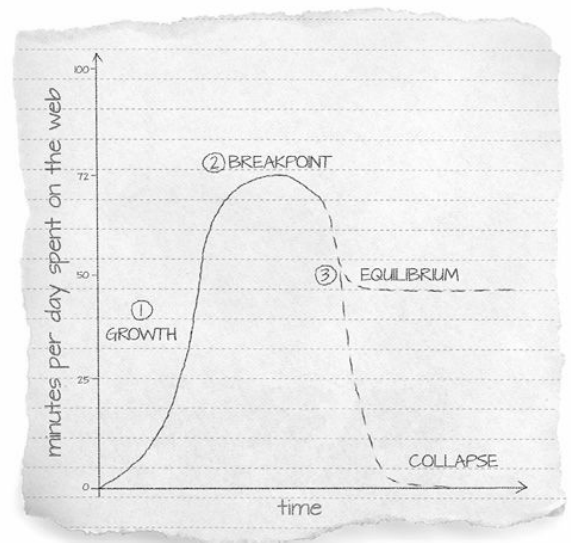
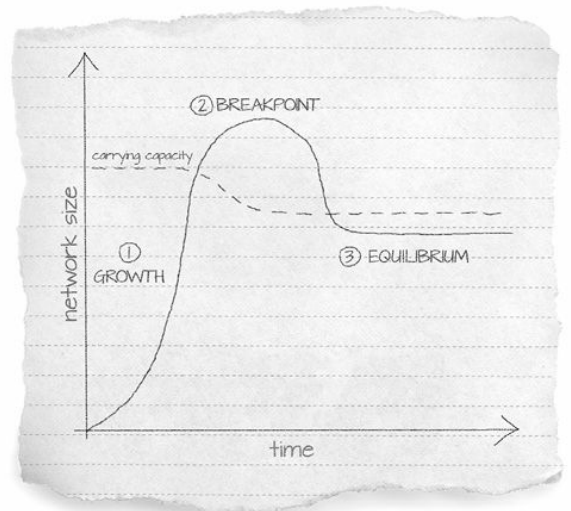
## 7. The three phases of networks (Jeff Stibel, 2013)

“There are three phases to any successful network: first, the network grows and grows and grows exponentially; second, the network hits a breakpoint, where it overshoots itself and overgrows to a point where it must decline, either slightly or substantially; finally, the network hits equilibrium and grows only in the cerebral sense, in quality rather than in quantity.”

“Internets, ant colonies, and brains all start small, grow steadily, and then explode into hypergrowth. In nature, all species multiply as much as resources allow. This expansion may start linearly, but it quickly becomes exponential. Populations of plants, animals, yeast, and brain cells grow unencumbered until they reach the maximum quantity that the environment can sustain, the carrying capacity of an ecosystem.”

“Ant colonies, various other animal species, brains, and internets are all networks, and as such they follow the same pattern of growth, breakpoint, and equilibrium. They start out small and grow explosively to the point where they overshoot and collapse. A successful network has only a small collapse, out of which a stronger network emerges wherein it reaches equilibrium, oscillating around an ideal size (...) At the phase of equilibrium, networks continue to grow, but in terms of quality instead of quantity. When the size of a network slows, other things speed up—like communication, intelligence, and consciousness. At this point, the real magic begins. This last network phase is poorly understood, even by biologists. We are just beginning to learn about equilibriums in biological systems, let alone in technology.”

*Stibel, Jeff (2013): Breakpoint. Why the web will implode, search will be obsolete, and everything else you need to know about technology is in your brain.*



## 8. Los seis motores más importantes del cambio global (Al Gore, 2013)

“In order to reclaim control of our destiny and shape the future, we must think freshly and clearly about the crucial choices that confront us as a result of:

- The emergence of a deeply interconnected global economy that increasingly operates as a fully integrated holistic entity with a completely new and different relationship to capital flows, labor, consumer markets, and national governments than in the past;
- The emergence of a planet-wide electronic communications grid connecting the thoughts and feelings of billions of people and linking them to rapidly expanding volumes of data, to a fast growing web of sensors being embedded ubiquitously throughout the world, and to increasingly

intelligent devices, robots, and thinking machines, the smartest of which already exceed the capabilities of humans in performing a growing list of discrete mental tasks (...);

- The emergence of a completely new balance of political, economic, and military power in the world that is radically different from the equilibrium that characterized the second half of the twentieth century, during which the United States of America provided global leadership and stability—shifting influence and initiative from West to East, from wealthy countries to rapidly emerging centers of power throughout the world, from nation-states to private actors, and from political systems to markets;
- The emergence of rapid unsustainable growth—in population; cities; resource consumption; depletion of topsoil, freshwater supplies, and living species; pollution flows; and economic output that is measured and guided by an absurd and distorted set of universally accepted metrics that blinds us to the destructive consequences of the self-deceiving choices we are routinely making;
- The emergence of a revolutionary new set of powerful biological, biochemical, genetic, and materials science technologies that are enabling us to reconstitute the molecular design of all solid matter, reweave the fabric of life itself, alter the physical form, traits, characteristics, and properties of plants, animals, and people, seize active control over evolution, cross the ancient lines dividing species, and invent entirely new ones never imagined in nature; and
- The emergence of a radically new relationship between the aggregate power of human civilization and the Earth’s ecological systems, including especially the most vulnerable—the atmosphere and climate balance upon which the continued flourishing of humankind depends—and the beginning of a massive global transformation of our energy, industrial, agricultural, and construction technologies in order to reestablish a healthy and balanced relationship between human civilization and the future.”

Gore, Al (2013): *The future. Six drivers of global change*, Random House.

## 9. Escenarios futuros del trabajo según Ulrich Beck

	Hope	Collapse
	1	2
Science-based information technologies	From the work society to the knowledge society	Capitalism without work
	3	4
Globalization	The world market – the neoliberal jobs miracle	The fixed location of work – a globalization risk
	5	6
Ecological crises	Sustainable work – the ecological economic miracle	Global apartheid
	7	8
Individualization	The self-employed – the freedom of insecurity	Individualization of work – disintegration of society

“If the framework of a full-employment society is replaced with that of a multi-activity society, the collapse scenarios become the occasion for a redefinition of work and of the necessary reforms. Three more future scenarios can then be developed (...): 9 Farewell to the work society: instead, the multi-activity society. 10

Condemned to leisure: the free-time society. 11 Post-national and political civil society: a European social model”

Beck, Ulrich (2000): *The brave new world of work*, Polity Press.

## 10. Stephen Hawking (2018) sobre la supervivencia de la humanidad

"I regard it as almost inevitable that either a nuclear confrontation or environmental catastrophe will cripple the Earth at some point in the next 1,000 years which, as geological time goes, is the mere blink of an eye. By then I hope and believe that our ingenious race will have found a way to slip the surly bonds of Earth and will therefore survive the disaster.

(...) I think we are acting with reckless indifference to our future on planet Earth (...) To leave Earth demands a concerted global approach—everyone should join in (...) The technology is almost within our grasp. It is time to explore other solar systems. Spreading out may be the only thing that saves us from ourselves. I am convinced that humans need to leave Earth. If we stay, we risk being annihilated." (cap. 7)

"When we invented fire, we messed up repeatedly, then invented the fire extinguisher. With more powerful technologies such as nuclear weapons, synthetic biology and strong artificial intelligence, we should instead plan ahead and aim to get things right the first time, because it may be the only chance we will get. Our future is a race between the growing power of our technology and the wisdom with which we use it. Let's make sure that wisdom wins." (cap. 9)

"The second development which will impact on the future of humanity is the rise of artificial intelligence (...) But the advent of super-intelligent AI would be either the best or the worst thing ever to happen to humanity. We cannot know if we will be infinitely helped by AI, or ignored by it and sidelined, or conceivably destroyed by it. As an optimist, I believe that we can create AI for the good of the world, that it can work in harmony with us. We simply need to be aware of the dangers, identify them, employ the best possible practice and management and prepare for its consequences well in advance." (cap. 10)

"I am advocating that all young people should be familiar with and confident around scientific subjects, whatever they choose to do. They need to be scientifically literate, and inspired to engage with developments in science and technology in order to learn more. A world where only a tiny super-elite are capable of understanding advanced science and technology and its applications would be, to my mind, a dangerous and limited one. I seriously doubt whether long-range beneficial projects such as cleaning up the oceans or curing diseases in the developing world would be given priority. Worse, we could find that technology is used against us and that we might have no power to stop it." (cap. 10)

Hawking, Stephen (2018): *Brief answers to the big questions*, Bantam Books.

## 11. ¿Es propensa la globalización al colapso o el retroceso?

- "The phenomenon of globalization has today become a ubiquitous way of understanding the world, but people who used the concept as a tool of analysis failed to understand its volatility and instability."
- "Globalization not only involves international movements of goods, people, and capital, but is also associated with transfers of ideas and shifts of technology, which affect and restructure our preferences. In consequence, globalization generates continuous uncertainty about values."

- “Globalization is vulnerable to periodic financial catastrophes, which involve very sudden alterations of concepts of value. That is, our values themselves are reevaluated during such crises. During a crisis, unexpected and apparently random linkages become apparent. People begin to see in what complex ways the world has become interconnected.”
- “The perception of instability calls into question the sophisticated techniques devised for monetary management (...) In the uncertainty of globalization setbacks, the experience of the past becomes a powerful template for understanding the contemporary predicament (...) Today, we look back to the Great Depression of the late 1920s and 1930s as a model for what can go wrong when globalization breaks apart.”
- “Politics and economics are inextricably and inherently linked, and politics provides an alternative to market mechanisms for the management of globalization crises.”
- “When breakdowns occur, reconstruction is extremely difficult and involves a long and arduous effort for the rebuilding of social trust. Value renewal takes time.”

## 12. ¿Ciclos de globalización?

- “Globalization is not only a process that occurs somewhere out there—in an objective and measurable world of trade and money. It also happens in our minds, and that part of globalization is often more difficult to manage. To understand both the process and our reactions to it, we need a historical grounding.”
- “All of these previous globalization episodes ended, almost always with wars that were accompanied by highly disruptive and contagious financial crises. Globalization is often thought to produce a universalization of peace, since only in a peaceful world can trade and an interchange of ideas really flourish. But in practice, a globalization of goods, capital, and people often leads to a globalization of violence.”
- “It is thus possible to speak of globalization cycles, with long periods of increased interchange of goods, and flows of people and capital. But then something happens. People feel there has been too much interaction; they draw back from the global setting and look instead for protected areas in which they can be safe from global threats and global devastation. The shock or trauma is often connected with financial collapse, especially the profound uncertainty that financial disaster brings.”

James, Harold (2009): *The creation and destruction of value: The globalization cycle*, Harvard University Press.

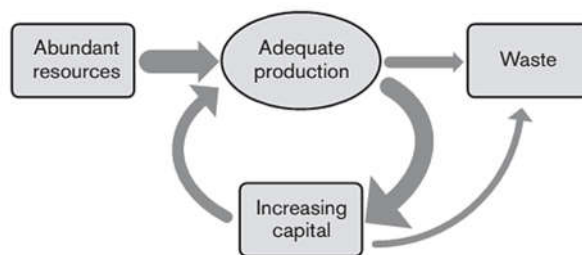
## 13. El prolongado descenso (John Michael Greer, 2008)

“This is the process I’ve named the Long Descent — the declining arc of industrial civilization’s trajectory through time. Like the vanished civilizations of the past, ours will likely face a gradual decline, punctuated by sudden crises and periods of partial recovery. The fall of a civilization is like tumbling down a slope, not like falling off a cliff. It’s not a single massive catastrophe, or even a series

of lesser disasters, but a gradual slide down statistical curves that will ease modern industrial civilization into history's dumpster."

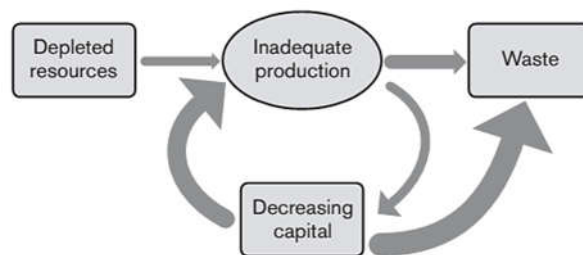
"At this point it's almost certainly too late to manage a transition to sustainability on a global or national scale, even if the political will to attempt it existed — which it clearly does not. It's not too late, though, for individuals, groups, and communities to make that

transition themselves, and to do what they can to preserve essential cultural and practical knowledge for the future. The chance that today's political and business interests will do anything useful in our present situation is small enough that it's probably not worth considering. Our civilization is in the early stages of the same curve of decline and fall that so many others have followed before it, and the crises of the present — peak oil, global warming and the like — are the current versions of the historical patterns of ecological dysfunction. To judge by prior examples, we can't count on the future to bring us a better and brighter world — or even a continuation of the status quo. Instead, what most likely lies in wait for us is a long, uneven decline into a new Dark Age from which, centuries from now, the civilizations of the future will gradually emerge."



#### 14. Colapso catabólico (John Michael Greer, 2008)

"The word 'catabolism' comes from the Greek, by way of the life sciences. In today's biology it refers to processes by which a living thing feeds on itself. One of the most striking features of the dead civilizations of the past is that they go through precisely this process as they move through the stages of decline and fall."



"... civilizations are complex, expensive, fragile things. To keep one going, you have to maintain and replace a whole series of capital stocks: physical (such as buildings); human (such as trained workers); informational (such as agricultural knowledge); social (such as market systems); and more. If you can do this within the 'monthly budget' of resources provided by the natural world and the efforts of your labor force, your civilization can last a very long time. Over time, though, civilizations tend to build their capital stocks up to levels that can't be maintained; each king (or industrial magnate) wants to build a bigger palace (or skyscraper) than the one before him, and so on. That puts a civilization into the same bind as the homeowner with the oversized house."

"In a growing or stable society, the resource base is abundant enough that production can stay ahead of the maintenance costs of society's capital — that is, the physical structures, trained people, information, and organizational systems that constitute the society. Capital used up in production or turned into waste can easily be replaced."

"In a society in catabolic collapse, resources have become so depleted that not enough is available for production to meet the maintenance costs of capital. As production falters, more and more of society's capital becomes waste, or is turned into raw material for production via salvage. If resource depletion can be stopped, the loss of capital brings maintenance costs back down below what production can

meet, and the catabolic process ends; if resource depletion continues, the catabolic process continues until all capital becomes waste.”

## 15. Los jinetes del apocalipsis del colapso catabólico

- Declining energy availability. “As oil depletion accelerates, and other resources such as uranium and Eurasian natural gas hit their own production peaks, the shortfall widens, and many lifestyles and business models that depend on cheap energy become nonviable.”
- Economic contraction. “Energy prices are already beginning to skyrocket as nations, regions, and individuals engage in bidding wars driven to extremes by rampant speculation. The global economy, which made economic sense only in the context of the politically driven low oil prices of the 1990s, will proceed to come apart at the seams, driving many import- and export-based industries onto the ropes, and setting off a wave of bankruptcies and business failures. Shortages of many consumer products will follow, including even such essentials as food and clothing. Soaring energy prices will have the same effect more directly in many areas of the domestic economy. Unemployment will likely climb to Great Depression levels, and poverty will become widespread even in what are now wealthy nations.”
- Collapsing public health. “As poverty rates spiral upward, shortages and energy costs impact the food supply chain; energy-intensive health care becomes unaffordable for all but the obscenely rich; global warming and ecosystem disruption drive the spread of tropical and emerging diseases; malnutrition and disease become major burdens. People begin to die of what were once minor, treatable conditions. Chronic illnesses such as diabetes become death sentences as the cost of health care climbs out of reach for most people. Death rates soar as rates of live birth slump, launching the first wave of population contraction.”
- Political turmoil. “What political scientists call ‘liberal democracy’ is really a system in which competing factions of the political class buy the loyalty of sectors of the electorate by handing out economic largesse. That system depends on abundant fossil fuels and the industrial economy they make possible. Many of today’s political institutions will not survive the end of cheap energy, and the changeover to new political arrangements will likely involve violence. International affairs face similar realignments as nations whose power and influence depend on access to abundant, cheap energy fall from their present positions of strength. Today’s supposedly ‘backward’ nations may well find that their less energy-dependent economies turn into a source of strength rather than weakness in world affairs. If history is any guide, these power shifts will work themselves out on the battlefield.”

Greer, John Michael (2008): *The long descent. A user’s guide to the end of the industrial age*, New Society Publishers.

## 16. ¿Se repite la historia? (Parag Khanna, 2017)

“We live in what I call the New Gilded Age. Today, we are recreating the terrible income inequality and economic divides that dominated the late nineteenth century and created the violent responses

that included the Haymarket bombing and the assassination of President William McKinley. Once again, we have a society where our politicians engage in open corruption, where unregulated corporate capitalism leads to boom-and-bust economies that devastate working people, where the Supreme Court limits legislation and regulations meant to create a more equal society, and where unions are barely tolerated. Life has become more unpleasant and difficult for most Americans in our lifetimes. This has already had a profound impact on American politics.”

“What the 2016 election and its aftermath should reiterate to all of us is the deep connection between who controls the government and the success of the labor movement. As the historian Jefferson Cowie has written, there has only been one major period in American history when the power of workers coincided with the power of government to help unions—from the 1930s to the 1970s or early 1980s. Other than this ‘Great Exception,’ we have struggled against a corporate dominated government.”

“American history is a story of freedom and oppression, often at the same time. True freedom cannot come without economic emancipation. We came very far to gain that freedom through the struggles of workers in the two centuries before today. In the past four decades, we have given back much of our freedom. Only through our combined struggle to demand the fruits of our labor can we regain our lost freedoms and expand those freedoms into a better life for all Americans.”

*Loomis, Erik (2018): A history of America in ten strikes, The New Press.*

## 17. Dos perspectivas sobre la historia de la humanidad

“The theory of the noble savage revolves around the idea that primitive life was free of any aggression and cruelty, thus there was no reason for conflict. The supposedly non-violent nature of human beings and the peaceful natural world were said to complement each other ‘ecologically.’ (...) Two similar theories favor the notion that the first humans were peaceful.

The religious viewpoint sees human destiny as a gradual deterioration: at the outset, humans inhabited a bucolic setting beside God, yet made the mistake of attempting to defy their Creator. Humans were thus expelled from Paradise and condemned to a life of toil and strife. The scientific view is that Paleolithic life was relatively easy since nature presented so many possibilities and, at this time, there were fewer populations to share them. Humans were, therefore, able to profit from the situation by balancing the many resources at their disposal (...) The arrival of the Neolithic tolled the knell of this golden age as humans became slaves to work: there was a regression of sorts as servitude began in earnest –a gradual descent into Hell.

The other view of the history of humankind is linked to the notion of progress. This viewpoint claims that savage man in his wild and shabby state, barely able to survive, gradually began to leave behind his inferior status through sheer persistence; by working hard and applying himself, man finally took control of nature. Thus, his destiny is one of continual improvement. Man is seen to be in control of his own plight and depends upon himself alone.”

“What if humans never were the innocent lambs nor the violent brutes that certain caricatures have made them out to be? What if humans always were the same complex and emotional beings they are today, with a tendency attimes to react harshly or violently?”

Guilaine, Jean; Jean Zammit (2005): *The origins of war. Violence in prehistory*, Cambridge University Press.

## 18. Tres generalizaciones sobre la dinámica histórica (Peter Turchin y Sergey A. Nefedov, 2009)

- **Superpoblación**

“One generalization can be called the neo-Malthusian principle: during periods of sustained population growth, if the output of the agrarian economy does not keep pace with the population, a number of relative price trends will be observed. One trend is rising prices for basic foodstuffs, energy, and land. Another one is falling real wages for labor. These trends are simply a consequence of the law of supply and demand. Thus, as the supply of labor increases, and if the demand for it is limited (which it is in agrarian economies), the price of labor inevitably decreases.”

- **Sobreproducción de la élite**

“Another generalization, dealing with the elite dynamics, is also a consequence of the law of supply and demand. The principal kind of wealth in agrarian societies is land. The elite landowners profit from overpopulation in two ways. First, they are consumers of labor: they need peasants to work their land, servants to carry out domestic chores, and craftsmen and artisans for producing items for status consumption. Second, their property, land, produces food and other commodities, such as fuel and raw materials, the demand for which increases together with the growing population. Because the items they consume become cheaper while the items they produce increase in value, the elites greatly profit from overpopulation (...) In the end, elite numbers and appetites outgrow their ‘carrying capacity’ (based on the labor of commoners). Just as overpopulation results in large segments of commoner population becoming immiserated, elite overproduction similarly results in large segments of elites becoming impoverished (not in absolute terms, as with common populace, but relatively to the standards of consumption needed to maintain the elite status). This generalization thus may be called the principle of elite overproduction.”

- **Inestabilidad sociopolítica**

“A third possible generalization deals with the causes of sociopolitical instability. The demographic-structural theory proposes three principal causes of the onset of a disintegrative trend (that is, a lengthy period of heightened instability): overpopulation, elite overproduction, and a fiscal crisis of the state. (...) Overpopulation and fiscal crisis are important contributing factors, but the dominant role in internal warfare appears to be played by elite overproduction leading to inraelite competition, fragmentation, and conflict, and the rise of counterelites who mobilize popular masses in their struggle against the existing order.”

Turchin, Peter; Sergey A. Nefedov (2009): *Secular cycles*, Princeton University Press.

## 19. Por qué colapsan las sociedades complejas

“Scholars typically attribute collapse to one of four causes: political or military forces, economic decline, social upheaval, or environmental/natural disasters (...) Ancient China illustrates circumstances in which one political system collapsed, only to be replaced by another, usually dynastic, system, which resulted in a re-emergent state; the defeat of the Late Shang Dynasty by the Western Zhou is one example.”

“The collapse of the Khmer Empire is perhaps one of the best illustrations of economic and social factors contributing to the dissolution of a state (...) Roman history featured several phases of social unrest and political change without complete decline. In Republican Rome, growing inequality between patricians and plebeians in the 5th century bce, combined with instances of public abuse of poor men and women (especially women) by elites, led to internal dissent that verged on rebellion. Government reforms were required to set the state back on solid footing.”

“Though the extreme case of Easter Island’s purportedly human-caused overexploitation of resources may be dismissed as a misreading of the evidence, numerous examples (...) indicate how deeply human groups are embedded within local environments, and the profound effect environmental crises may have on culture groups at all levels of complexity. A strong case may be put forward for the role of environmental crisis in the decline of Classic Maya civilization (...) The collapse of Mycenaean, Hittite, and Levantine societies at the end of the Late Bronze Age was affected by the migration of groups coming from more inland areas of Europe under circumstances of apparent subsistence stress.”

Ross, Jennifer C.; Sharon R. Steadman (2017): *Ancient complex societies*, Routledge.

## 20. ¿Caerá la civilización actual como lo hicieron las precedentes?

“Modern civilization believes that it commands the historical process with technological power. Allied to capitalist markets that foster continual innovation, this power will allow it to overcome the challenges I identify and thereby escape the common fate of all previous civilizations. No longer bound by the past, or so we think, our future is infinitely bright. The late futurist Herman Kahn, for example, claimed that by the year 2200, ‘humans would everywhere be rich, numerous, and in control of the forces of nature.’

I argue to the contrary that industrial civilization will yield to the ‘same passions’ that have produced the ‘same results’ in all previous times. There is simply no escape from our all-too-human nature. In the end, mastering the historical process would require human beings to master themselves, something they are very far from achieving. (This is why democracy, considered by some to be an asset in the struggle against the forces that challenge industrial civilization, is in fact a liability.) Commanding history would also require them to overcome all of the natural limits that have defeated previous civilizations. As will be shown, this is unlikely. Hence our civilization, too, will decline and fall. In fact, the process of decline is already well advanced.

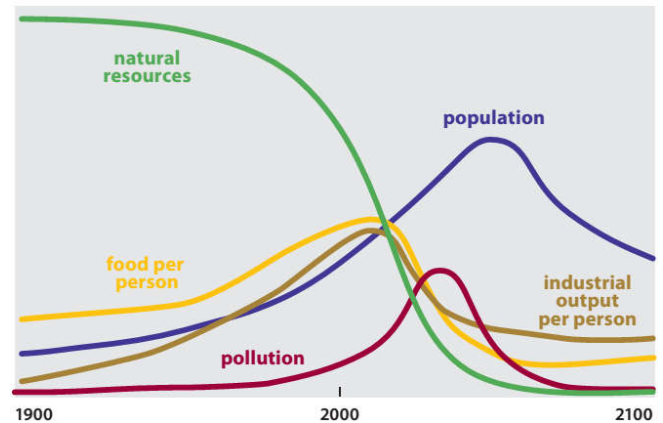
“The essential reason is contained in Gibbon’s terse verdict on the decline and fall of Rome: immoderate greatness (...) In essence, immoderate greatness exemplifies what the ancient Greeks

would have called hubris: ‘overbearing pride or presumption.’ Civilization is *Homo sapiens*’s bold attempt to rise above the natural state in which the species lived for almost all of its two hundred thousand years on Earth. Unfortunately, by its very nature, this effort to become greater encounters four implacable biophysical limits. It also sets in motion a seemingly inexorable moral and practical progression from original vigor and virtue to terminal lethargy and decadence.”

Ophuls, William (2012): *Immoderate greatness. Why civilizations fail*, CreateSpace.

## 21. Mundo lleno y mundo vacío

Las teorías y concepciones económicas dominantes se crearon en un ‘mundo vacío’: uno con una población reducida, recursos naturales ilimitados y un medio ambiente con capacidad suficiente para absorber desechos. Las economías en un mundo vacío no están sujetas a límites planetarios. Un ‘mundo lleno’ causa daños al medio ambiente y los desechos desempeñan un papel dominante. A la derecha, una proyección de la economía mundial bajo el supuesto de que todo sigue igual: la lógica de un mundo vacío aplicada a un mundo lleno.



## 22. ¿Una lección de la historia?

El paralelismo de ideas, procesos y desarrollos en diferentes civilizaciones del pasado sugiere que, en presencia de ciertas condiciones generales, las sociedades humanas tienden a crecer más grandes, más complejas y más exigentes ambientalmente.

## 23. El precio del colapsar y el de no colapsar

“Each time history repeats itself, the price goes up” (Ronald Wright, 2011). El progreso posibilita el crecimiento de las civilizaciones. Es plausible que se necesite más gente para dirigir una civilización más compleja y hacerla más duradera. Pero entonces, cuando fracasa, afecta a más personas (la caída de la primera civilización, Sumeria, afectó a cientos de miles; la de Roma, a millones; la nuestra, afectaría a miles de millones).

## 24. ¿Se acaba la ciencia?

¿No hay ya nuevos grandes descubrimientos científicos? ¿Se ha convergido ya lo máximo a la verdad? ¿La aparente fuerza y potencia de la ciencia actual no es un indicio de su inminente desaparición? (Hay ejemplos de sistemas que colapsan justo antes de alcanzar su plenitud.) Un signo del fin de la ciencia es que “most published research is false” (John P. A. Ioannidis, 2005, “Why most published research is false”, PLoS Medicine 2(8)): la investigación científica se ha convertido en una forma de recaudar dinero y conseguir prestigio; la búsqueda de la verdad es secundaria.

Horgan, John (2015): *The end of science. Facing the limits of knowledge in the twilight of the scientific age*, Basic Books.

## 25. Los cuatro futuros de Peter Frase

El mundo futuro puede acabar dominado por la escasez o la abundancia (reflejando los límites ecológicos) y también por la jerarquía o la igualdad (reflejando los límites políticos de una sociedad de clases). Igualdad + abundancia = **comunismo** ('de cada cual según su capacidad, a cada cual según su necesidad': el mundo de Star Trek). Jerarquía + abundancia = **rentismo** («las técnicas para producir abundancia están monopolizadas por una pequeña élite»). Igualdad + escasez = **socialismo** ('vivir dentro de sus posibilidades mientras se proporciona a todos la mejor vida posible'). Jerarquía + escasez = **exterminismo** ('comunismo para unos pocos', a la espera de una 'guerra genocida de los ricos contra los pobres': Elysium de Neill Blomkamp, 2013).

<i>Peter Frase's scenario</i>	ABUNDANCE	SCARCITY
EQUALITY	Communism	Socialism
HIERARCHY	Rentism	Exterminism

## 26. Escenarios para el año 2100 de Robert Costanza

La matriz de escenarios abarca dos dimensiones: visiones y políticas mundiales (optimismo tecnológico vs. escepticismo) y el estado real del mundo (los optimistas tienen razón o los escépticos la tienen). Optimismo tecnológico + optimismo positivo = **Star Trek** (los recursos son ilimitados, la tecnología puede resolver cualquier problema, la competencia económica es buena). Escepticismo tecnológico + optimismo positivo = **Gran Gobierno** (los recursos son ilimitados, pero los gobiernos regulan el desarrollo tecnológico para lograr el desarrollo social). Optimismo tecnológico + escépticos positivos = **Mad Max** (los recursos son limitados, pero se ha dado vía libre a la competencia y la expansión tecnológica, por lo que el mundo está gobernado por poderosas corporaciones). Escepticismo tecnológico + escépticos positivos = **Ecotopía** (con recursos limitados, los mercados y el consumismo se han disciplinado para lograr la sostenibilidad).

<i>David Costanza's scenario</i>	OPTIMISTS RIGHT	SKEPTICS RIGHT
TECHNOLOGICAL OPTIMISM	Star Trek	Mad Max
TECHNOLOGICAL SKEPTICISM	Big Government	Ecotopia

## 27. Cinco tendencias en los 50 próximos años (Watson, 2012)

- Envejecimiento
- Poder (económico, político, militar) desplazándose de Occidente a Oriente
- Mayor conectividad global
- Convergencia de tecnologías (GRIN = Genética + Robótica + Internet + Nanotecnología)
- El medio ambiente (condiciones planetarias, agotamiento de recursos)

## 28. Cinco transformaciones en los 50 próximos años (Watson, 2012)

- Globalización: todo se hipervinculará.

- Localización: contracorriente de la globalización, ya que no a todos les gustará la globalización ni la homogeneización.
- Polarización: las clases medias tenderán a desaparecer, ya sea subiendo o bajando en la escala de ingresos (hacia una nueva élite gerencial o hacia una clase trabajadora esclavizada o hacia los desempleados).
- Ansiedad, resultante de una mayor incertidumbre y vulnerabilidad.
- Búsqueda de sentido: ¿se convertirá la ciencia en la nueva religión o se reforzarán las religiones tradicionales?

Watson, Richard (2012): *The Future: 50 Ideas You Really Need to Know*.

## 29. El riesgo moral de buscar/construir 'planetas B'

"Let's say we cross the 50 million miles to Mars—then what? To survive, you'd need to go underground. But to what end? *You can go underground on Earth if you want*. And the multibillion-dollar attempts at building a "biosphere" here on our home planet (where building supplies arrived on a truck) ended in abject failure. Kim Stanley Robinson wrote the greatest novels about the colonization of Mars, a trilogy that dates back a quarter century. Now, says their author, he thinks the whole thing would be a mistake. 'It creates a moral hazard,' he says. People imagine that if we mess up the Earth, we can 'always go to Mars or the stars. It's pernicious.' In fact, it's worse than that. It distracts us from the almost unbearable beauty of the planet we already inhabit."

McKibben, Bill (2019): *Falter. Has the human game begun to play itself out?*, Henry Holt and Company.