LEARNING MACHINES
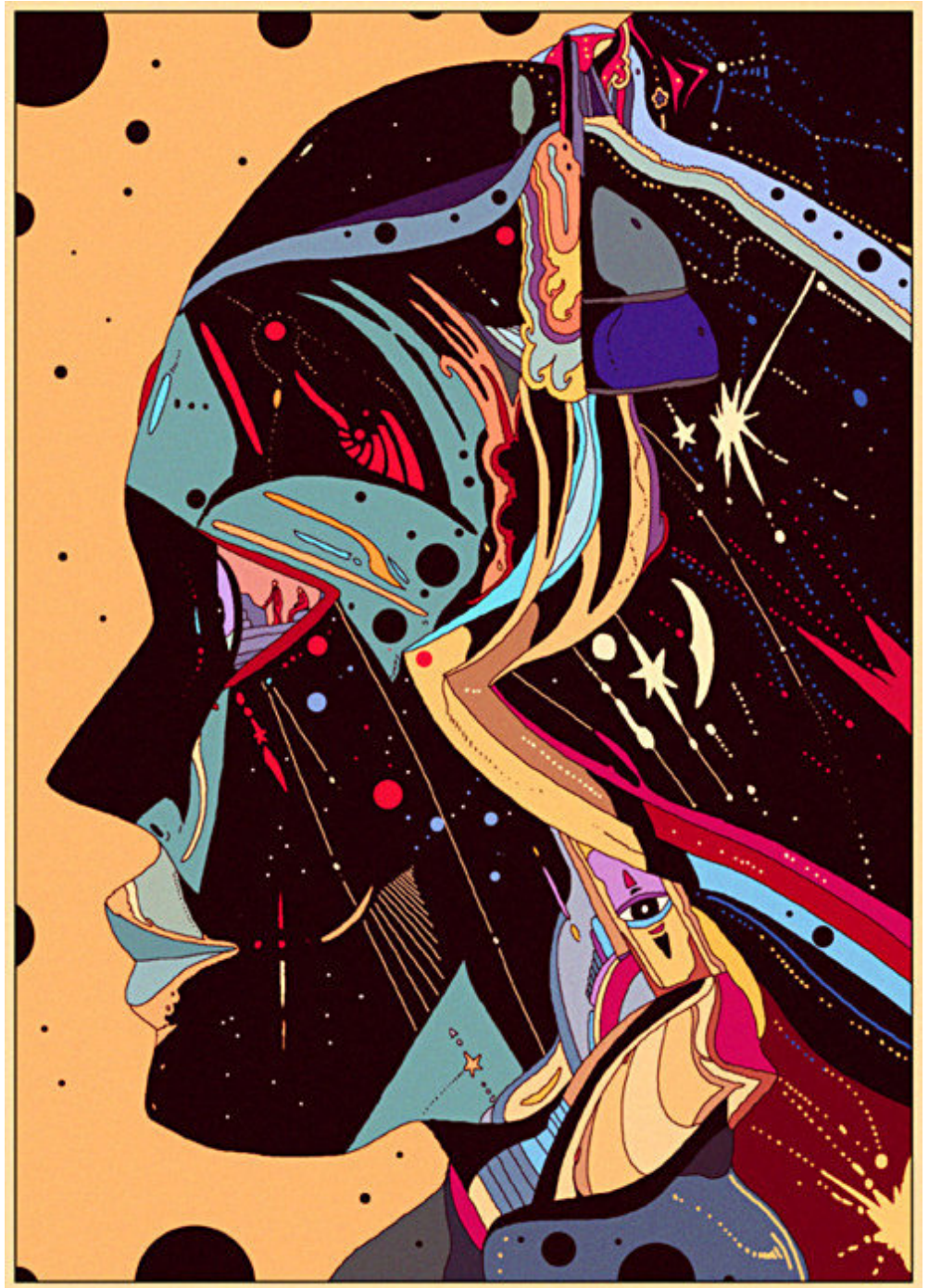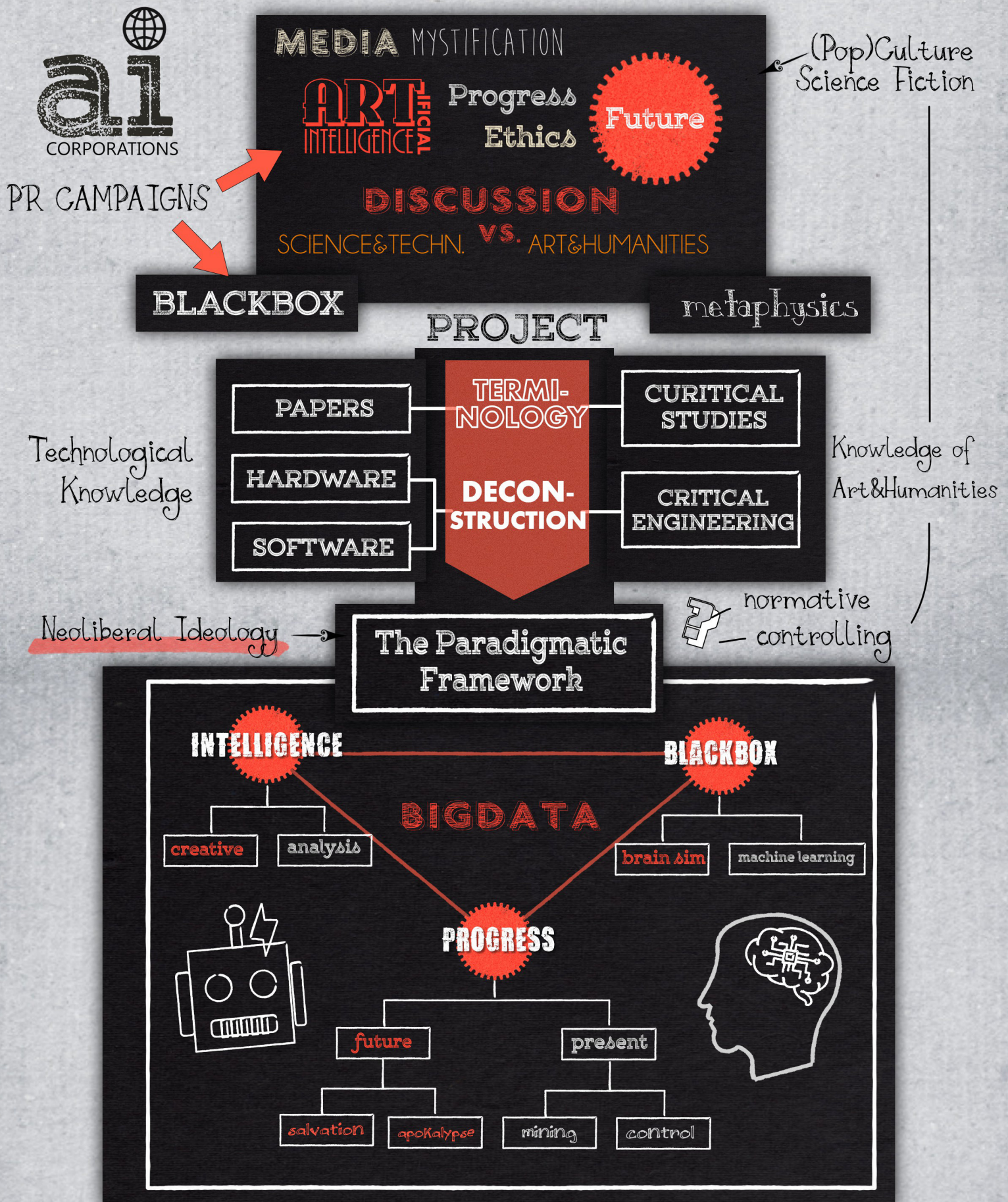

Machine Learning in
Theory&Practice

Dr. Alexander König

Version 1 - 2019

The Artificial Intelligence Paradigm

One of the major argument against Machine Learning is that these systems are promoting an outdated behaviorist view which leads to the imposition of metrics on human endeavors [Ito – 2018, Katz - 2017] . The idea of rebranding terms like "intelligence" is an essential strategy behind the aforementioned PR campaigns. This mechanism built an "Algorithmic Ideology" [Mager - 2014], in this special case a normative framework, that limits access to knowledge, moves the attention away from recent problems to a speculative future, and stages the development of AI as a competition between man and machine. The paradigms follow neoliberal ideas and promote the connection between the "Theory of Games and Economic Behavior" [Neuman – 1944] and a general business-ideology. In this reductionist worldview everything can be seen as a "game" and being intelligent means optimizing the parameters to be able to win [Joi Ito – 2018]. "Artificial Intelligence" can therefore be seen as a trope that inherits the domains of biology (function and norm) and economy (conflict and rule) according to Foucault [Foucault – 1966] and installs a new form of governmentality, beyond algorithms.

The public discourse about AI follows opinions like that stated in "Superintelligence" [Bostrom 2014]: "If machine brains one day come to surpass human brains in general intelligence, the fate of our species would depend on the actions of powerful AI." The idea that AI is of the utmost importance is fueled by large PR campaigns of Google (Alpha Go, 2015), Microsoft (Next Rembrandt, 2016) and IBM (Jeopardy 2011) [Elish, Booyd - 2017]. Most discussions and critical approaches focus on a near, or distant future, without criticizing the idea of "progress" itself. The focus of the companies on games and art has shaped research agendas and prioritized certain kinds of intelligence over others [Ensmenger, -2012]. The quality of the data is a leading factor and limitations mean that cultural biases and unsound logics get reinforced, scaled and distorted [Elish, Booyd - 2017]. Instead of establishing a careful consideration of the implications of long term deployment, the spectacle is clearly prioritized [Crawford - 2016].

The apparently undying fact that this process is immanent and can only lead to messianic or apocalyptic outcomes is discussed in depth by Adorno [Fortschritt – Adorno – 1969]. Stylizing Technology as such an overpowering force may lead to the problem of an emergent general feeling of powerlessness. In the "Global Risk Report" of the WEF from 2016 a whole chapter is focused on the risks of AI. Their survey cites AI and Robotics as the number one risk factor in Technology. Further, following Horkheimer and Adorno's critique in "Dialectics of Enlightenment" this fear might fuel regressive cultural-counteractions that try to reestablish ideas of

"nation, tradition, family and nature" against such threads [Horkheimer, Adorno – 1947].

"The Economist" dedicated a whole issue to the topic "Big Data" and stated that "the data economy demands a new approach to antitrust rules" [The Economist - May 6th 2017]. "Virtual Competition" questions the promises of an "algorithm-driven economy" and state that companies like Google, Facebook and Amazon, replace the idea of Adam Smith's "Invisible Hand" with the idea of a "Digital Hand" that is regulating the market by AI-Systems [Ezrachi, Stucke - 2016]. Systems that get better the more data they obtain from users, are pointing towards a paradigm shift in computing. [Halevy, Norvig, Pereira - 2009]. In accumulating more resources (User Data), the Systems get better and can easily outperform competitors, even if they've hired better talent. Such an alteration can lead to a monopoly and distortion of the markets [Ross - 2017]. To counter these effects some experts propose to give data some sort of "half-life", by arguing that spending these data-resources would solve the described economical struggle [The Economist - May 6th 2017]. A "right to privacy" therefore makes more and more economical sense and is getting major support from WEF [WEF Report 2011]. Other studies [Laudon - 1996] try to figure out national market models, based on a complex "banking" system. These ideas are culminating in "The Economics of Privacy" [Acquisti - 2010] and " From the Economics of Privacy to the Economics of Big Data" [Acquisti – 2014]. Though all these works show how economics, Big Data and AI are entangled in a quasi monopoly, based on exploitation of user-data, the authors never question the economic system itself. Thus, though AI and its relation to databases, data-infrastructures and their socioethical production, reflect real world rationalities to a certain extent, they also reproduce and reinforce them upon the world. [Kitchin – 2014]
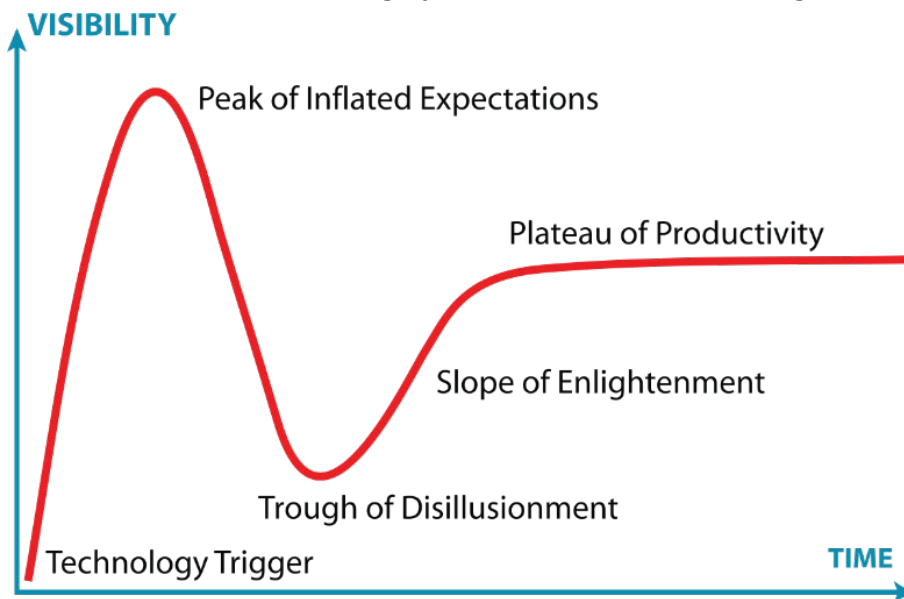
The breakthrough of actual AI, and still one of its most basic tasks, is image classification. "ImageNet Classification with Deep Convolutional Neural Networks" by Alex Krizhevsky, Ilya Sutskever, and Geoffrey Hinton from 2012, started the redefinition of AI as machine learning. The paper clearly shows the statistical approach of the classification, giving several declarations with probabilities. The difference between such classifications and an intelligent subject becomes vivid when all the technical content is visualized, not just a result. The classification problems and resulting bias is widely discussed [Skeem, Lowenkamp – 2016]. And some authors go so far to state that AI inherits an "implicit logic of surveillance capitalism and the global architecture of computer mediation" [Zuboff – 2015/2019] . This problems come imminent through the widespread use in commercial applications through APIS. Face++, according to MIT Techology Review one of the smartest companies in 2017, offers a web service where customers can upload pictures via an API to the company's servers. The AI classifies Age, Gender, Smiling (with percentage), Head Pose, Emotion, Ethnicity [https://www.faceplusplus.com]. This technology is not only used by huge companies, but available for commercial use on a large scale.

Surveillance Capitalism'

by Shoshana Zuboff

1. A new economic order that claims human experience as free raw material for hidden commercial practices of extraction, prediction and sales;

2. A parasitic economic logic in which the production of goods and services is subordinated to a new global architecture of behavioural modification;

3. A rogue mutation of capitalism marked by concentrations of wealth, knowledge and power unprecedented in human history;

4. The foundational framework of a surveillance economy;

5. As significant a threat to human nature in the twenty-first century as industrial capitalism was to the natural world in the nineteenth and twentieth;

6. The origin of a new instrumentarian power that asserts dominance over society and presents startling challenges to market democracy;

7. A movement that aims to impose a new collective order based on total certainty;

8. An expropriation of critical human rights that is best understood as a coup from above: an overthrow of the people's sovereignty.

Another very important fact is, that machine-learning changed the paradigms of coding itself. Through it code got reduced to data. The formally common "model-based, probability-based and rule-based recognition technologies" were replaced by deep learning [Welker – 2018]. That means the proprietary code, written by experts with a deep understanding of the subject, can be outperformed by a deep learning system, scripted with much less effort and trained with enough data, so technological progress does not lead necessarily to a higher technological knowledge on all levels. Different Machine Learning systems, trained with enough data"
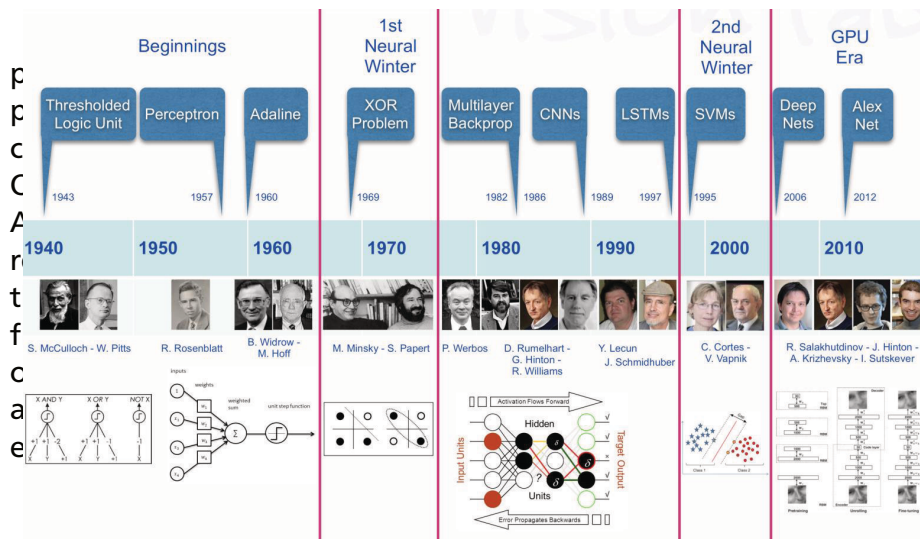
VISIBILITY

Peak of Inflated Expectations

Plateau of Productivity

Slope of Enlightenment

Trough of Disillusionment

Technology Trigger

TIME

are able to yield the same results as far more complex algorithms. The idea that data matters more than algorithm development results in an "Unreasonable Effectiveness of Data" [Norvig – 2009]. Microsoft researchers Michele Banko and Eric Brill further stated: "these results suggest that we may want to reconsider the tradeoff between spending time and money on algorithm development versus spending on corpus development" [Banko, Brill – 2001]

It seems that the gap and the hierarchical levels of power within the economic systems is growing and leading to an increasing danger through lack of understanding. Inside the "Black Box", critique and deconstruction | The true function and problems of AI are most vivid in image recognition: the AI can be easily fooled and will classify totally abstract images with high confidence High Confidence Predictions for Unrecognizable Images [Nguyen, Yosinski, Clune – 2015]. These images are totally unrecognizable to humans, but are ones that state-of-the-art AI systems believe with 99.6% certainty to be a familiar object.

The myth of the linear progress in development of technology

When technologists are asked about the limitation of a current technical development, thw answer is often: "this is not yet possible, but since technology is constantly evolving, it is only a matter of time." On the other hand, new technologies are often subject to "hype", which the actual products cannot do justice to and which is then followed by disappointment.

Beginnings

1st Neural Winter

2nd Neural Winter

GPU Era

Thresholded Logic Unit	Perceptron	Adaline	XOR Problem	Multilayer Backprop	CNNs	LSTMs	SVMs	Deep Nets	Alex Net
1943	1957	1960	1969	1982	1986	1989	1997	1995	2006	2012

1940 **1950** **1960** **1970** **1980** **1990** **2000** **2010**

S. McCulloch - W. Pitts   R. Rosenblatt   B. Widrow - M. Hoff   M. Minsky - S. Papert   P. Werbos   D. Rumelhart - G. Hinton - R. Williams   Y. Lecun J. Schmidhuber   C. Cortes - V. Vapnik   R. Salakhutdinov - J. Hinton - A. Krizhevsky - I. Sutskever

As Paul Feyerabend explained extensively in his works, scientific and technical development is not linear, but subject to constant changes of direction, the so-called paradigm shifts. These changes can also be observed within AI research. And it is probably no coincidence that this field of research made such financial advances when the idea came up to use user data for advertising purposes.

Paul Karl Feyerabend (1.13, 1924 – 2.11, 1994) was an Austrian-born philosopher of science best known for his work as a professor of philosophy at the University of California, Berkeley, where he worked for three decades (1958–1989). Feyerabend became famous for his purportedly anarchistic view of science and his rejection of the existence of universal methodological rules.He was an influential figure in the sociology of scientific knowledge.

GOOGLE AS A FORTUNE TELLER:

The Secrets of Surveillance Capitalism

SHOSHANA ZUBOFF

Google surpassed Apple as the world's most highly valued company in January for the first time since 2010. (Back then each company was worth less than 200 billion. Now each is valued at well over 500 billion.) While Google's new lead lasted only a few days, the company's success has implications for everyone who lives within the reach of the Internet. Why? Because Google is ground zero for a wholly new subspecies of capitalism in which profits derive from the unilateral surveillance and modification of human behavior. This is a new surveillance capitalism that is unimaginable outside the inscrutable high velocity circuits of Google's digital universe, whose signature feature is the Internet and its successors. While the world is riveted by the showdown between Apple and the FBI, the real truth is that the surveillance capabilities being developed by surveillance capitalists are the envy of every state security agency. What are the secrets of this new capitalism, how do they produce such staggering wealth, and how can we protect ourselves from its invasive power?

"Most Americans realize that there are two groups of people who are monitored regularly as they move about the country. The first group is monitored involuntarily by a court order requiring that a tracking device be attached to their ankle. The second group includes everyone else…"

Some will think that this statement is certainly true. Others will worry that it could become true. Perhaps some think it's ridiculous. It's not a quote from a dystopian novel, a Silicon Valley executive, or even an NSA official. These are the words of an auto insurance industry consultant intended as a defense of "automotive telematics" and the astonishingly intrusive surveillance capabilities of the allegedly benign systems that are already in use or under development. It's an industry that has been notoriously exploitative toward customers and has had obvious cause to be anxious about the implications of self-driving cars for its business model. Now, data about where we are, where we're going, how we're feeling, what we're saying, the details of our driving, and the conditions of our vehicle are turning into beacons of revenue that illuminate a new commercial prospect. According to the industry literature, these data can be used for dynamic real-time driver behavior modification triggering punishments (real-time rate hikes, financial penalties, curfews, engine lock-downs) or rewards (rate discounts, coupons, gold stars to redeem for future benefits).

Bloomberg Business Week notes that these automotive systems will give insurers a chance to boost revenue by selling customer driving data in the same way that Google profits by collecting in-

formation on those who use its search engine. The CEO of Allstate Insurance wants to be like Google. He says, "There are lots of people who are monetizing data today. You get on Google, and it seems like it's free. It's not free. You're giving them information; they sell your information. Could we, should we, sell this information we get from people driving around to various people and capture some additional profit source…? It's a long-term game."

Who are these "various people" and what is this "long-term game"? The game is no longer about sending you a mail order catalogue or even about targeting online advertising. The game is selling access to the real-time flow of your daily life –your reality—in order to directly influence and modify your behavior for profit. This is the gateway to a new universe of monetization opportunities: restaurants who want to be your destination. Service vendors who want to fix your brake pads. Shops who will lure you like the fabled Sirens. The "various people" are anyone, and everyone who wants a piece of your behavior for profit. Small wonder, then, that Google recently <u>announced</u> that its maps will not only provide the route you search but will also suggest a destination.

The goal: to change people's actual behavior at scale

This is just one peephole, in one corner, of one industry, and the peepholes are multiplying like cockroaches. Among the many interviews I've conducted over the past three years, the Chief Data Scientist of a much-admired Silicon Valley company that develops applications to improve students' learning told me, "The goal of everything we do is to change people's actual behavior at scale. When people use our app, we can capture their behaviors, identify good and bad behaviors, and develop ways to reward the good and punish the bad. We can test how actionable our cues are for them and how profitable for us".

The very idea of a functional, effective, affordable product as a sufficient basis for economic exchange is dying. The sports apparel company Under Armour is reinventing its products as wearable technologies. The CEO wants to be like Google. He says, "If it all sounds eerily like those ads that, because of your browsing history, follow you around the Internet, that's exactly the point--except Under Armour is tracking real behavior and the data is more specific… making people better athletes makes them need more of our gear." The examples of this new logic are endless, from <u>smart vodka bottles</u> to <u>Internet-enabled rectal thermometers</u> and quite literally everything in between. A <u>Goldman Sachs</u> <u>report</u> calls it a "gold rush," a race to "vast amounts of data."

The assault on behavioral data

We've entered virgin territory here. The assault on behavioral data is so sweeping that it can no longer be circumscribed by the concept of privacy and its contests. This is a different kind of challenge now, one that threatens the existential and political canon of the modern liberal order defined by principles of self-determina-

tion that have been centuries, even millennia, in the making. I am thinking of matters that include, but are not limited to, the sanctity of the individual and the ideals of social equality; the development of identity, autonomy, and moral reasoning; the integrity of contract, the freedom that accrues to the making and fulfilling of promises; norms and rules of collective agreement; the functions of market democracy; the political integrity of societies; and the future of democratic sovereignty. In the fullness of time, we will look back on the establishment in Europe of the "Right to be Forgotten" and the EU's more recent invalidation of the Safe Harbor doctrine as early milestones in a gradual reckoning with the true dimensions of this challenge.

There was a time when we laid responsibility for the assault on behavioral data at the door of the state and its security agencies. Later, we also blamed the cunning practices of a handful of banks, data brokers, and Internet companies. Some attribute the assault to an inevitable "age of big data," as if it were possible to conceive of data born pure and blameless, data suspended in some celestial place where facts sublimate into truth.

Capitalism has been hijacked by surveillance

I've come to a different conclusion: The assault we face is driven in large measure by the exceptional appetites of a wholly new genus of capitalism, a systemic coherent new logic of accumulation that I call surveillance capitalism. Capitalism has been hijacked by a lucrative surveillance project that subverts the "normal" evolutionary mechanisms associated with its historical success and corrupts the unity of supply and demand that has for centuries, however imperfectly, tethered capitalism to the genuine needs of its populations and societies, thus enabling the fruitful expansion of market democracy.

Surveillance capitalism is a novel economic mutation bred from the clandestine coupling of the vast powers of the digital with the radical indifference and intrinsic narcissism of the financial capitalism and its neoliberal vision that have dominated commerce for at least three decades, especially in the Anglo economies. It is an unprecedented market form that roots and flourishes in lawless space. It was first discovered and consolidated at Google, then adopted by Facebook, and quickly diffused across the Internet. Cyberspace was its birthplace because, as Google/Alphabet Chairperson Eric Schmidt and his coauthor, Jared Cohen, celebrate on the very first page of their book about the digital age, "the online world is not truly bound by terrestrial laws…it's the world's largest ungoverned space."

While surveillance capitalism taps the invasive powers of the Internet as the source of capital formation and wealth creation, it is now, as I have suggested, poised to transform commercial practice across the real world too. An analogy is the rapid spread of mass production and administration throughout the industrialized world in the early twentieth century, but with one major caveat.

Mass production was interdependent with its populations who were its consumers and employees. In contrast, surveillance capitalism preys on dependent populations who are neither its consumers nor its employees and are largely ignorant of its procedures.

Internet access as a fundamental human right

We once fled to the Internet as solace and solution, our needs for effective life thwarted by the distant and increasingly ruthless operations of late twentieth century capitalism. In less than two decades after the Mosaic web browser was released to the public enabling easy access to the World Wide Web, a 2010 BBC poll found that 79% of people in 26 countries considered Internet access to be a fundamental human right. This is the Scylla and Charybdis of our plight. It is nearly impossible to imagine effective social participation —from employment, to education, to healthcare— without Internet access and know-how, even as these once flourishing networked spaces fall to a new and even more exploitative capitalist regime. It's happened quickly and without our understanding or agreement. This is because the regime's most poignant harms, now and later, have been difficult to grasp or theorize, blurred by extreme velocity and camouflaged by expensive and illegible machine operations, secretive corporate practices, masterful rhetorical misdirection, and purposeful cultural misappropriation.

Taming this new force depends upon careful naming. This symbiosis of naming and taming is vividly illustrated in the recent history of HIV research, and I offer it as analogy. For three decades scientists aimed to create a vaccine that followed the logic of earlier cures, training the immune system to produce neutralizing antibodies, but mounting data revealed unanticipated behaviors of the HIV virus that defy the patterns of other infectious diseases.

HIV research as analogy

The tide began to turn at the International AIDS Conference in 2012, when new strategies were presented that rely on a close understanding of the biology of rare HIV carriers whose blood produces natural antibodies. Research began to shift toward methods that reproduce this self-vaccinating response. A leading researcher announced, "We know the face of the enemy now, and so we have some real clues about how to approach the problem."

The point for us is that every successful vaccine begins with a close understanding of the enemy disease. We tend to rely on mental models, vocabularies, and tools distilled from past catastrophes. I am thinking of the twentieth century's totalitarian nightmares or the monopolistic predations of Gilded Age capitalism. But the vaccines we've developed to fight those earlier threats are not sufficient or even appropriate for the novel challenges we face. It's like we're hurling snowballs at a smooth marble wall only to watch

them slide down its façade, leaving nothing but a wet smear: a fine paid here, an operational detour there.

An evolutionary dead-end

I want to say plainly that surveillance capitalism is not the only current modality of information capitalism, nor is it the only possible model for the future. Its fast track to capital accumulation and rapid institutionalization, however, has made it the default model of information capitalism. The questions I pose are these: Will surveillance capitalism become the dominant logic of accumulation in our time or, will it be an evolutionary dead-end — a toothed bird in capitalism's longer journey? What will an effective vaccine entail?

A cure depends upon many individual, social, and legal adaptations, but I am convinced that fighting the "enemy disease" cannot begin without a fresh grasp of the novel mechanisms that account for surveillance capitalism's successful transformation of investment into capital. This has been one focus of my work in a new book, Master or Slave: The Fight for the Soul of Our Information Civilization, which will be published early next year. In the short space of this essay, I'd like to share some of my thoughts on this problem.

Fortune telling and selling

New economic logics and their commercial models are discovered by people in a time and place and then perfected through trial and error. Ford discovered and systematized mass production. General Motors institutionalized mass production as a new phase of capitalist development with the discovery and perfection of large-scale administration and professional management. In our time, Google is to surveillance capitalism what Ford and General Motors were to mass-production and managerial capitalism a century ago: discoverer, inventor, pioneer, role model, lead practitioner, and diffusion hub.

Specifically, Google is the mothership and ideal type of a new economic logic based on fortune telling and selling, an ancient and eternally lucrative craft that has exploited the human confrontation with uncertainty from the beginning of the human story. Paradoxically, the certainty of uncertainty is both an enduring source of anxiety and one of our most fruitful facts. It produced the universal need for social trust and cohesion, systems of social organization, familial bonding, and legitimate authority, the contract as formal recognition of reciprocal rights and obligations, and the theory and practice of what we call "free will." When we eliminate uncertainty, we forfeit the human replenishment that attaches to the challenge of asserting predictability in the face of an always-unknown future in favor of the blankness of perpetual compliance with someone else's plan.

Only incidentally related to advertising

Most people credit Google's success to its advertising model. But the discoveries that led to Google's rapid rise in revenue and market capitalization are only incidentally related to advertising. Google's success derives from its ability to predict the future – specifically the future of behavior. Here is what I mean:

From the start, Google had collected data on users' search-related behavior as a byproduct of query activity. Back then, these data logs were treated as waste, not even safely or methodically stored. Eventually, the young company came to understand that these logs could be used to teach and continuously improve its search engine.

The problem was this: Serving users with amazing search results "used up" all the value that users created when they inadvertently provided behavioral data. It's a complete and self-contained process in which users are ends-in-themselves. All the value that users create is reinvested in the user experience in the form of improved search. In this cycle, there was nothing left over for Google to turn into capital. As long as the effectiveness of the search engine needed users' behavioral data about as much as users needed search, charging a fee for service was too risky. Google was cool, but it wasn't yet capitalism — just one of many Internet startups that boasted "eyeballs" but no revenue.

Shift in the use of behavioral data

The year 2001 brought the dot.com bust and mounting investor pressures at Google. Back then advertisers selected the search term pages for their displays. Google decided to try and boost ad revenue by applying its already substantial analytical capabilities to the challenge of increasing an ad's relevance to users — and thus its value to advertisers. Operationally this meant that Google would finally repurpose its growing cache of behavioral data. Now the data would also be used to match ads with keywords, exploiting subtleties that only its access to behavioral data, combined with its analytical capabilities, could reveal.

It's now clear that this shift in the use of behavioral data was an historic turning point. Behavioral data that were once discarded or ignored were rediscovered as what I call behavioral surplus. Google's dramatic success in "matching" ads to pages revealed the transformational value of this behavioral surplus as a means of generating revenue and ultimately turning investment into capital. Behavioral surplus was the game-changing zero-cost asset that could be diverted from service improvement toward a genuine market exchange. Key to this formula, however, is the fact that this new market exchange was not an exchange with users but rather with other companies who understood how to make money from bets on users' future behavior. In this new context, users were no longer an end-in-themselves. Instead they became a means to profits in a new kind of marketplace in which users are neither buyers nor sellers nor products. Users are the source of free raw material that feeds a new kind of manufacturing process.

While these facts are known, their significance has not been fully appreciated or adequately theorized. What just happened was the discovery of a surprisingly profitable commercial equation — a series of lawful relationships that were gradually institutionalized in the sui generis economic logic of surveillance capitalism. It's like a newly sighted planet with its own physics of time and space, its sixty-seven hour days, emerald sky, inverted mountain ranges, and dry water.

A parasitic form of profit

The equation: First, the push for more users and more channels, services, devices, places, and spaces is imperative for access to an ever-expanding range of behavioral surplus. Users are the human nature-al resource that provides this free raw material. Second, the application of machine learning, artificial intelligence, and data science for continuous algorithmic improvement constitutes an immensely expensive, sophisticated, and exclusive twenty-first century "means of production." Third, the new manufacturing process converts behavioral surplus into prediction products designed to predict behavior now and soon. Fourth, these prediction products are sold into a new kind of meta-market that trades exclusively in future behavior. The better (more predictive) the product, the lower the risks for buyers, and the greater the volume of sales. Surveillance capitalism's profits derive primarily, if not entirely, from such markets for future behavior.

While advertisers have been the dominant buyers in the early history of this new kind of marketplace, there is no substantive reason why such markets should be limited to this group. The already visible trend is that any actor with an interest in monetizing probabilistic information about our behavior and/or influencing future behavior can pay to play in a marketplace where the behavioral fortunes of individuals, groups, bodies, and things are told and sold. This is how in our own lifetimes we observe capitalism shifting under our gaze: once profits from products and services, then profits from speculation, and now profits from surveillance. This latest mutation may help explain why the explosion of the digital has failed, so far, to decisively impact economic growth, as so many of its capabilities are diverted into a fundamentally parasitic form of profit.

Unoriginal Sin

The significance of behavioral surplus was quickly camouflaged, both at Google and eventually throughout the Internet industry, with labels like "digital exhaust," "digital breadcrumbs," and so on. These euphemisms for behavioral surplus operate as ideological filters, in exactly the same way that the earliest maps of the North American continent labeled whole regions with terms like "heathens," "infidels," "idolaters," "primitives," "vassals," or "rebels." On the strength of those labels, native peoples, their places and claims, were erased from the invaders' moral and legal equations, legiti-

mating their acts of taking and breaking in the name of Church and Monarchy.

We are the native peoples now whose tacit claims to self-determination have vanished from the maps of our own behavior. They are erased in an astonishing and audacious act of dispossession by surveillance that claims its right to ignore every boundary in its thirst for knowledge of and influence over the most detailed nuances of our behavior. For those who wondered about the logical completion of the global processes of commodification, the answer is that they complete themselves in the dispossession of our intimate quotidian reality, now reborn as behavior to be monitored and modified, bought and sold.

The process that began in cyberspace mirrors the nineteenth century capitalist expansions that preceded the age of imperialism. Back then, as Hannah Arendt described it in The Origins of Totalitarianism, "the so-called laws of capitalism were actually allowed to create realities" as they traveled to less developed regions where law did not follow. "The secret of the new happy fulfillment," she wrote, "was precisely that economic laws no longer stood in the way of the greed of the owning classes." There, "money could finally beget money," without having to go "the long way of investment in production…"

"The original sin of simple robbery"

For Arendt, these foreign adventures of capital clarified an essential mechanism of capitalism. Marx had developed the idea of "primitive accumulation" as a big-bang theory — Arendt called it "the original sin of simple robbery" — in which the taking of lands and natural resources was the foundational event that enabled capital accumulation and the rise of the market system. The capitalist expansions of the 1860s and 1870s demonstrated, Arendt wrote, that this sort of original sin had to be repeated over and over, "lest the motor of capital accumulation suddenly die down."

In his book The New Imperialism, geographer and social theorist David Harvey built on this insight with his notion of "accumulation by dispossession." "What accumulation by dispossession does," he writes, "is to release a set of assets…at very low (and in some instances zero) cost. Overaccumulated capital can seize hold of such assets and immediately turn them to profitable use…It can also reflect attempts by determined entrepreneurs…to 'join the system' and seek the benefits of capital accumulation."

Breakthrough into "the system"

The process by which behavioral surplus led to the discovery of surveillance capitalism exemplifies this pattern. It is the foundational act of dispossession for a new logic of capitalism built on profits from surveillance that paved the way for Google to become a capitalist enterprise. Indeed, in 2002, Google's first profitable

year, founder Sergey Brin relished his breakthrough into "the system", as he told Levy,

Honestly, when we were still in the dot-com boom days, I felt like a schmuck. I had an Internet start-   up — so did everybody else. It was unprofitable, like everybody else's, and how hard is that? But when we became profitable, I felt like we had built a real business."

Brin was a capitalist all right, but it was a mutation of capitalism unlike anything the world had seen.

Once we understand this equation, it becomes clear that demanding privacy from surveillance capitalists or lobbying for an end to commercial surveillance on the Internet is like asking Henry Ford to make each Model T by hand. It's like asking a giraffe to shorten its neck or a cow to give up chewing. Such demands are existential threats that violate the basic mechanisms of the entity's survival. How can we expect companies whose economic existence depends upon behavioral surplus to cease capturing behavioral data voluntarily?   It's like asking for suicide.

More behavioral surplus for Google

The imperatives of surveillance capitalism mean that there must always be more behavioral surplus for Google and others to turn into surveillance assets, master as prediction, sell into exclusive markets for future behavior, and transform into capital. At Google and its new holding company called Alphabet, for example, every operation and investment aims to increasing the harvest of behavioral surplus from people, bodies, things, processes, and places in both the virtual and the real world.   This is how a sixty-seven hour day dawns and darkens in an emerald sky. Nothing short of a social revolt that revokes collective agreement to the practices associated with the dispossession of behavior will alter surveillance capitalism's claim to manifest data destiny.

What is the new vaccine? We need to reimagine how to intervene in the specific mechanisms that produce surveillance profits and in so doing reassert the primacy of the liberal order in the twenty-first century capitalist project. In undertaking this challenge we must be mindful that contesting Google, or any other surveillance capitalist, on the grounds of monopoly is a 20th century solution to a 20th century problem that, while still vitally important, does not necessarily disrupt surveillance capitalism's commercial equation. We need new interventions that interrupt, outlaw, or regulate 1) the initial capture of behavioral surplus, 2) the use of behavioral surplus as free raw material, 3) excessive and exclusive concentrations of the new means of production, 4) the manufacture of prediction products, 5) the sale of prediction products, 6) the use of prediction products for third-order operations of modification, influence, and control, and 5) the monetization of the results of these operations. This is necessary for society, for people, for the future, and it is also necessary to restore the healthy evolution of capitalism itself.

A coup from above

In the conventional narrative of the privacy threat, institutional secrecy has grown, and individual privacy rights have been eroded. But that framing is misleading, because privacy and secrecy are not opposites but rather moments in a sequence. Secrecy is an effect; privacy is the cause. Exercising one's right to privacy produces choice, and one can choose to keep something secret or to share it. Privacy rights thus confer decision rights, but these decision rights are merely the lid on the Pandora's Box of the liberal order. Inside the box, political and economic sovereignty meet and mingle with even deeper and subtler causes: the idea of the individual, the emergence of the self, the felt experience of free will.

Surveillance capitalism does not erode these decision rights — along with their causes and their effects — but rather it redistributes them. Instead of many people having some rights, these rights have been concentrated within the surveillance regime, opening up an entirely new dimension of social inequality. The full implications of this development have preoccupied me for many years now, and with each day my sense of danger intensifies. The space of this essay does not allow me to follow these facts to their conclusions, but I offer this thought in summary.

Surveillance capitalism reaches beyond the conventional institutional terrain of the private firm. It accumulates not only surveillance assets and capital, but also rights. This unilateral redistribution of rights sustains a privately administered compliance regime of rewards and punishments that is largely free from detection or sanction. It operates without meaningful mechanisms of consent either in the traditional form of "exit, voice, or loyalty" associated with markets or in the form of democratic oversight expressed in law and regulation.

Profoundly anti-democratic power

In result, surveillance capitalism conjures a profoundly anti-democratic power that qualifies as a coup from above: not a coup d'état, but rather a coup des gens, an overthrow of the people's sovereignty. It challenges principles and practices of self-determination —in psychic life and social relations, politics and governance — for which humanity has suffered long and sacrificed much. For this reason alone, such principles should not be forfeit to the unilateral pursuit of a disfigured capitalism. Worse still would be their forfeit to our own ignorance, learned helplessness, inattention, inconvenience, habituation, or drift. This, I believe, is the ground on which our contests for the future will be fought.

Hannah Arendt once observed that indignation is the natural human response to that which degrades human dignity. Referring to her work on the origins of totalitarianism she wrote, "If I describe these conditions without permitting my indignation to interfere, then I have lifted this particular phenomenon out of its context in

human society and have thereby robbed it of part of its nature, deprived it of one of its important inherent qualities."

So it is for me and perhaps for you: The bare facts of surveillance capitalism necessarily arouse my indignation because they demean human dignity. The future of this narrative will depend upon the indignant scholars and journalists drawn to this frontier project, indignant elected officials and policy makers who understand that their authority originates in the foundational values of democratic communities, and indignant citizens who act in the knowledge that effectiveness without autonomy is not effective, dependency-induced compliance is no social contract, and freedom from uncertainty is no freedom.
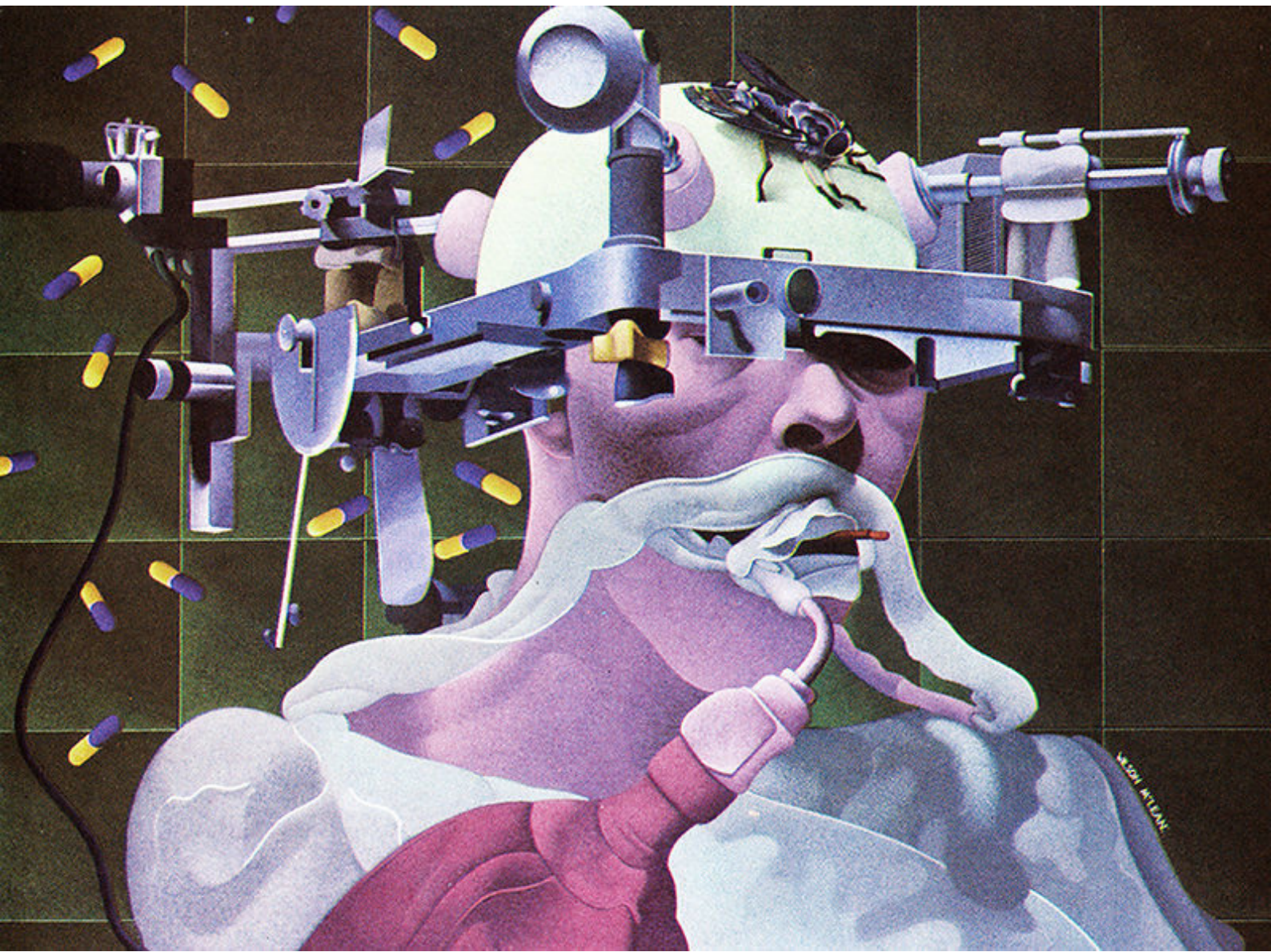
Technophilosophy

Thus, these three pairs of function and norm, conflict and rule, signification and system completely cover the entire domain of what can be known about man. [Foucault – 1966]

The internal technical function of AIs can be perfectly described, by what Foucault relates to the functions that man appears to possess against a "projected surface of biology": receiving stimuli (physiological ones, but also social, interhuman, and cultural ones) reacting to them, adapting himself, evolving, submitting to the demands of an environment, coming to terms with the modifications it imposes, seeking to erase imbalances, acting in accordance with regularities, having, in short, conditions of existence and the possibility of finding average norms of adjustment which permit him to perform his functions. [Foucault – 1966]

These functions have become technical reality and their main use is to legitimate economics as a kind of natural law. It seems that the domains of "function / norm" and "conflict / rule" have entered into a new relation. Foucault describes the economic domain as one in which man finds himself in constant situations of conflict "he escapes from them or succeeds in dominating them, in finding a solution that will […] appease their contradictions; he establishes a body of rules which are both a limitation of the conflict and a result of it. This mode of operation was even more streamlined through the idea of "game theory" [Neumann - 1944] and the "finding of solutions" became the modus operandi of "intelligence" itself. The limitation and result of the conflict is not only the rules, but the dominant form of existence, as propagated through "AI". Such an intelligence can find the perfect solution for every conflict through the optimization of functions.

"The projected surfaces of biology and economics" embedded in a technical system form the frame for the third domain: "the projected surface of language, man's behavior appears as an attempt to say something; his slightest gestures, even their involuntary the human sciences mechanisms and their failures, have a meaning; and everything he arranges around him by way of objects, rites, customs, discourse, all the traces he leaves behind him, constitute a coherent whole and a system of signs." In the technological reality these signs lose their communicative meaning and are substituted by data/value. These kinds of signs only exist in a vector context, a multidimensional relation-- they have lost their inherent indexicality. Through "blackboxing", the signs were cut off from reference and dissolved in the first two domains of biology and economics.

Scientific inspiration for the idea of artificial perception is "Vision" by David Marr. Written in 1982, that attempts a holistic explanation of visual perception in general. It lays out the principles of "A computational Investigation into the human representation and processing of visual information". Marr's Colleague Tomas Poggio stated deep concerns about the usefulness of "Deep Learning Networks" for Brain and Cognitive Sciences [Poggio – 2012] . For him these models are, despite their current popularity, just a distraction. The similarity of the technical neural networks with the

actual processes in the brain is therefore scientifically untenable and of a metaphorical meaning. So it is hubris to define such a concept of biological intelligence as the thing-in-itself. At the same time, within this rebuke is the "concept's longing to become identical with the thing.[...] The supposition of identity is indeed the ideological element of pure thought, all the way down to formal logic; but hidden in it is also the truth moment of ideology, the pledge that there should be no contradiction, no antagonism." [Adorno – 1966] Within a given rule set, functions, and goals it is impossible to formulate something outside the epistemological boundaries. Transcendental ideas like "emergence" and "singularity" have to appear beyond the frontiers because of the impossibility of finding an ontological or epistemological explanation for a "becoming of consciousness".

It is probably impossible to give empirical contents transcendental value, or to displace them in the direction of a constituent subjectivity, without giving rise, at least silently, to an anthropology – that is, to a mode of thought in which the rightful limitations of acquired knowledge (and consequently of all empirical knowledge) are at the same time the concrete forms of existence, precisely as they are given in that same empirical knowledge.[Foucault- 1966] An anthropology of an AI would therefore consist in the trace of its learning towards a point of saturation. Furthermore, everything non intrinsic, such as the classification of terms (index, tag), will be transcendental obtained knowledge. According to Gilbert Simondon, the more complex and, therefore, harder to understand a technology is, the more susceptible it becomes to mystification from those who perceive technology as purely intuitive.[simondon - 1958]

The technically reflected knowledge, which in the form of the encyclopedia becomes a canon, possesses "cultic" tendencies similar to the intuitive form. The knowledge is accessible only to an initiate, who is henceforth a member of an understanding elite. The consequences of such monopolies of knowledge and power are societal in nature, and in their impact, often more relevant to human development than the technologies themselves. The regulation and distribution of this technological knowledge is therefore a matter of power and social order. Science and technology are self-historical and refer to the current canon, that is stripped off all non technical references. The historical development of the power structures that are in charge of this knowledge, provides information about the nature of the technology itself, which is never purely technical and objective in nature. Simondon is skeptical of knowledge elites and technocrats as well as of cultural anti-technophobia. Required to re-integrate technological dynamics into a cultural flow, his solution to this is the reintegration of intuitive, dynamic aspirations within technology, and the dissolution of knowledge monopolies. Simondon advocates a practical experience that contributes significantly to the dynamic, evolutionary development of Technology. [simondon – 1958, König – 2015]

Renaissance / Technology

The thought of every age is reflected in its technique.

- Norbert Wiener

In the Renaissance era, people began again to seek their knowledge in original texts, beyond the rigid dogmatics of the Church, in order to gain uncensored access to all human thought. For Gilbert Simondon, these are the first expressions of an "encyclopaedic spirit". It turns first to existing knowledge, since technological development and its potential were not sufficiently advanced to allow universalisation (the basis for this was the printing press). The Renaissance, however, showed "a very great goodwill towards the techniques [...]; they were already valued either as paradigms and means of expression, or for their human value, which opened up new avenues".

Renaissance art was primarily concerned with imitating nature on the basis of natural philosophy, whereby natural things became the object of representation and "the term of any representation". Elisabeth von Samsonow speaks here of the "founding of an art of 'cognitive style' that seeks to bridge the gap between the man-made art world and the natural world not created by man by means of a critical concept of perception at all".In the Renaissance man attained an autonomy within the world and was not only subject to the divine will, as the scholastics considered to be the case. The artist has gone from being a "tool of God" to an independently acting individual carrying his own tools. His work possessed at the same time a claim to truth and science. This autonomy was accompanied by an understanding of the world that allowed people to recognize functions and facts that were beyond a purely religious reason. The emergence of perspective in painting indicated the awareness of a "distance from nature" that obeyed logical rules. These had to be understood through a rational reconstruction of nature.

This imitation of nature is understood by Samsonow as a "concept of the mediation of concept and perception", which results from a consciousness of distance and simultaneous participation in nature. In the exploration of nature by means of geometry, surveying and perspective operations, the distance to nature was shortened. The pair of terms distance-participation was extended by the pair creation-knowledge. Geometry served as a new, paradigmatic model that replaced the old forms. The truth of geometry results from the creation of models, the measurements and the division of the world into coordinates, which leads to the formation of "geometrically and arithmetically operating" models. natural sciences" in the 15th and 16th centuries. The geometric conception of space shaped all areas of Renaissance life and is therefore essential for the aesthetics of the time. In the Renaissance "art and technology [...] are still largely inseparable areas (Greek techni = lat. ars)". Another central significance in the critique of perception of the Renaissance adopts the knowledge of mechanics "as logic of motion".

This logic is linked to the idea of a superior mind that controls the body like a machine. The body and its physiognomy are subject to a strict hierarchical order.   However, Samsonov expressly points out that the origins of digital apparatus lie in the "philosophical drafts of numerological combinatorics" and not in Leonardo da Vinci's natural philosophy. There are "several evolutionary stages" between our modern technology and its technology. Gilbert Simondon warns in such a context against a "culture of the Mystification", in which knowledge is replaced by the figure of the scholar. This does not establish knowledge, but an "idolatry of the human carriers of knowledge". This mystification applies to the figure "Leonardo da Vinci": a work created under the paradigm of universalism should not be used to legitimize this universalism as an "original state". The division of the sciences into different fields of knowledge is not reversible and cannot be reconstructed by objects that are relics of a time before the division.

Such division did not arise from a mystified figure that represents the origin of knowledge, but from the dilemma of a time in which one had to refer to old knowledge, since no current one was available, and this could not withstand the current mental and technological developments.   The separation of the humanities from science and technology in our time leads to social legitimation problems. For Elisabeth of Samsonov is clear that it is difficult for the humanities to "to assert self-conception in a technical world." 118 These differences can be seen in the strict separation of the universities and their methodology. The philosophy that "the Incompetence of modern technology and natural science suspected, [...] an existence on the border of social insignificance".The philosophy is not "adapted" to the current problems of industry and the environment, and the "Babylonian language confusion" within technology, known as "technolect", makes a common discourse within the faculties almost impossible. For Simondon, on the other hand, "pedagogical and basically non-technological education lacks the universality of simultaneousness, which is expressed by saying that it is aimed at culture rather than general education rather than knowledge". For Simondon, this discarding of knowledge makes no sense, since it conceals the encyclopaedic order of knowledge and refers to an external symbol, to people like Leonardo da Vinci: "[T]he knowledge is replaced by the figure of the scholar, that is, by an element of social typology or characterology with its classification catalogues, which is completely inappropriate to knowledge itself and introduces into culture a mystification which makes it inauthentic". The reference to "inventors" and persons in the further course should therefore always be considered under this premise; the technological development takes place according to its own dynamics and is independent of inventor spirits.
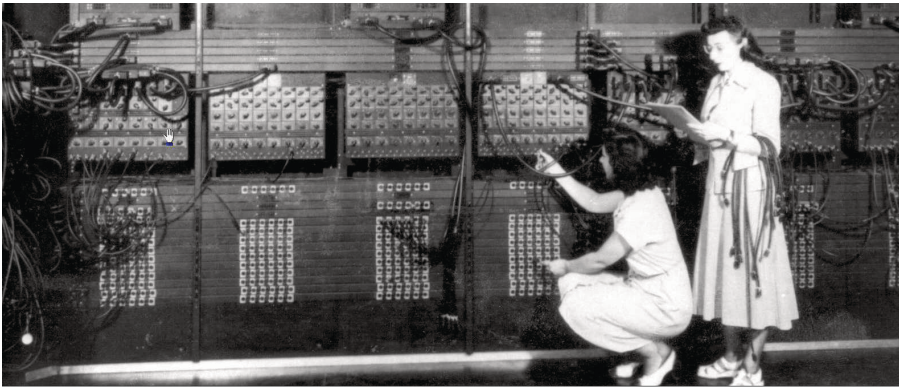
The structure of the technical object:

Element - Individual - Ensemble

Simondon divides the development of the technical object into three stages: technical "elements", which are tools; "individuals", who use the tools; and "ensembles", which coordinate the individuals. The imbalance that prevails in the relationship between culture and technology stems from the fact that the transition from the technical individual to technical ensembles in culture has not taken place. Machines do not replace man, but "it is man who replaced the non-existent machines until the industrial revolution". The machines become the technical individual, the carrier of the tools. Culture blocks itself from this knowledge and opposes the deprivation of the tools with an "anti-posture" instead of considering the newly emerging genealogical stage of "man as the operator" of these tool carriers.

As a functioning individual, the machine generates its own dynamics. The functions are synthesized and reintegrated. The object concretizes itself through functional overdetermination. This means that the concretization further develops the object and helps it to a purity of the abstract idea. In the most favorable case, the technical object is a non-specific element that can be used in other technical objects.

> *The indeterminacy, which is an acquired property of the modern machine, but which tends to constitute the essence of all technical objects, prohibits the classification of technical objects according to exogenous criteria, which are their applications. These are the procedures used in the different fields of application, and not the Applications themselves, which form the families of technical objects.*

The object develops from an abstract idea to a concrete object, but not purely material. It is a development from the idea of "drive" to a principle of "combustion engine", not from the idea of "engine" to a real drive in an automobile. The concretisation would

Gilbert Simondon (* 2 October 1924 in Saint-Étienne; † 7 February 1989 in Palaiseau) was a French philosopher.

In his dissertation, L'individuation à la lumière des notions de forme et d'information (1964 and 1989), published in two parts, he attempted to understand all forms of biological, psychological and social individuation as forms of a single phenomenon through the combination of information theory and Gestalt psychology.

Simondon also early recognized the importance of technology for philosophy. In Du Mode d'Existence des Objets Techniques (1958) he attempts to bring together technological development and biological evolution in a new understanding. His aim is to break through the epistemological boundaries of cybernetics and arrive at a general theory of the machine.

As central problems of cybernetics, as represented by Norbert Wiener for example, Simondon sees their fixation on the idea of the automaton and thus an overemphasis on the importance of equilibria. For Simondon, the perfect automaton, which registers environmental influences as disturbances of its systemic equilibrium, processes them and thus returns to this equilibrium, is merely a borderline case that technical developments can approach. A cybernetics called "technicist" in this sense by Simondon does not do justice to the historical development and unfolding of concrete techniques.

therefore consist in the interaction between the abstract idea and the series of engines actually built: the engines would be improved, whereby they would develop into an increasingly concrete idea, until the idea is again so far "indefinite" and finally becomes a mode of operation.

> *The single technical object is not this or that hic et nunc given thing, but something that has a genesis. The unity of the technical object, its individuality and specificity are the Characteristics of consistency and convergence of its genesis. The genesis of the technical object is a component of its essence.*

> *The technical object has its own historicity, which is not reflected by the explains to the people who made it. The genesis of technical objects is the history of ideas and not a series of successive inventions. The technical object organizes itself in a continuous feedback, it improves itself, obeying an inner necessity. The Overdetermination forces the object to constantly evolve. As in a phylogenetic series, a particular stage of evolution contains structures and schemata that are the origin of an evolution of forms. The technical being develops through convergence and adaptation to itself; it unifies within itself according to the principle of an inner resonance.* [43]

In the course of this development, the technical object becomes more and more precisely defined and becomes a highly integrated system. This means that the individual parts increasingly come together to form an overall function, and the Individual functions are subordinate to this. The individual elements are arranged in groups that can take over several functions at the same time. In the ideal case this would mean that a part of the technical object must belong to as many functional groups as possible in order to achieve optimum integrability. This applies to Simondon's sophisticated engine, where "each important part is so firmly connected to the others by mutual energy exchange that it cannot be any different from what it is".This tendency to the highest possible integration of the individual parts is the Standardization of the technical object. This standardization "for the Production of increasingly integrated basic forms allows the Industrialization and not vice versa: "Industry does not come into being because of standardization, but because there is such a tendency in the process of general technological development". The more concrete an object is, the less certain it is. The production according to a "need" or "measure" also means an adaptation to the environment. As the object evolves, it loses the specific characteristics of its surroundings in favour of universal applicability.

> *At the level of industry [...] the system of needs is less coherent than the system of the object; needs are shaped according to the industrial technical object, which thereby acquires the power to shape a civilization.*

The technical object is thus in a position to shape society due to its higher coherence density. The inner tendency is so high that it is able to transfer its "needs" to the outside world. There is indeed "a convergence of economic constraints (material, labour, energy) and technical requirements in the strict sense". The technological necessities "prevail in evolution".This concretization leads to a logical discontinuity, which can be explained by the two different motion of the technical development. On one hand there is an internal movement of the individual parts towards integration into the technical object and on the other hand a general movement of the complete system, in the sense of an evolution from the abstract to the concrete idea. Both developments are linked to each other and influence each other. When the subsystems have reached the level of maximum saturation allowed by the overall system, development is slowed down and the only option is a break in the system. This break is at the same time the necessity of a new direction of function, because it is not a standstill, but the evolution of the technical which object moves in the direction of the processes of its subsystems. From the border-situation, which comes up by these forces, new possibilities. According to Simondon, "specialisation does not take place from function to function, but from synergy to synergy. It is not the individual function, but the synergy of the functions that constitutes the real Subunit in technical object".This fracture always consists of an erratic development. For Simondon, the evolution of technology, with constant compression and saturation, takes place in a kind of dead end from which it can only free itself by jumping to another level. This results in the jumpy dynamics of the technology: During the jump, a maximum of speed or acceleration, the differentiations and perfections of the system proceed more and more slowly. The tendency of the subsystems to inherence is linked to the general function of the technical object. Stiegler sees a peculiarity of the industrial technical object in the "unification of the parts to one whole, which is not the thing that man has created by thinking in functions, but a synergistic necessity, which was for the most part not foreseen by him, which manifests itself while functioning inside the object, where the technical object invents itself - independent of the 'generating intention'".This creates a momentum of its own:

Each part of the concrete object is no longer just that whose essence is the fulfills a function that the designer wanted, but is part of the of a system in which a multitude of forces are effective and effects are achieved that are independent of the generating intention.

Accordingly, the technical object invents, discovers and gives birth to "irrevocable" objects. Realities from a pool of physically determined possibilities. This logic is different from that of conceptual design and is never really predictable, since the object only manifests itself through its invention. Stiegler further calls for the introduction of a techno-science whose experiment replaces scientific deduction, since neither physics, sociology nor psychology are sufficient, "to describe the phenomenon of the technical object as a genesis of an individual and production of an order". The evolu-

tionary peculiarities of the technical object, which transforms mutations into new functional principles, must be taken into account.

Culture as defence reaction

With the advent of the industrial society, a far-reaching Change of culture. Since then it has served as a "defence system against technology [...] and this defence presents itself as the defence of man and assumes that the technical objects do not contain any human reality". [52] It overlooks the fact that technology is not a living object that can be thought of without people. In the previous sections we spoke of a largely autonomous technical system, but this, like politics, cannot exist outside a human context. Scientific disciplines, on the other hand, seem to have a penchant for universal objectivity and tend to establish their knowledge systems outside human thought as "truth". On closer examination, close historical and ideological interdependencies also emerge in this area.

> If there can be an alienation of man (or culture) through technology, then it is not caused by the machine, but by the misjudgment of its nature and essence.

This "misjudgment" has its origins in industrialization and the transformation of technology from an individualized object to an "ensemble". In order to recognize the actual nature of technology, it is necessary to penetrate to its "nature". According to Simondon, this requires a new kind of knowledge, which goes hand in hand with a certain technological competence. That's what it's all about, to get rid of prejudices, such as that "the degree of Perfection of a machine is proportional to the degree of its automatism. [...] In fact, the automatism is a rather low degree of technical perfection. To make a machine automatic, you [...] have to sacrifice many possible applications".According to Simondon, this fear of automatism conceals the true character of the machine, which lies in its indeterminacy. Because it is only through these that integration into other technical ensembles is made possible. Man finds his place in the coordination of objects, whose "functioning in the core of technical ensembles" he determines. [55] [It is] precisely this insight that is relevant for an analysis of the digital technology in which humans operate with software and hardware ensembles. Fear of technology is therefore based on a lack of understanding of technology and is often rooted in an irrational myth in which technology is understood as a foreign living being instead of a dynamic system. However, the fear of "becoming automatic" is only unfounded if the technique is not regarded as a foreign, organic body, but as a system with which one can operate. "Understanding" in this context means understanding the technology itself, but also learning the place that people occupy within technology. What is misjudged in these anti-technology, but also in the technocratic currents of our time, is the way of thinking epistemology. The causal chains are either swapped or cut completely.

As an example, the debate on artificial intelligence could be cited here, the basis of which is initially the assumption that thinking and language can be absolutely formalized. Only when these premises are fulfilled does a discussion about artificial intelligence really make sense. Both critics and advocates of such theses refer to the technical construct, often without taking up the underlying (philosophical and epistemological) debates. Above all, the connection between the actual non-technical foundations of a technology and a critical examination of them requires a precise investigation of this branched genealogy of the fields of knowledge and their historical development. Because the natural sciences, which are the theoretical Fundamentals of technology, build on cultural and philosophical foundations. Although the technical systems have an inner intentionality, they themselves have no possibility of exchanging or coupling themselves with other systems. This means that humans operate with system sets whose direction and compatibility they recognize and apply. This work differs fundamentally from the earlier times, when man himself still handled tools mechanically. Technology and culture have such great discrepancies because the latter have not understood this transformation of technology. In order for the culture to be adapted to the technology, it is necessary to "dynamic schemes" of today's technology and to put old fears aside. These technical dynamics lead to a social dynamic, and the call for a new understanding goes hand in hand with the demand for a new science and its epistemology. Simondon demands: "This dynamic of objects as industrial technology is a science of machines, and therefore it should be called mechanology". One should pursue technology as "sociology" and "psychology", since there are dynamics in technical objects that cannot be derived purely from the human soul or from society. This dynamic, which "plays a decisive role in the course of human development"[59], requires an independent investigation and thus also its own methods.

The machines have their own genesis, which develops independently of humans. One can thus speak of an "autonomy of the machine: of the autonomy of its genesis". [60] If we look at technical dynamics not in an anthropological way, but as a process, we see that the device is not a tool, but a system. The technical object also has its "own inventiveness", a process of concretization through functional overdetermination. This Concretization is the history of the technical object; it gives it "its existence with the aim of a development that proves that it cannot be regarded as a mere device". [61] The emergence of modern monitoring methods also shows that it is above all social changes that can be stopped. But these problems are also due to a lack of balance in which a ruling "technocracy", which is "in the situation of intelligent users or organisers", desecrates nature. They lack the intuitive handling of the technical elements that would prevent such an abuse of power.

Innovation and economic techno-structures

The concept of innovation refers very strongly to economies and social structures. Innovation is the response of technology to current needs and problems. Innovation differs from the concept of invention, is flexible in its movement, adaptable and thus relatively easy to control. The effects of innovation are calculable with economic methods and are directed to the outside world, to concrete technical Objects that are directed towards a "need" that arises beyond the technical system. The technical invention, as explained above, on the other hand, obeys an inner necessity of technology and is restricted and curtailed by external influences. Science is closely linked to technology. This aspect, "which transforms the conditions of scientific discovery itself".leads to a structural resemblance.

> On the basis of this new relationship between science, technical system and economic system, the state develops as a "Technostructure" or "technocracy" and tries to regulate the transfer processes between the individual systems.

The state assumes a regulatory function, which is assigned to the systems of Science. These purely functional techno systems have no moral or ethical values in their logic to limit themselves. This is the "new" development which, according to Deleuze, has overcome the old subjects of technology as hypnotists and leads to a conspiracy of the supervisors. The state is therefore at the same time the regulating moment of technology as long as it distinguishes itself from it and puts a stop to it, and the faceless controller of the masses as soon as it is infiltrated by technology Although technology is closely interwoven with the natural sciences, these also possess their own genealogy, which is independent of the technical one.

A technical philosophy must therefore not only be based on the two universalisms and provide a "phase balance", as Simondon demands, but also investigate the philosophical discourses from which technology originates and into which it flows. Both the fear and the deification of technology thus disregard an important point of genesis: the close relationship of the natural sciences to philosophical and cultural ideas. In Simondon's time, technology drew its "knowledge" mainly from physics, which is the physical or electrical Objects. With the advent of computer technology. knowledge branches of mathematics and logic, actually philosophical disciplines, are becoming more and more important. From industrial to digital technical object For an ontological view of a technical object, it is necessary to track down the lines of development in order to determine its tendency and modes of operation.

Simondon's theories mentioned here refer to a mechanical or electrical technology with industrial application. The digital technology, however, is purely immaterial. Simondon postulates: "Every concrete technical object is a physico-chemical system in which, ac-

cording to the laws of all sciences, reciprocal effects are exerted on each other". The development of the objects is regulated by physical conditions of the environment and is promoted at the same time by these. A digital technical object, however, obeys purely formal-logical and mathematical laws at the level of software. The concretization of the digital-technical object also remains immaterial and results in a perfection of the formal software structure. Like the technical objects, this programming code tends towards a high degree of coherence. The difference of the digital technical object consists in the absence of restrictive conditions due to a complex environment. The digital rupture consists mainly in a loss of the "environment". In the pre-digital age, machines and people still shared a common "milieu", which led to a massive change in the environment through industrialization, the automobile and electrical energy. The digital milieu is shifted into the machines themselves, and an effect on the human milieu can only be achieved indirectly. At the same time, it is impossible for man to participate in this environment. This problem is the subject of numerous pop-cultural topics, above all TRON (1982), in which the main protagonist is "digitized" and becomes a hero in a dematerialized fairytale world. However, Simondon's dynamic technical principles can also be applied within the digital domain, albeit in a modified form.
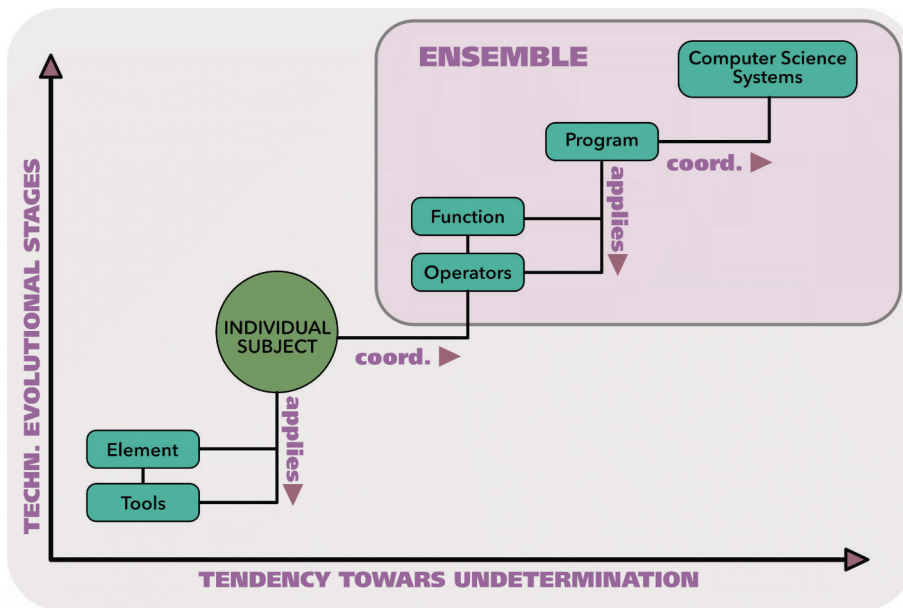
The extension of the „ensemble concept" of

Simondon by the digital

In the industrial technical object, Simondon is using two opposing movements: an internal tendency towards "overdetermination" and "integration" and an external tendency towards "concretization". These tendencies are kept in balance by "feedback": The inner force tends towards a detachment from the technical object, this direction is taken up by the system itself and will integrate into the process of Concretization. If a certain idea differentiates itself inside, this idea is further developed and results in a technical object. In addition, the "break" in technological development is an essential component of evolution, which in this case "erratic". The main point of reference is the environmental conditions, which require an adaptation of the technology and only allow certain possibilities of development and arebecoming more and more dependent from ecomomy.

With the advent of digital machines, such a break also occurred within this causal relationship chain of developmental stages: The internal differentiation detached itself from the technical object and became an immaterial program structure, while the material apparatus (circuits and processors) became increasingly integrated. The development of software did not take place from an abstract idea to a concrete object, but rather behaves like mathematical or scientific systems and becomes more and more formal. Technology has overridden matter, got split and tended in different directions, but still has a close relationship to physicality, which from now on is parallel and not integrated with software. The physical circuits of modern processors today have a capacity of 216 mm² of 1.16 billion transistors, which suggests thatthe density of inherence is increasing more and more. Modern software, on the other hand, tends to broaden and decentralize, as for example, with cloud computing. The actual software is located on servers that the user can access using a wide variety of devices (smartphone, tablet PC, notebook,

etc.). In the technical ensembles of industry, control logic has decoupled from the physical world. The machines are no longer controlled by humans, but run fully automatically. After losing control over the tools, humans have to accept the loss of power over the ensembles.

Element - Function

In the digital milieus, "functions" form a counterpart to the "tools" of the industrial milieus described in Simondon. The function or algorithm is the smallest element and can be used in various areas. Its structure is mathematical and undetermined. At the beginning of the history of programming, the functions were entered and executed directly, computers like the classic Turing machine are unable to perform more than one arithmetic operation. It therefore required an individual to use the functions correctly in order to achieve the desired result. The combination and application of the functions was the responsibility of human control. The function contains "the concretized technical reality"which Simondon assigns to the element. The digital function exists purely in the abstract and has no real formations (like the elements of Simondon). The difference now is that an algorithm resembles a screw in terms of its application structure, but does not develop along physically conditioned genealogies, but strives towards a mathematical "purity. The digital element is at the same time the concrete interface to the machine ensembles. A function can be programmed directly into the hardware of the computer, but a program or information structure must first be transferred into the machine code in order to be executable.

Individual - Programming

In Simondon's theory, the individual applies the individual elements, in the. In the digital environment, this corresponds to the programmer who executes the functions. The required knowledge of the functions can be learned intuitively, similar to the "craft", an idea that is mainly represented by the "hacker". The individual. is "the associated milieu of the carriers and custodians of technicity"; accordingly, the digital milieu is the hardware and its programming, which overlaps with the real world, but does not share its elements. At the programming level, functions and algorithms are used to change the environment. At this point the position of the human being is located, who called up functions with the programming of computers, which in turn controlled industrial machine ensembles.

Ensemble - Computer Science

On the structural level of Simondon's ensembles is computer science, which no longer consists of a purely function- and solution-oriented programming, but rather approaches problems structurally and formally-logically. Computer science designs plans that make it possible for a program, make decisions and perform functions independently. It makes use of several programs to solve problems, so direct programming by the individual may become superfluous. The task of a computer scientist is more like that of an architect than that of the actual programmer. Theoretically, a computer scientist does not have to be able to program, and mathematicians and logicians who no longer come into contact with the actual computer hardware are often found in this area. The digital motion picture can be understood as such a digital ensemble, which has a high degree of indeterminacy. This means that it can be used in many areas without losing a certain basic characteristic. The third part of this book will focus on the specific application in relation to the film, as specific characteristics emerge.

Cultural defence mechanisms in the digital

technical object

The emerging cultural fear of the digital can be derived from the cultural break as well as the "loss of tools" in Simondon. This cultural fear, however, takes on another dimension, which can be explained by its position within the physical element-individual ensemble trinity:

The figure of the "hacker" makes it possible to illustrate the problem arising from the break between the digital and mechanical ensembles. This abstract and completely immaterial fracture enables a "Remote control" of the entire mechanical ensembles by digital computers. The "hacker" no longer needs to understand anything about the mechanical processes of industrial machines, but only about the computers that control them. The mechanic, who is also in Simondon, gives way to a purely abstract idea of control. The hacker can infiltrate several such machines at the same time without being physically present. He bypasses the knowledge barrier that exists around the ensembles and, through intuitive appropriation, gains access to the complex machine systems. A famous example in this context would be "Captain Crunch", who used the sound signal of a whistle to gain access to telephone systems in America. The technical engineering knowledge needed to control the ensembles can be bypassed by programming skills that require a much lower level of knowledge. For example, a machine park that requires several engineers to understand can be controlled by a person who has the know-how of computers but no knowledge of mechanical engineering. The fear of "artificial intel-

ligence" follows the same principle as the fear of "artificial intelligence". "Loss of tools" during industrialization: Humans pass their control over the tools to the.

"Elements". The machine ensembles, however, need to be controlled by an engineer who, above all, has the knowledge of the

The way the machines work differs from that of the craftsman. The Engineer, who took over the management of the machine ensembles, was replaced with the advent of computers by the same. These were initially controlled by programmers. The direct programming of the hardware was finally taken over by software ensembles. The technology has expanded, but the most important thing is still an organizing, human individual who uses the software ensembles. The individual no longer enters direct hardware commands, but makes use of more dedicated

Software developments to fulfill the tasks. The displacement of the People by the computer led once again to fears within the population, and a new form of cultural defensive reaction began.

The "fear" of digital machines is based on the same logic as that of the "loss of tools" in Simondon and results from the assumption of a loss of human individuality. The shift of the same to a higher organizational level is not understood, and thus a feeling of "disempowerment" and "being replaced" by the computer or the program arises. These fears have developed into mythological figures who inscribe themselves in popular culture. Besides the already mentioned "hacker", the fear of an "artificial intelligence", which fears an automatism on the ensemble level of the digital, is also important. For if the technical ensembles organise themselves on this level, man would be completely ousted from technology. What Simondon already postulated for the mechanical ensembles applies all the more to their digital counterparts: man is and remains the "conductor" of the machines, "the reciprocal

Translators of all with respect to all. Thus man has the function of being the permanent coordinator and inventor of the machines that surround him. He is in the midst of the machines that trade and work with him."

In this context Vilém Flusser warns against a "mathematisation of the philosophical discourse". In his view, a "disappointed elite of formal thinkers" is responsible for the "models of knowledge, experience and behaviour that society follows". He also sets the

The term "programmer" equals "technocrat", "media operator" or "opinion leader". In addition, all art forms would become "exact scientific disciplines" that could no longer be distinguished from science. A pure rejecting skepticism, on the other hand, is "the Mistrust of the old, subjective, linearly thinking and historically conscious human being towards the new".

Such a fear of technology is therefore strongly related to the fear of losing one's maturity and control. The digital technology is hier-

archically superior to the industrial technology that controls it. An individual who is able to intuitively acquire digital knowledge could manipulate industrial ensembles without a direct understanding at the level of a engineer, as was usually the case with control systems. The previous forms of knowledge and the power hierarchies associated with them can thus be short-circuited, since the digital world increasingly has influence on the real world. This circumstance explains the vehemence with which the topic of digital knowledge transfer is discussed especially in the field of education, especially since the younger generation possesses knowledge that the older generation hardly knows about and that it can no longer fully control.

Maturity and myth

The technical objects are linked "according to a status of maturity and according to a status of nonage".
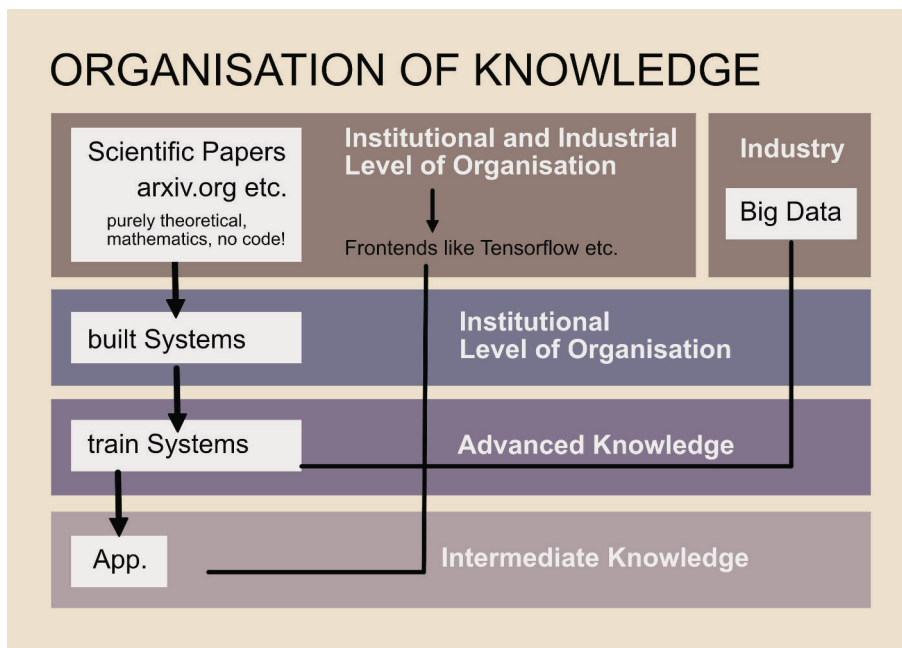
The childlike contact is intuitively learned and habitual, unreflected. The technical knowledge is implicit. This corresponds to the level of a child or apprentice who learns technological knowledge in a practical way. On the other hand, there is a mature debate on technology. This is where the awareness and reflective operation of a "free adult, who is aware of the means of rationalization developed by scientific knowledge". [76] This knowledge difference is analogous to that between craftsman and engineer, without being hierarchical. The intuitive technical approach strives for a technocracy, which dominates and universalizes technical knowledge.

Knowledge control

An analysis of today's knowledge structures in which technology is taught and understood reveals the profound cultural problems that Simondon already denounced by identifying two opposing movements: On the one hand, the "implicit, instinctive and magical character" of the technical education and, on the other hand, that which one encounters in the encyclopedia.

> The imagination of the craftsman drowns in the concrete, so entangled is it in the handling of the material and the sensual existence; it is dominated by its object; that of the engineer, on the other hand, is dominant; it turns the object into a bundle of measured relationships, a product, an ensemble of properties.

Knowledge of technology is taught and regulated by adults and responsible persons. An unreflected, practically learned knowledge, like that of a craftsman, is regarded by academic circles as inferior and is excluded from any academic knowledge transfer.

ORGANISATION OF KNOWLEDGE

Scientific Papers arxiv.org etc.	Institutional and Industrial Level of Organisation	Industry
purely theoretical, mathematics, no code!	Frontends like Tensorflow etc.	Big Data

built Systems	Institutional Level of Organisation
train Systems	Advanced Knowledge
App.	Intermediate Knowledge

Technology is a field of knowledge with a claim to university or universality and is closely linked to the natural sciences. The magic, unreflected character of the rite still adheres to the craft.

The attainment of technical knowledge through purely adaptive action harbours the risk of knowledge loss or technological stagnation. The more complex and thus more difficult it is to understand a technology, the more susceptible it is to mystification by those who understand technology only intuitively.

The technically reflected knowledge, which becomes a canon in the form of the encyclopedia, possesses similar "cultic" tendencies as the intuitive form. Knowledge is only accessible to an initiate who is now a member of an understanding elite. The consequences of such monopolies of knowledge and power are of a societal nature and are often more significant for human development than the technologies themselves.
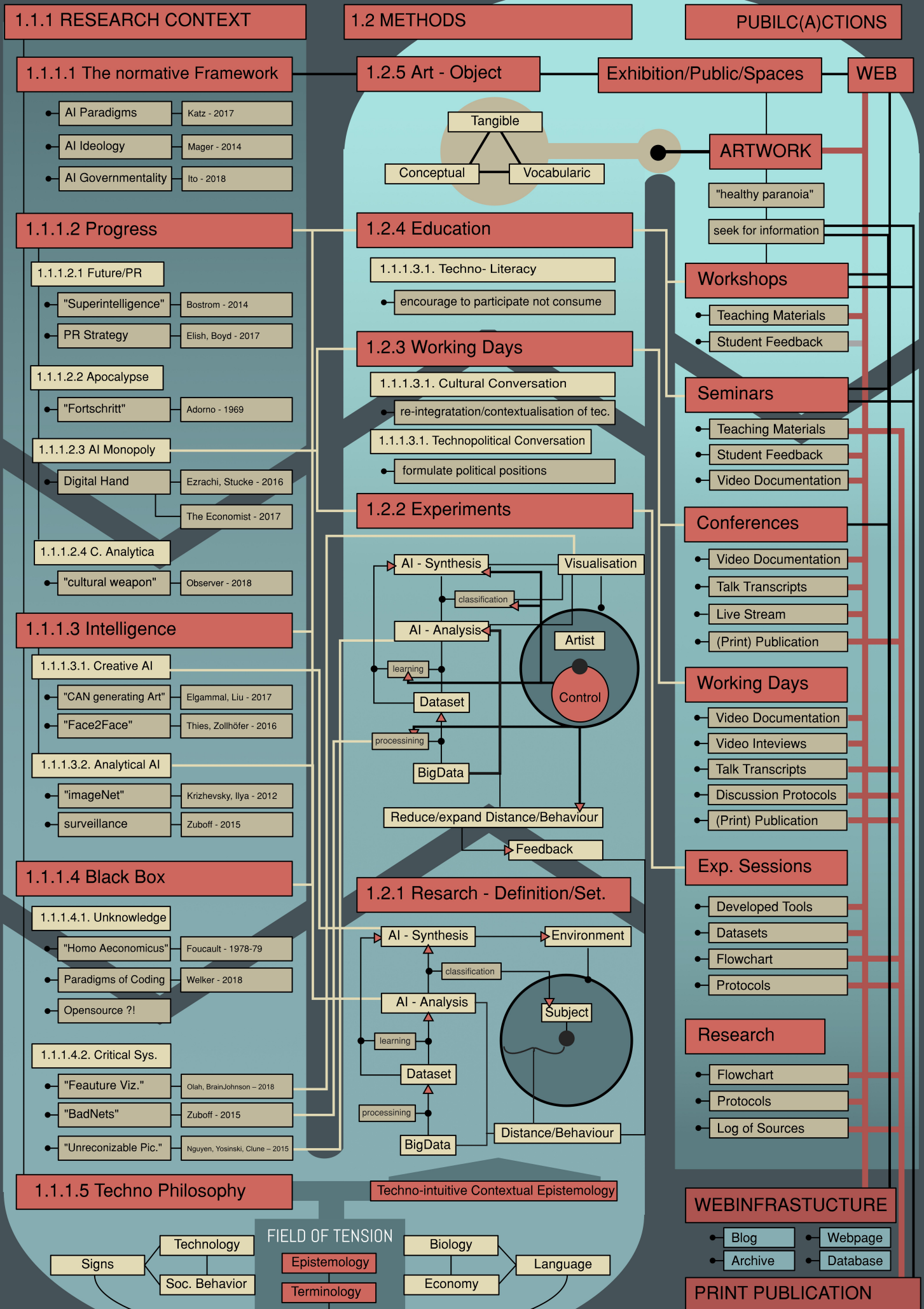
> It is human society, with its dark forces and powers, that is placed in the circle that has become immense and capable of enclosing everything. The circle is the objective reality of the book that represents and creates this circle. Everything that is listed and depicted in the encyclopaedic book [figuré] passes into the power of the individual, who possesses a depicted symbol of all human activities in their most secret details. The encyclopedia actualizes a universality of initiation and thereby produces a kind of departure of the very meaning of each initiation; the secret of the objectified universal is preserved by the the idea of the mystery destroys the positive sense (perfection of knowledge, familiarity with the sacred), but destroys the negative character (darkness, means of exclusion by the mystery, knowledge reserved for a small number of people).
> The technique becomes an exoteric mystery. The Encyclopédie is a magic thing.

The regulation and distribution of this knowledge, and also the selection of the knowledge that is included in the canon, lies outside this knowledge in social social orders. Natural sciences and technology give themselves ahistorically and refer to the current canon. The historical development of the power structures that watch over this knowledge provides information about the nature of the technology itself, which is never purely technical and objective.

Simondon is sceptical of both knowledge elites and technocrats as well as cultural hostility to technology. He calls for the technological dynamic to be reintegrated into a cultural flow, the solution being the reintegration of intuitive, dynamic endeavours within technology and the dissolution of knowledge monopolies. Simondon advocates a practical experience that contributes significantly to the dynamic evolutionary development of the technology:

> *[...] there is no evidence that adequate knowledge of technical reality is possible through concepts [...] In order to gain knowledge, man must really be put into a concrete situation, because it is a way of existence that he must experience and experience. The tool, the instrument, the isolated machine can be perceived by a subject that remains detached from them. But the technical ensemble can only be grasped through intuition, for it cannot be regarded as a detached, abstract, manipulable object that man can dispose of. It corresponds to an experience of existence and of putting into a concrete situation, it is connected with the subject through mutual influence.*

It therefore requires both technical experience and reflection to ensure technical dynamism. A technocracy does not come about through the mastery of technology, but through the one-sided mastery of knowledge. This knowledge is not only kept by science, but education and debate about it are subject to cultural instances.

1.1.1 RESEARCH CONTEXT

1.1.1.1 The normative Framework

- AI Paradigms — Katz - 2017
- AI Ideology — Mager - 2014
- AI Governmentality — Ito - 2018

1.1.1.2 Progress

1.1.1.2.1 Future/PR
- "Superintelligence" — Bostrom - 2014
- PR Strategy — Elish, Boyd - 2017

1.1.1.2.2 Apocalypse
- "Fortschritt" — Adorno - 1969

1.1.1.2.3 AI Monopoly
- Digital Hand — Ezrachi, Stucke - 2016
- The Economist - 2017

1.1.1.2.4 C. Analytica
- "cultural weapon" — Observer - 2018

1.1.1.3 Intelligence

1.1.1.3.1. Creative AI
- "CAN generating Art" — Elgammal, Liu - 2017
- "Face2Face" — Thies, Zollhöfer - 2016

1.1.1.3.2. Analytical AI
- "imageNet" — Krizhevsky, Ilya - 2012
- surveillance — Zuboff - 2015

1.1.1.4 Black Box

1.1.1.4.1. Unknowledge
- "Homo Aeconomicus" — Foucault - 1978-79
- Paradigms of Coding — Welker - 2018
- Opensource ?!

1.1.1.4.2. Critical Sys.
- "Feauture Viz." — Olah, BrainJohnson – 2018
- "BadNets" — Zuboff - 2015
- "Unreconizable Pic." — Nguyen, Yosinski, Clune – 2015

1.1.1.5 Techno Philosophy

FIELD OF TENSION
- Signs
- Technology
- Soc. Behavior
- Epistemology
- Terminology
- Semiotics
- Biology
- Economy
- Language

1.2 METHODS

1.2.5 Art - Object
- Tangible
- Conceptual
- Vocabularic

1.2.4 Education
- 1.1.1.3.1. Techno- Literacy
- encourage to participate not consume

1.2.3 Working Days
- 1.1.1.3.1. Cultural Conversation
- re-integratation/contextualisation of tec.
- 1.1.1.3.1. Technopolitical Conversation
- formulate political positions

1.2.2 Experiments
- AI - Synthesis
- Visualisation
- classification
- AI - Analysis
- learning
- Dataset
- Artist
- Control
- processining
- BigData
- Reduce/expand Distance/Behaviour
- Feedback

1.2.1 Resarch - Definition/Set.
- AI - Synthesis
- Environment
- classification
- AI - Analysis
- Subject
- learning
- Dataset
- processining
- BigData
- Distance/Behaviour

Techno-intuitive Contextual Epistemology

PUBILC(A)CTIONS

Exhibition/Public/Spaces — WEB

ARTWORK
- "healthy paranoia"
- seek for information

Workshops
- Teaching Materials
- Student Feedback

Seminars
- Teaching Materials
- Student Feedback
- Video Documentation

Conferences
- Video Documentation
- Talk Transcripts
- Live Stream
- (Print) Publication

Working Days
- Video Documentation
- Video Inteviews
- Talk Transcripts
- Discussion Protocols
- (Print) Publication

Exp. Sessions
- Developed Tools
- Datasets
- Flowchart
- Protocols

Research
- Flowchart
- Protocols
- Log of Sources

WEBINFRASTUCTURE
- Blog
- Webpage
- Archive
- Database

PRINT PUBLICATION

TECHNOLOGICAL LITERACY

Methods

The following paragraphs will outline possible research-methods and their application. The structure of the method follows an ontological approach grounded on the techno-philosophy of Gilbert Simondon (see previous chapter), which gets updated to our digital age and delivers a theoretical explanation to the current problems with ML. Critical Engineering is thus defined as a form as engineering that chooses art-based research to create a "techno culture" and so enables a trans disciplinary discourse. The method is also a main subject to the studies of research itself. It will be expanded and redefined throughout the course of work

Critical Engineering

Most works dealing with AI center around the idea of an "artificial being" and reflect on that idea, as stated by several researchers this has nothing to do with the actual situation ML is applied. The production of artifacts such as paintings, music or sculptures as mimicry of a classical notion of art is not really fruitful because this does not reflect the way this technology is used by large scale of major tech companies, nor does it serve any modern artistic approach.

While ML-Systems are widely used in a net environment to classify data and the greatest thread at the moment is that the systems become more and more available to generate content, most art projects consist of "self-containing-systems" that emphasis the idea of "intelligence" without stating the importance of a certain network a datastructure, that are the actual motor of the rapid development.

The most common way to reflect AI is as in correlation to the artist: what happens if the machine has a self? So, the artist thinks himself into the machine and reflects her or himself: as machine. If the process aka the technology behind that process is not made transparent, a spectator might think that the machine is really capable of doing such thing. Other works see "the" machine as an almighty aperture that is able to control without human interaction, setting a self against a pure object. But following the ideas of Gilbert Simondon: There is always one or more individuals implementing the ideology on the upper level of the machine-ensembles, which are actually aiming at an individual, but just to classify them as part of a certain set of individuals. At the moment these individuals are behaving in an absolute predictable way, they are unmasked as a "bot" because statistic probability has become a function.

The critical engineering manifesto

The Critical Engineering Working Group Berlin, October 2011-2019

Julian Oliver, Gordan Savičić, Danja Vasiliev

0. The Critical Engineer considers Engineering to be the most transformative language of our time, shaping the way we move, communicate and think. It is the work of the Critical Engineer to study and exploit this language, exposing its influence.

1. The Critical Engineer considers any technology depended upon to be both a challenge and a threat. The greater the dependence on a technology the greater the need to study and expose its inner workings, regardless of ownership or legal provision.

2. The Critical Engineer raises awareness that with each technological advance our techno-political literacy is challenged.

3. The Critical Engineer deconstructs and incites suspicion of rich user experiences.

4. The Critical Engineer looks beyond the "awe of implementation" to determine methods of influence and their specific effects.

5. The Critical Engineer recognises that each work of engineering engineers its user, proportional to that user's dependency upon it.

6. The Critical Engineer expands "machine" to describe interrelationships encompassing devices, bodies, agents, forces and networks.

7. The Critical Engineer observes the space between the production and consumption of technology. Acting rapidly to changes in this space, the Critical Engineer serves to expose moments of imbalance and deception.

8. The Critical Engineer looks to the history of art, architecture, activism, philosophy and invention and finds exemplary works of Critical Engineering. Strategies, ideas and agendas from these disciplines will be adopted, re-purposed and deployed.

9. The Critical Engineer notes that written code expands into social and psychological realms, regulating behavior between people and the machines they interact with. By understanding this, the Critical Engineer seeks to reconstruct user-constraints and social action through means of digital excavation.

10. The Critical Engineer considers the exploit to be the most desirable form of exposure.

The need for a technical culture, critical engineering as art-based practice

The technical object must be known in itself if the relationship between man and machine is to be steady and valid. Hence the need for a technical culture. [Simondon]

Knowledge and Knowledge-Structures have been identified as the main problems of technology and the root of misunderstandings leading to public debates such as that about "Artificial Intelligence". The position of an artist towards the fields of technology are widely discussed, so I would like to propagate a way here where the engineer is enabled to see himself as an artist out of the need to obtain, learn and share technological knowledge in a cultural context.

A normal (software)engineering process can be broken down in: 1. Product Conceptualization; 2. Design and Prototyping; 3. Deployment; 4. Maintenance&Support. The conceptualization is normally market oriented and often includes market-research. Design and Prototyping also focus on the user experience whereas prototyping is also a tool for calculating costs and efficiency. In CE (Critical Engineering) the Conceptualization is the result of an interdisciplinary discourse, in case of this project focusing on Artificial Intelligence. This results in design-strategies, but focusing on exploring the inner workings of ML networks and their relation to data, with the notion to find specific traits in the system that explicitly show these in a vivid way. Building and designing such systems also give an insight that can not be obtained by mere learning or gathering information. Thus, it is of utterly importance to be able to do the engineering yourself because the process of "debugging" is crucial forthe understanding of computing.

Instead of relying on standard methods of obtaining knowledge in science and engineering I would suggest art-based methods because they are approved to work well in cultural fields from which they originated and enable to address and answer questions that originate form technology, but are not technological themselves and therefore out of the spectrum of the disciplines interests, methods and tool sets. The "Deployment" and "Maintenance&Support" within Critical Engineering has the same necessities as in traditional engineering but it's focus is again not to sell a product and/or entertain, but to address the critical thinking of the user in showing how this technology is working. Workflows in engineering are optimized to minimize errors and system failure, flaws in UI etc. and user feedback is used to improve the product, however in CE these attributes are of high interest. In relation to ML-Systems it is crucial to show that there is no "Perfect Intelligence" at work that

might control humanity, but an advanced computer system that is as much error driven as normal programs.
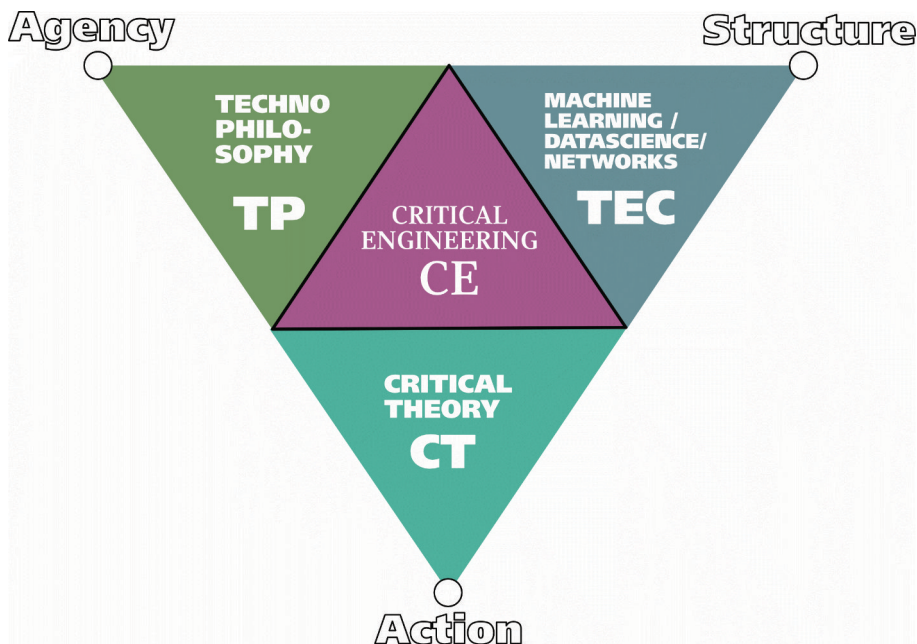
Art-Based research methods yield strong results especially when it comes to critical and ethical questions, where we talk about social culture relations and political impacts. Another crucial point for using art-based methods in relation to machine learning is that the ethical questions discussed widely are mostly based on technical papers that lack any form of subjectivity and also propagate a "concrete technical being". If ethical impacts are discussed then in a quantitative fashion. But ethics, moral and enlightenment need a reflective subject that sets itself into social, cultural and political relation.

The critical engineer chooses art-based research and art as his form of communication and knowledge production. The CE is not an artist that chooses technology as a form of his expression or art-form, he/she is an engineer that chooses art and art-based research as a tool-set that, in combination with engineering, enables them to address social and cultural problems that originate from technology and therefore lies in their responsibility. Such a responsibility can not been as an "outside" product that comes after the development, but should be inherent to the process. We strongly opposed to the idea that is possible to press social and cultural norms resulting in "ethics" into a straight form of code and would rather lecture ethics and philosophy again to engineering students.

Reflexive Practice inside an Open-Source-Community

As postulated in the "Critical Engineering Manifesto" [2011], "each work of engineering engineers its user, proportional to that user's dependency upon it. " bringing the engineer into a position of responsibility but also in a self indulged state of a reflexive practice. This is one of the most effective methods as it enables to " question content and contexts as problematic situations are revealed within particular settings" [Sulivan] . Engineering is seen as

the "most transformative language of our time" and the CE is oblidged to "study and exploit this language and exposing its influences", this also opens up the field where an emancipatory interest emerges that causes to enact in a artistic, social, political, educational way, leading to cultural changes. [Sulivan].

The acts of engineering form cyclical processes and the transformative processes to the subject should therfore been recorded, discussed and reflected.

In contrast to common art-practices where the outcome is an artifact and the artist is positioning her-/himself as the author, the projects will adopt the practice of engineering, where knowledge is shared via open-source and a community driven development can be obtained (which is then also subject to the reflective process).

The systems as a self-reflexive subject

While cycling through programming and testing the criticalengineering team will get a feeling for the technology and tries to find flaws and special behaviors within the systems to point out their inner workings. What are interesting parameters to tweak and what setup illustrates best the ideas developed inside the other stages? It is also mandatory not just to focus on the coding procedures but also keep the bigger picture in mind here, so the practitioners will write diary like notes. This stage totally differs from the product-centrist approach of engineering because it is rather the intention to cause a certain discomfort in the user and show technology instead of concealing it behind nicely designed Uis.

Deployment of the work

The final artwork should be very pointed, and therefore needs to be shown in a context such that this sharpness is conveyed. Media art too often ends up within the world of the spectacle, that we see going right back to the magic lantern – It's not the intention of the program to produce such spectacles, but rather enable the access to deeper understanding of the epistemology of technologies through these entry points. Tech-art should mature beyond a fascination with itself, 'innovation' rhetoric and technics, and grow into a critically discursive, volatile and rigorous domain for exploring the very real compressed techno-political and cultural challenges of our time. When networked computer users are made to tangibly witness their vulnerabilities, they may reach vital criticality, or a 'healthy paranoia'. This happens through a combination of technological and emotional triggers. One main method is to build "poisonous objects", that infect the curiosity of the spectator and result in the need to look behind the technology. The pleasant effect of the appearance is turned around. This should lead to a techno-political literacy through being tangible, conceptual and vocabularic:

• tangible, in a way that they should be self explaining and could be understood intuitively.

• conceptual, because they result in, and therefore point to, cultural and techno-political conversations.

• vocabularic, for the reason that they are documented through the whole working process and are therefore transferable.

The art-object is not intended as a product for the art market, but as a form of communication. The knowledge is understandable by intuition, but at the same time it can serve as an entree point to the theoretical ideas, as well as a concern for engineering. The objects should be utterly transparent in their appearance and their ways of production.
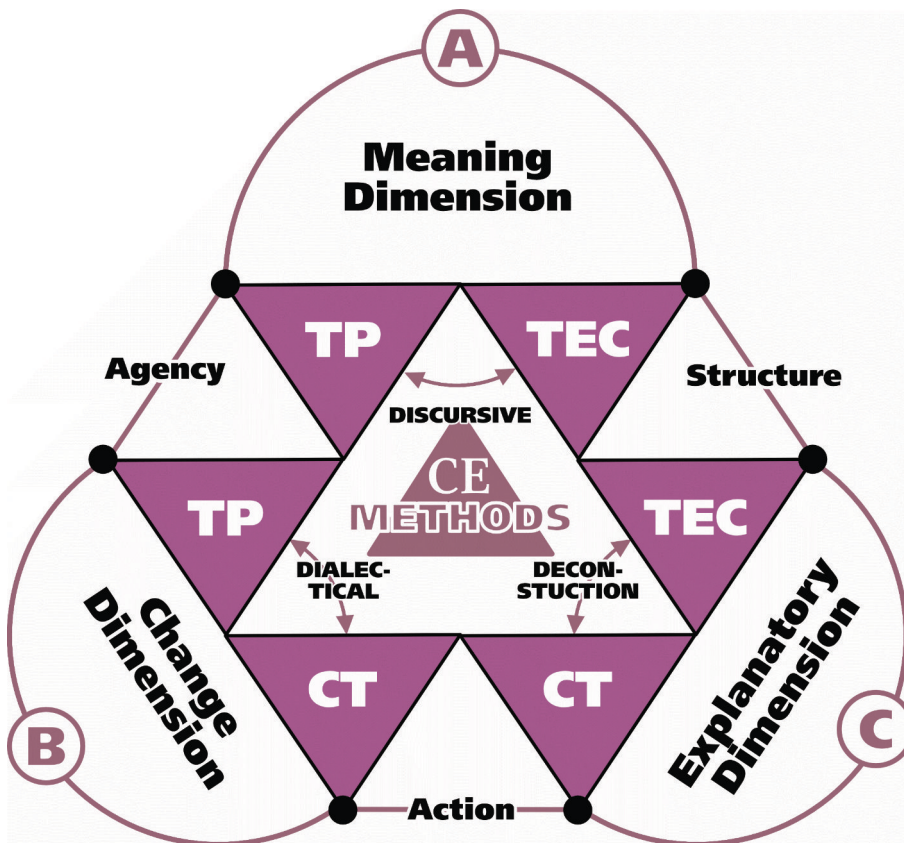
Discourse between Techno Philosophy and Computer science > Create Meaning

The clarification of terminology and metaphorical uses as well as a historical-ontological framing of the same are of importance. Thus a deep technological understanding can not be obtained outside technology a form of translation or exemplification should be achieved. The roots of CS in formal logic and cybernetics as well as the philosophical implications of programming languages will be the matter of discussions, as well as the fact that an ideology of a "harmoni mundi" ,as stated by Leibniz, is still involved in the notion of AI/ML and should be as well analyzed as the idea of "ethics" that can be programmed.

Dialectics between Techno Philosophy and Critical Theory > Create Change

What are possible strategies to change the actual hierarchical structures of knowledge? And how can these be taught and implemented in current art and educational practices?

Deconstruction between Critical Theory and Com. Science > Explanation

Expert-Discussion of relevant technical papers under critical viewpoints, for example the notion of art in "A Neural Algorithm of Artistic Style" [Gatys 2015] But also a technical examination of artworks with an emphasis on providing the idea of an "artificial consciousness", or investigating the actual technological base of texts written about AI by theoreticians. This discussions will take place as informal gatherings but audio will be recorded and transcribed and made public. This should yield in clarifying terminology by decreasing the metaphorical use of terms.
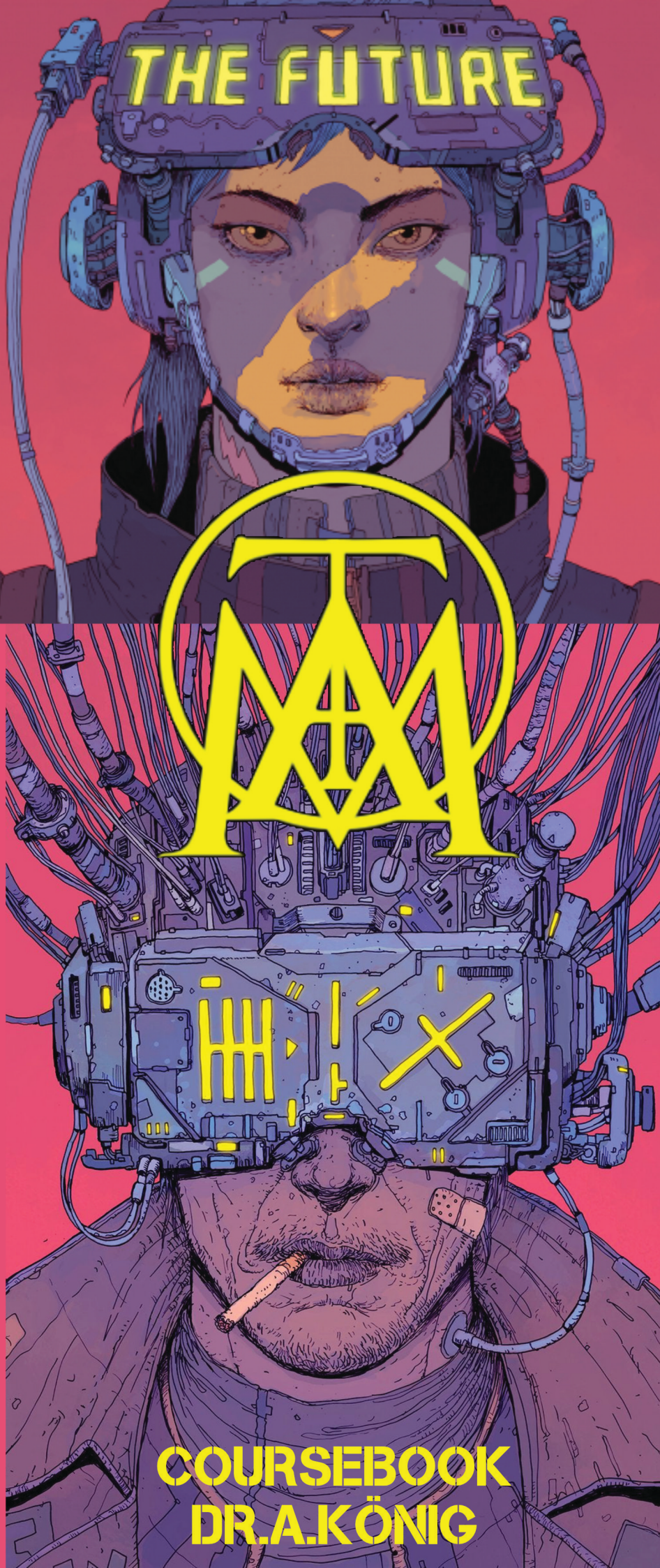
Natural Language and it's programming

We are seeing more and more that the fundamental values of our pluralistic society are in danger. Instead of accepting other life-styles and values, groups try to impose their views on others and override them with repressions as soon as they are unwilling to do so. Whether religion, sexuality or nationality, intolerance is on the rise. Science and technology believe themselves free from these problems, but as soon as a model, such as machine-learning, is regarded as generally valid for all areas of life, it becomes problematic, because then technology becomes an ideology that holds a universally valid claim to truth.

At the same time, it is problematic to create knowledge homogeneity by metaphorically levelling out differences, as often happens in popular scientific conceptions. Often such a supposed similarity is produced by the similarity of the terms, or metaphors are used. Thus quantum mechanics is a popular subject of esotericism, although scientists like Süsskind make it clear that it can only be grasped through a mathematical model and not through fabulations. In plain language: If you want to deal with quantum mechanics, you have to understand the mathematics behind it, because this is the only way to really understand a mathematical model.

In return, it should be clear that politics cannot be described by such models and is subject to a different sphere. Instead of establishing artificial references and an eternal unification of concepts under an ideological functional construct, different ways of thinking should be understood as such. It is easy to see everything from a scientific or religious point of view, but the actual achievement would be to limit the respective thinking to certain areas without claiming sovereignty. The question of an "ethics of machines" is therefore absurd, since this area is not a technical one.

In this context, I would like to introduce the Jewish Kabbalah. It is a widely elaborated thought model that had influences on modern philosophers such as Benjamin and Derrida and is deeply rooted in the Jewish tradition. To declassify this tradition and concept of language as "not valid" because it is not suitable for machine procedures would hopefully be a comprehensible assumption for everyone. This model of thinking is not opposed to that of the NLP, but reaches into other areas such as law, interpretation and cultural change/tradition. A purely technical view of "law" is therefore just as impossible as a purely cultural critique of NLP without understanding the technical principles.

It is basically a question of interpretation: A teacher who gives the student a bad mark because he has not adhered to the general

interpretation, i.e. the solution, although his argumentation is stringent and logical, certainly has less of the language he teaches understood than the student. This plurality has always prevailed in philosophy, and Spinoza's thought buildings stand next to those of Hegel and Derrida. In the different ways of thinking there is an undeniable depth that cannot be dismissed by the fact that it does not "function". In return, it would also be presumptuous to deny technology a depth, because it is directed only at this function. This division of knowledge into subject areas competing for the sovereignty to interpret may not be solely to blame, but it is a great co-responsibility for the ever-increasing division in society. The specialist, who thinks his enormous knowledge in his field, enables also to judge in other fields on the same level, is subject to the same deception as the "rabid citizen" who appropriates half knowledge about youtube. These are opinions and not knowledge based not only on facts, but also on logical, structural and coherent connections. Both commit an active "knowledge renunciation" in favor of an "opinion", this is comfortable and saves the laborious appropriation of knowledge. Since this is a conscious process (a refusal attitude out of convenience), one can also give the respective persons the responsibility for it, they consciously give up their "maturity" and swagger in the half-truths of opinion and ignorance.

The intention of the following stabling is therefore not to create a homogeneous reference, but to make it clear that these views of language can exist parallel to each other without one being "true" and the other "false". It would be more interesting to discuss the differences and limits of the systems than to create a common ground (because there is one).
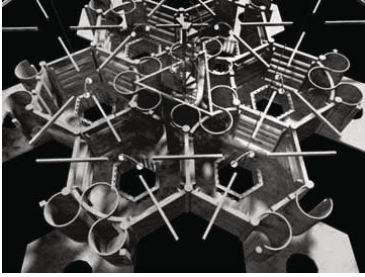
Borges

The Library of Babel

Jorge Luis Borges

By this art you may contemplate the variations of the 23 letters...

The Anatomy of Melancholy, part 2, sect. II, mem. IV

The universe (which others call the Library) is composed of an indefinite and perhaps infinite number of hexagonal galleries, with vast air shafts between, surrounded by very low railings. From any of the hexagons one can see, interminably, the upper and lower floors. The distribution of the galleries is invariable. Twenty shelves, five long shelves per side, cover all the sides except two; their height, which is the distance from floor to ceiling, scarcely exceeds that of a normal bookcase. One of the free sides leads to a narrow hallway which opens onto another gallery, identical to the first and to all the rest. To the left and right of the hallway there are two very small closets. In the first, one may sleep standing up; in the other, satisfy one's fecal necessities. Also through here passes a spiral stairway, which sinks abysmally and soars upwards to remote distances. In the hallway there is a mirror which faithfully duplicates all appearances. Men usually infer from this mirror that the Library is not infinite (if it were, why this illusory duplication?); I prefer to dream that its polished surfaces represent and promise the infinite ... Light is provided by some spherical fruit which bear the name of lamps. There are two, transversally placed, in each hexagon. The light they emit is insufficient, incessant.

Like all men of the Library, I have traveled in my youth; I have wandered in search of a book, perhaps the catalogue of catalogues; now that my eyes can hardly decipher what I write, I am preparing to die just a few leagues from the hexagon in which I was born. Once I am dead, there will be no lack of pious hands to throw me over the railing; my grave will be the fathomless air; my body will sink endlessly and decay and dissolve in the wind generated by the fall, which is infinite. I say that the Library is unending. The idealists argue that the hexagonal rooms are a necessary from of absolute space or, at least, of our intuition of space. They reason that a triangular or pentagonal room is inconceivable. (The mystics claim that their ecstasy reveals to them a circular chamber containing a great circular book, whose spine is continuous and which follows the complete

circle of the walls; but their testimony is suspect; their words, obscure. This cyclical book is God.) Let it suffice now for me to repeat the classic dictum: The Library is a sphere whose exact center is any one of its hexagons and whose circumference is inaccessible.

There are five shelves for each of the hexagon's walls; each shelf contains thirty-five books of uniform format; each book is of four hundred and ten pages; each page, of forty lines, each line, of some eighty letters which are black in color. There are also letters on the spine of each book; these letters do not indicate or prefigure what the pages will say. I know that this incoherence at one time seemed mysterious. Before summarizing the solution (whose discovery, in spite of its tragic projections, is perhaps the capital fact in history) I wish to recall a few axioms.

First: The Library exists ab aeterno. This truth, whose immediate corollary is the future eternity of the world, cannot be placed in doubt by any reasonable mind. Man, the imperfect librarian, may be the product of chance or of malevolent demiurgi; the universe, with its elegant endowment of shelves, of enigmatical volumes, of inexhaustible stairways for the traveler and latrines for the seated librarian, can only be the work of a god. To perceive the distance between the divine and the human, it is enough to compare these crude wavering symbols which my fallible hand scrawls on the cover of a book, with the organic letters inside: punctual, delicate, perfectly black, inimitably symmetrical.

Second: The orthographical symbols are twenty-five in number. (1) This finding made it possible, three hundred years ago, to formulate a general theory of the Library and solve satisfactorily the problem which no conjecture had deciphered: the formless and chaotic nature of almost all the books. One which my father saw in a hexagon on circuit fifteen ninety-four was made up of the letters MCV, perversely repeated from the first line to the last. Another (very much consulted in this area) is a mere labyrinth of letters, but the next-to-last page says Oh time thy pyramids. This much is already known: for every sensible line of straightforward statement, there are leagues of senseless cacophonies, verbal jumbles and incoherences. (I know of an uncouth region whose librarians repudiate the vain and superstitious custom of finding a meaning in books and equate it with that of finding a meaning in dreams or in the chaotic lines of one's palm ... They admit that the inventors of this writing imitated the twenty-five natural symbols, but maintain that this application is accidental and that the books signify nothing in themselves. This dictum, we shall see, is not entirely fallacious.)

For a long time it was believed that these impenetrable books corresponded to past or remote languages. It is true that the most ancient men, the first librarians, used a language quite different from the one we now speak; it is true that a few miles to the right the tongue is dialectical and that ninety floors farther up, it is incomprehensible. All this, I repeat, is true, but four hundred and ten pages of inalterable MCV's cannot correspond to any language, no matter how dialectical or rudimentary it may be. Some insinuated that each letter could influence the following one and that the value of MCV in the third line of page 71 was not the one the same series may have in another position on another page, but this vague thesis did not prevail. Others thought of

cryptographs; generally, this conjecture has been accepted, though not in the sense in which it was formulated by its originators.

Five hundred years ago, the chief of an upper hexagon (2) came upon a book as confusing as the others, but which had nearly two pages of homogeneous lines. He showed his find to a wandering decoder who told him the lines were written in Portuguese; others said they were Yiddish. Within a century, the language was established: a Samoyedic Lithuanian dialect of Guarani, with classical Arabian inflections. The content was also deciphered: some notions of combinative analysis, illustrated with examples of variations with unlimited repetition. These examples made it possible for a librarian of genius to discover the fundamental law of the Library. This thinker observed that all the books, no matter how diverse they might be, are made up of the same elements: the space, the period, the comma, the twenty-two letters of the alphabet. He also alleged a fact which travelers have confirmed: In the vast Library there are no two identical books. From these two incontrovertible premises he deduced that the Library is total and that its shelves register all the possible combinations of the twenty-odd orthographical symbols (a number which, though extremely vast, is not infinite): Everything: the minutely detailed history of the future, the archangels' autobiographies, the faithful catalogues of the Library, thousands and thousands of false catalogues, the demonstration of the fallacy of those catalogues, the demonstration of the fallacy of the true catalogue, the Gnostic gospel of Basilides, the commentary on that gospel, the commentary on the commentary on that gospel, the true story of your death, the translation of every book in all languages, the interpolations of every book in all books.

When it was proclaimed that the Library contained all books, the first impression was one of extravagant happiness. All men felt themselves to be the masters of an intact and secret treasure. There was no personal or world problem whose eloquent solution did not exist in some hexagon. The universe was justified, the universe suddenly usurped the unlimited dimensions of hope. At that time a great deal was said about the Vindications: books of apology and prophecy which vindicated for all time the acts of every man in the universe and retained prodigious arcana for his future. Thousands of the greedy abandoned their sweet native hexagons and rushed up the stairways, urged on by the vain intention of finding their Vindication. These pilgrims disputed in the narrow corridors, proferred dark curses, strangled each other on the divine stairways, flung the deceptive books into the air shafts, met their death cast down in a similar fashion by the inhabitants of remote regions. Others went mad ... The Vindications exist (I have seen two which refer to persons of the future, to persons who are perhaps not imaginary) but the searchers did not remember that the possibility of a man's finding his Vindication, or some treacherous variation thereof, can be computed as zero.

At that time it was also hoped that a clarification of humanity's basic mysteries -- the origin of the Library and of time -- might be found. It is verisimilar that these grave mysteries could be explained in words: if the language of philosophers is not sufficient, the multiform Library will have produced the unprecedented language required, with its vocabularies and grammars. For four centuries now men have exhausted the hexagons ...

There are official searchers, inquisitors. I have seen them in the performance of their function: they always arrive extremely tired from their journeys; they speak of a broken stairway which almost killed them; they talk with the librarian of galleries and stairs; sometimes they pick up the nearest volume and leaf through it, looking for infamous words. Obviously, no one expects to discover anything.

As was natural, this inordinate hope was followed by an excessive depression. The certitude that some shelf in some hexagon held precious books and that these precious books were inaccessible, seemed almost intolerable. A blasphemous sect suggested that the searches should cease and that all men should juggle letters and symbols until they constructed, by an improbable gift of chance, these canonical books. The authorities were obliged to issue severe orders. The sect disappeared, but in my childhood I have seen old men who, for long periods of time, would hide in the latrines with some metal disks in a forbidden dice cup and feebly mimic the divine disorder.

Others, inversely, believed that it was fundamental to eliminate useless works. They invaded the hexagons, showed credentials which were not always false, leafed through a volume with displeasure and condemned whole shelves: their hygienic, ascetic furor caused the senseless perdition of millions of books. Their name is execrated, but those who deplore the `treasures'' destroyed by this frenzy neglect two notable facts. One: the Library is so enormous that any reduction of human origin is infinitesimal. The other: every copy is unique, irreplaceable, but (since the Library is total) there are always several hundred thousand imperfect facsimiles: works which differ only in a letter or a comma. Counter to general opinion, I venture to suppose that the consequences of the Purifiers' depredations have been exaggerated by the horror these fanatics produced. They were urged on by the delirium of trying to reach the books in the Crimson Hexagon: books whose format is smaller than usual, all-powerful, illustrated and magical.

We also know of another superstition of that time: that of the Man of the Book. On some shelf in some hexagon (men reasoned) there must exist a book which is the formula and perfect compendium of all the rest: some librarian has gone through it and he is analogous to a god. In the language of this zone vestiges of this remote functionary's cult still persist. Many wandered in search of Him. For a century they have exhausted in vain the most varied areas. How could one locate the venerated and secret hexagon which housed Him? Someone proposed a regressive method: To locate book A, consult first book B which indicates A's position; to locate book B, consult first a book C, and so on to infinity ... In adventures such as these, I have squandered and wasted my years. It does not seem unlikely to me that there is a total book on some shelf of the universe; (3) I pray to the unknown gods that a man -- just one, even though it were thousands of years ago! -- may have examined and read it. If honor and wisdom and happiness are not for me, let them be for others. Let heaven exist, though my place be in hell. Let me be outraged and annihilated, but for one instant, in one being, let Your enormous Library be justified. The impious maintain that nonsense is normal in the Library and that the reasonable (and even humble and pure coherence) is an almost miraculous exception. They speak (I know) of the

`feverish Library whose chance volumes are constantly in danger of changing into others and affirm, negate and confuse everything like a delirious divinity.'' These words, which not only denounce the disorder but exemplify it as well, notoriously prove their authors' abominable taste and desperate ignorance. In truth, the Library includes all verbal structures, all variations permitted by the twenty-five orthographical symbols, but not a single example of absolute nonsense. It is useless to observe that the best volume of the many hexagons under my administration is entitled The Combed Thunderclap and another The Plaster Cramp and another Axaxaxas mlö. These phrases, at first glance incoherent, can no doubt be justified in a cryptographical or allegorical manner; such a justification is verbal and, ex hypothesi, already figures in the Library. I cannot combine some characters

dhcmrlchtdj

which the divine Library has not foreseen and which in one of its secret tongues do not contain a terrible meaning. No one can articulate a syllable which is not filled with tenderness and fear, which is not, in one of these languages, the powerful name of a god. To speak is to fall into tautology. This wordy and useless epistle already exists in one of the thirty volumes of the five shelves of one of the innumerable hexagons -- and its refutation as well. (An n number of possible languages use the same vocabulary; in some of them, the symbol library allows the correct definition a ubiquitous and lasting system of hexagonal galleries, but library is bread or pyramid or anything else, and these seven words which define it have another value. You who read me, are You sure of understanding my language?) The methodical task of writing distracts me from the present state of men. The certitude that everything has been written negates us or turns us into phantoms. I know of districts in which the young men prostrate themselves before books and kiss their pages in a barbarous manner, but they do not know how to decipher a single letter. Epidemics, heretical conflicts, peregrinations which inevitably degenerate into banditry, have decimated the population. I believe I have mentioned suicides, more and more frequent with the years. Perhaps my old age and fearfulness deceive me, but I suspect that the human species -- the unique species -- is about to be extinguished, but the Library will endure: illuminated, solitary, infinite, perfectly motionless, equipped with precious volumes, useless, incorruptible, secret.

I have just written the word "infinite". I have not interpolated this adjective out of rhetorical habit; I say that it is not illogical to think that the world is infinite. Those who judge it to be limited postulate that in remote places the corridors and stairways and hexagons can conceivably come to an end -- which is absurd. Those who imagine it to be without limit forget that the possible number of books does have such a limit. I venture to suggest this solution to the ancient problem: The Library is unlimited and cyclical. If an eternal traveler were to cross it in any direction, after centuries he would see that the same volumes were repeated in the same disorder (which, thus repeated, would be an order: the Order). My solitude is gladdened by this elegant hope. (4)

Translated by J. E. I.

Practice

CONCEPT	DATA	PROGRAM	DISCUSSION
Social	Books	Word2Vec	Meaning vs. Semantical Comparison
Style	News	Charts	
Politics	Law	Graphs	LITERATURE
Science	Twitter	Plots	Walter Benjamin - "The Task of the Translator"
...	...	Relations	

HYPOTHESIS → GET DATA → EXPERIMENT → REFLECT

General assumption: Word2vec reconstructs linguistic contexts of words (paper) - AI understands text (media)

https://github.com/akoenig-mat/bauhauslearningmachines

Python code in one module gains access to the code in another module by the process of importing it. The import statement is the most common way of invoking the import machinery, but it is not the only way.

In [1]:
```python
from __future__ import absolute_import, division, print_function
```

First we import common system-tools etc. here that are not directly connected to NLP

In [2]:
```python
import codecs
import glob
import logging
import multiprocessing
import os
import pprint
import re
```

In [3]:
```python
import nltk
import gensim.models.word2vec as w2v
from gensim.models import KeyedVectors
from gensim.models import Word2Vec
from gensim.utils import simple_preprocess
import sklearn.manifold
from sklearn.manifold import TSNE
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as ns
```

```
D:\Anaconda3\lib\site-packages\gensim\utils.py:1197: UserWarning: detected Windo
ws; aliasing chunkize to chunkize_serial
    warnings.warn("detected Windows; aliasing chunkize to chunkize_serial")
```

You will probably run into an "ModuleNorFoundError" here. THis means that the needed module is not installed on your system. You can do that in the anaconda command prompt: for example: **"conda install -c anaconda nltk"** or **"conda install -c anaconda gensim"** and **"conda install -c conda-forge glob2"**
for detailed information refer to https://docs.anaconda.com/anaconda/user-guide/tasks/install-packages/ (https://docs.anaconda.com/anaconda/user-guide/tasks/install-packages/)

In [4]:
```python
%pylab inline
```

```
Populating the interactive namespace from numpy and matplotlib
```

Set up logging

In [5]:
```python
logging.basicConfig(format='%(asctime)s: %(levelname)s: %(message)s',level=loggi
ng.INFO)
```

Download NLTK tokenizer models (only the first ĕme)

In [6]:
```python
nltk.download("punkt")
nltk  .download("stopwords")
```

```
[nltk_data] Downloading package punkt to
[nltk_data]                 C:\Users\fmx\AppData\Roaming\nltk_data...
[nltk_data]         Package punkt is already up-to-date!
[nltk_data] Downloading package stopwords to
[nltk_data]                 C:\Users\fmx\AppData\Roaming\nltk_data...
[nltk_data]         Package stopwords is already up-to-date!
```

Out[6]:   True

Prepare Corpus

Load books from files

In [7]:
```python
book_filenames      = sorted(glob.glob("txtdata\*.txt"))
```

In [8]:
```python
print("Found books:")
book_filenames
```

Found books:

Out[8]:   ['txtdata\\truth-and-method-gadamer-2004.txt']

Combine the books into one string

In [9]:
```python
corpus_raw = u""
for book_filename in book_filenames:
    print("Reading '{0}'...".format(book_filename))
    with codecs.open(book_filename, "r", "utf-8") as book_file:
        corpus_raw += book_file.read()
    print("Corpus is now {0} characters  long".format(len(corpus_raw)))
    print()
```

Reading 'txtdata\truth-and-method-gadamer-2004.txt'...
Corpus is now 1618721 characters long

Build your vocabulary (word tokenizaĕon)

In [10]:
```python
tokenizer      = nltk.data.load('tokenizers/punkt/english.pickle')
```

Given a character sequence and a defined document unit, tokenization is the task of chopping it up into pieces, called tokens , perhaps at the same time throwing away certain characters, such as punctuation.

```
In [11]:   raw_sentences = tokenizer.tokenize(corpus_raw)
```

```
In [12]:   #convert into a list of words
           #rtemove unnnecessary,, split into words, no hyphens
           #list of words
           def sentence_to_wordlist(raw):
               clean = re.sub("[^a-zA-Z]"," ", raw)
               words = clean.split()
               return words
```

```
In [13]:   #sentence where each word is tokenized
           sentences = []
           for raw_sentence in raw_sentences:
               if len(raw_sentence) > 0:
                   sentences.append(sentence_to_wordlist(raw_sentence))
```

```
In [14]:   print(raw_sentences[5])
           print  (sentence_to_wordlist(raw_sentences[5]))
```

```
The hermeneutic phenomenon is
basically not a problem of method at all.
['The', 'hermeneutic', 'phenomenon', 'is', 'basically', 'not', 'a', 'problem', '
of', 'method', 'at', 'all']
```

```
In [15]:   token_count= sum([len(sentence) for sentence in sentences])
           print  ("The book corpus contains {0:,}tokens".format(token_count))
```

```
The book corpus contains 260,890 tokens
```

Train Word2Vec

Word2vec is a method of computing vector representations of words introduced by a team of researchers at Google led by Tomas Mikolov. Google hosts an open-source version of Word2vec released under an Apache 2.0 license. In 2014, Mikolov left Google for Facebook, and in May 2015, Google was granted a patent for the method, which does not abrogate the Apache license under which it has been released.

Foreign Languages

While words in all languages may be converted into vectors with Word2vec, and those vectors learned with deep-learning frameworks, NLP preprocessing can be very language specific, and requires tools beyond our libraries. The Stanford Natural Language Processing Group has a number of Java-based tools for tokenization, part-of-speech tagging and named-entity recognition for languages such as Mandarin Chinese, Arabic, French, German and Spanish. For Japanese, NLP tools like Kuromoji are useful. Other foreign-language resources, including text corpora, are available here. http://www-nlp.stanford.edu /links/statnlp.html (http://www-nlp.stanford.edu/links/statnlp.html)

```
size = 160
window = 10
min_count = 2
workers = multiprocessing.cpu_count()
sg=1
seed = 1
sample = 1e-3
iter    = 5
```

size (int, optional) – Dimensionality of the word vectors.

window (int, opěonal) – Maximum distance between the current and predicted word within a sentence.

min_count (int, opěonal) – Ignores all words with total frequency lower than this.

workers (int, optional) – Use these many worker threads to train the model (=faster training with multicore machines).

sg ({0, 1}, optional) – Training algorithm: 1 for skip-gram; otherwise CBOW.

seed (int, opěonal) – Seed for the random number generator. Initial vectors for each word are seeded with a hash of the concatenation of word + str(seed). Note that for a fully deterministically-reproducible run, you must also limit the model to a single worker thread (workers=1), to eliminate ordering jitter from OS thread scheduling. (In Python 3, reproducibility between interpreter launches also requires use of the PYTHONHASHSEED environment variable to control hash randomization).

sample (float, opěonal) – The threshold for configuring which higher-frequency words are randomly downsampled, useful range is (0, 1e-5).

iter (int, optional) – Number of iterations (epochs) over the corpus.

https://radimrehurek.com/gensim/models/word2vec.html (https://radimrehurek.com/gensim/models/word2vec.html)

```
word2vec = w2v.Word2Vec(
    size = size,
    window = window,
    min_count = min_count,
    workers = workers,
    sg = sg,
    seed = seed,
    sample = sample,
    iter = iter
)
```

In [18]:
```
word2vec .build_vocab(sentences)
```

```
2019-11-13 17:13:44,594 : INFO : collecting all words and their counts
2019-11-13 17:13:44,595 : INFO : PROGRESS: at sentence #0, processed 0 words, ke
eping 0 word types
2019-11-13 17:13:44,633 : INFO : PROGRESS: at sentence #10000, processed 223470
words, keeping 11480 word types
2019-11-13 17:13:44,639 : INFO : collected 12895 word types from a corpus of 260
890 raw words and 11459 sentences
2019-11-13 17:13:44,639 : INFO : Loading a fresh vocabulary
2019-11-13 17:13:44,695 : INFO : min_count=2 retains 7334 unique words (56% of o
riginal 12895, drops 5561)
2019-11-13 17:13:44,696 : INFO : min_count=2 leaves 255329 word corpus (97% of o
riginal 260890, drops 5561)
2019-11-13 17:13:44,714 : INFO : deleting the raw counts dictionary of 12895 ite
ms
2019-11-13 17:13:44,715 : INFO : sample=0.001 downsamples 45 most-common words
2019-11-13 17:13:44,716 : INFO : downsampling leaves estimated 185415 word corpu
s (72.6% of prior 255329)
2019-11-13 17:13:44,730 : INFO : estimated required memory for 7334 words and 16
0 dimensions: 13054520 bytes
2019-11-13 17:13:44,731 : INFO : resetting layer weights
```

In [19]:
```
print ("Word2Vec vocabulary length:", len(word2vec.wv.vocab))
```

Word2Vec vocabulary length: 7334

Start training, this might take a minute or two...

In [20]:
```
word2vec .train(sentences, total_words=token_count, epochs = 10 )
```

(1853917, 2608900)

Save to file, can be useful later

In [21]:
```python
word2vec.save("word2vecGadamer.w2v")
```

2019-11-13 17:13:49,911 : INFO : saving Word2Vec object under word2vecGadamer.w2 v, separately None
2019-11-13 17:13:49,912 : INFO : not storing attribute vectors_norm
2019-11-13 17:13:49,913 : INFO : not storing attribute cum_table
D:\Anaconda3\lib\site-packages\smart_open\smart_open_lib.py:398: UserWarning: Th is function is deprecated, use smart_open.open instead. See the migration notes for details: https://github.com/RaRe-Technologies/smart_open/blob/master/README. rst#migrating-to-the-new-open-function
    'See the migration notes for details: %s' % _MIGRATION_NOTES_URL
2019-11-13 17:13:50,006 : INFO : saved word2vecGadamer.w2v

Explore the trained model.

In [22]:
```python
#Load rhe trained model
word2vec   = w2v.Word2Vec.load("word2vecGadamer.w2v")
```

2019-11-13 17:13:50,012 : INFO : loading Word2Vec object from word2vecGadamer.w2 v
2019-11-13 17:13:50,092 : INFO : loading wv recursively from word2vecGadamer.w2 v.wv.* with mmap=None
2019-11-13 17:13:50,093 : INFO : setting ignored attribute vectors_norm to None
2019-11-13 17:13:50,094 : INFO : loading vocabulary recursively from word2vecGad amer.w2v.vocabulary.* with mmap=None
2019-11-13 17:13:50,095 : INFO : loading trainables recursively from word2vecGad amer.w2v.trainables.* with mmap=None
2019-11-13 17:13:50,096 : INFO : setting ignored attribute cum_table to None
2019-11-13 17:13:50,096 : INFO : loaded word2vecGadamer.w2v

In [23]:
```python
print (word2vec.wv.most_similar('hermeneutics', topn=5))
```

2019-11-13 17:13:50,117 : INFO : precomputing L2-norms of word weight vectors

[('theology', 0.6939617395401001), ('theological', 0.6652019619941711), ('Protes tant', 0.6600164175033569), ('positivism', 0.6594288349151611), ('philological', 0.6527665257453918)]

Compress the word vectors into 2D space and plot them

In [24]:
```python
#tsne = sklearn.manifold.TSNE(n_components=2, random_state=0)
tsne_model_en_2d = TSNE(perplexity=15, n_components=2, init='pca', n_iter=3500, ran dom_state =32)
```

In [25]:
```python
all_word_vectors_matrix        = word2vec.wv.vectors
```

Train t-SNE, this could take a minute or two...

In [26]:
```python
all_word_vectors_matrix_2d = tsne_model_en_2d.fit_transform(all_word_vectors_matri x )
```

Plot the big picture

In [27]:
```python
points = pd.DataFrame(
    [
        (word, coords[0], coords[1])
        for word, coords in [
            (word, all_word_vectors_matrix_2d[word2vec.wv.vocab[word].index])
            for word in word2vec.wv.vocab
        ]
    ],
    columns=["word", "x", "y"]
)
```
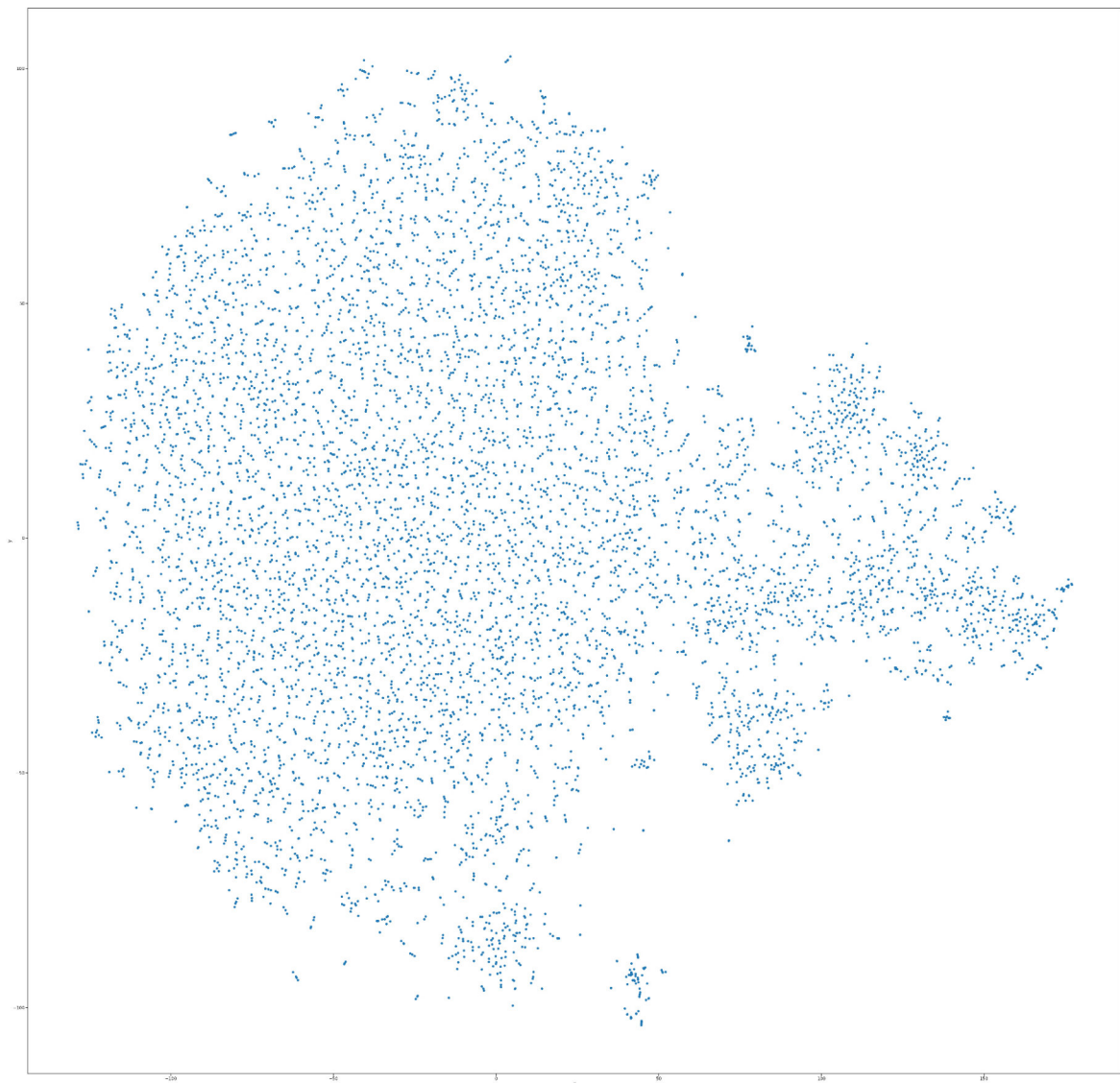
In [28]:
```python
points  .head(100)
```

In [29]:
```python
sns .set_context("poster")
```

In [30]:
```python
points   .plot.scatter("x", "y", s=100, figsize=(100, 100))
```

Out[30]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x238ba2d3128>
```


Zoom in to some interesẽng places

In [31]:
```python
def plot_region(x_bounds, y_bounds):
    slice = points[
        (x_bounds[0] <= points.x) &
        (points.x <= x_bounds[1]) &
        (y_bounds[0] <= points.y) &
        (points.y <= y_bounds[1])
    ]

    ax = slice.plot.scatter("x", "y", s=35, figsize=(10, 8))
    for i,  point in slice.iterrows():
        ax.text(point.x + 0.005, point.y + 0.005, point.word, fontsize=11)
```

```
In [32]:   plot_region   (x_bounds=(120, 170), y_bounds=(-25, 25))
```


Explore semanȇc similariȇes

https://radimrehurek.com/gensim/models/word2vec.html (https://radimrehurek.com/gensim/models/word2vec.html)
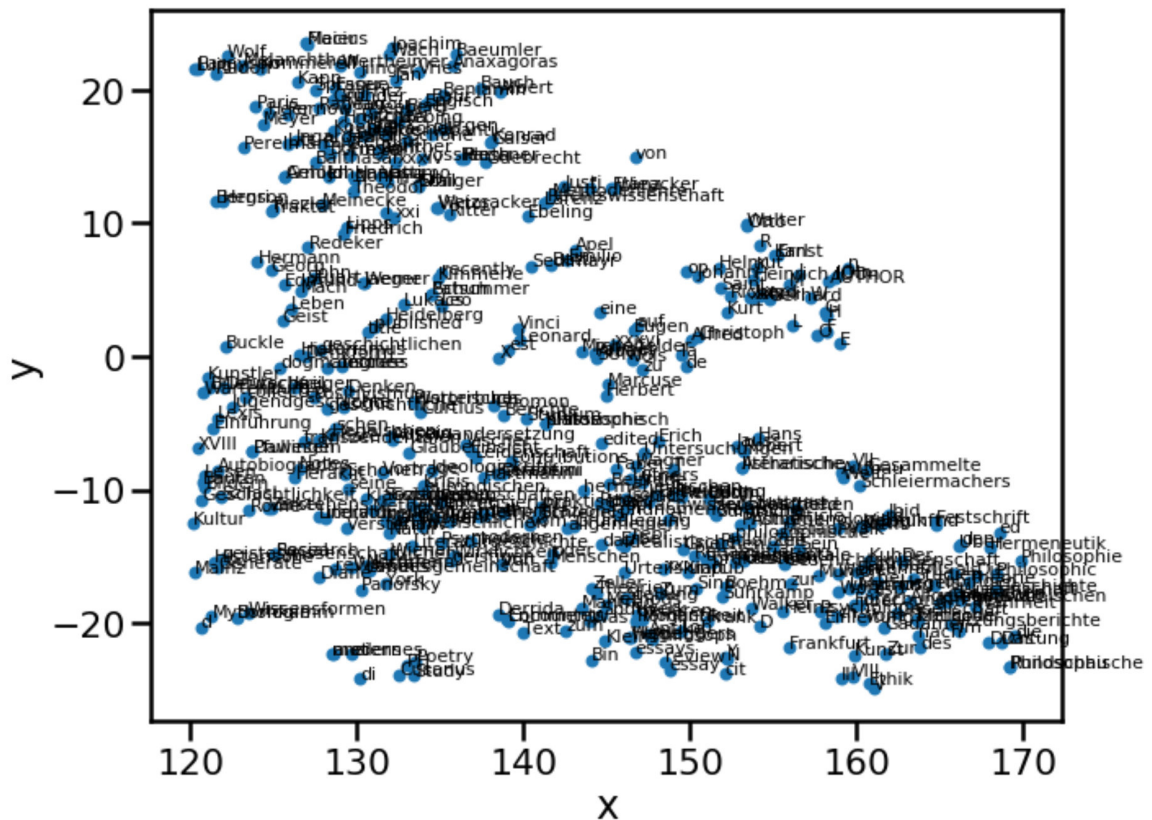
Words closest to the given words

```
In [33]:   word2vec .wv.most_similar("hermeneutics")
```

```
Out[33]:   [('theology', 0.6939617395401001),
            ('theological', 0.6652019619941711),
            ('Protestant', 0.6600164175033569),
            ('positivism', 0.6594288349151611),
            ('philological', 0.6527665257453918),
            ('biblical', 0.650628924369812),
            ('philology', 0.6295825242996216),
            ('jurisprudence', 0.6273232698440552),
            ('triumph', 0.6135364770889282),
            ('romantic', 0.6123664379119873)]
```

```
In [34]:   word2vec .wv.most_similar("language")
```

```
Out[34]:   [('linguistic', 0.6164131164550781),
            ('medium', 0.6057897806167603),
            ('foreign', 0.604753851890564),
            ('gesture', 0.5861180424690247),
            ('enters', 0.5855332612991333),
            ('entering', 0.579769492149353),
            ('grow', 0.5773585438728333),
            ('languages', 0.5726710557937622),
            ('speakers', 0.565049946308136),
            ('communication', 0.5625156164169312)]
```

```
In [35]:   word2vec .wv.most_similar("technology")
```

```
Out[35]:   [('investigators', 0.9139717817306519),
            ('explaining', 0.9090038537979126),
            ('badly', 0.9080491065979004),
            ('invoked', 0.9003320932388306),
            ('fitted', 0.8987998962402344),
            ('superstition', 0.897407054901123),
            ('specialized', 0.8953264951705933),
            ('founders', 0.8936773538589478),
            ('inferences', 0.8930826187133789),
            ('objectifying', 0.8912484645843506)]
```

Linear relaἔonships between word pairs

```
In [36]:   def nearest_similarity_cosmul(start1, end1, end2):
               similarities = word2vec.wv.most_similar_cosmul(
                   positive=[end2, start1],
                   negative=[end1]
               )
               start2 = similarities[0][0]
               print("{start1} is related to {end1}, as {start2} is related to {end2}".format
           (**locals()))
               return start2
```

```
In [37]:   nearest_similarity_cosmul("language", "power", "state")
           nearest_similarity_cosmul("hermeneutics", "philosophy", "truth")
           nearest_similarity_cosmul          ("truth", "text", "language")
```

```
           language is related to power, as occurs is related to state
           hermeneutics is related to philosophy, as texts is related to truth
           truth is related to text, as discrediting is related to language
```

```
Out[37]:   'discrediting'
```

```
In [38]:   word2vec .wv.most_similar(positive=['language'], negative=['truth'])
```

```
Out[38]:   [('linguistic', 0.3101714253425598),
            ('Humboldt', 0.3088313341140747),
            ('languages', 0.3015397787094116),
            ('foreign', 0.28921735286712646),
            ('Latin', 0.28912097215652466),
            ('word', 0.2510349154472351),
            ('formation', 0.20814663171768188),
            ('Greek', 0.19917407631874084),
            ('usage', 0.1906086653470993),
            ('Language', 0.1819884181022644)]
```

```
In [39]:   word2vec .wv.most_similar(positive=['truth'], negative=['men'])
```

```
Out[39]:   [('questioning', 0.40631091594696045),
            ('philosophical', 0.3960045576095581),
            ('claim', 0.37246373295783997),
            ('objection', 0.3374600410461426),
            ('intention', 0.3333823084831238),
            ('transcendental', 0.3271540403366089),
            ('answer', 0.32421034574508667),
            ('Historical', 0.31538695096969604),
            ('principle', 0.310794472694397),
            ('raised', 0.31049269437789917)]
```

```
In [40]:   print  (word2vec.wv.most_similar_cosmul(positive='truth', negative=None, topn=5))
```

```
           [('progressive', 0.8384996056556702), ('Tightness', 0.8382585644721985), ('attai
           ned', 0.8366586565971375), ('claim', 0.8337680697441101), ('merge', 0.8329724669
           456482)]
```

Text Summarization This module provides functions for summarizing texts. Summarizing is based on ranks of text sentences using a variation of the TextRank algorithm. Federico Barrios, Federico L´opez, Luis Argerich, Rosita Wachenchauzer (2016). Variations of the Similarity Function of TextRank for Automated Summarization, https://arxiv.org/abs/1602.03606 (https://arxiv.org/abs/1602.03606)

```
In [41]:   #from gensim.summarization import summarize, keywords
           #from pprint import pprint

           # Summarize the paragraph
           #pprint(summarize(corpus_raw, word_count=20))
           #> ('the PLA Rocket Force national defense science and technology experts panel, '
           #>  'according to a report published by the')

           # Important keywords from the paragraph
           #print(keywords(text))
```

```
In [42]:   # Which word from the given list doesn't go with the others?
           #print(word2vec.wv.doesnt_match(['god', 'death', 'Ahab', 'Jesus', 'root']))
```

```
In [43]:   # Compute cosine distance between two words.
           #print(word2vec.wv.distance('god', 'sun'))
           #> 0.22957539558410645
```

Get the probability distribuĕon of the center word given context words.

Parameters

        context_words_list (list of str) – List of context words.

        topn (int, optional) – Return topn words and their probabilities.

```
In [44]:   output_sentence = "truth and existence "
           wordlist = str.split(output_sentence)
           print  (word2vec.predict_output_word(context_words_list=wordlist, topn=10))
```

```
           [('language', 0.00093965104), ('own', 0.0008969674), ('truth', 0.0007870565), ('
           into', 0.0007516786), ('hence', 0.00069189), ('their', 0.00066980545), ('its',
           0.0006252158), ('itself', 0.0006053861), ('all', 0.0005986291), ('claim', 0.0005
           785071)]
```

```
In [45]:    # Get the words closer to w1 than w2
            print (word2vec.wv.words_closer_than(w1='philosophy', w2='hermeneutics'))
```

Find a word in the plot

```
In [46]:    points = pd.DataFrame(
                [
                    (word, coords[0], coords[1])
                    for word, coords in [
                        (word, all_word_vectors_matrix_2d[word2vec.wv.vocab[word].index])
                        for word in word2vec.wv.vocab
                    ]
                ],
                columns=["word", "x", "y"]
            )
```

We search for a certain "centerword" in our Dataframe and add '(?:\s|$)' as empty space behind the word, otherwise we will also get matches IN an word as return.

```
In [47]:    centerword = "truth"
            df = points
            df[df['word'].str.match(centerword + '(?:\s|$)')]
            value_x = df.loc[df['word'].str.match(centerword + '(?:\s|$)'), 'x'].values[0]
            value_y = df.loc[df['word'].str.match(centerword + '(?:\s|$)'), 'y'].values[0]
            print (value_x, value_y)
```

-75.22692108154297 65.79857635498047

The values are used to built a plot with a certain width around this word.

In [48]:
```python
#value_x = -36.29
#value_y = -89.17
width = 10

def plot_region(x_bounds, y_bounds):
    slice = points[
        (x_bounds[0] <= points.x) &
        (points.x <= x_bounds[1]) &
        (y_bounds[0] <= points.y) &
        (points.y <= y_bounds[1])
    ]

    ax = slice.plot.scatter("x", "y", s=35, figsize=(10, 10))
    for i, point in slice.iterrows():
        ax.text(point.x + 0.008, point.y + 0.008, point.word, fontsize=11)

plot_region(x_bounds=(value_x-width/2, value_x+width/2), y_bounds=(value_y-width/2,
value_y +width/2))
```
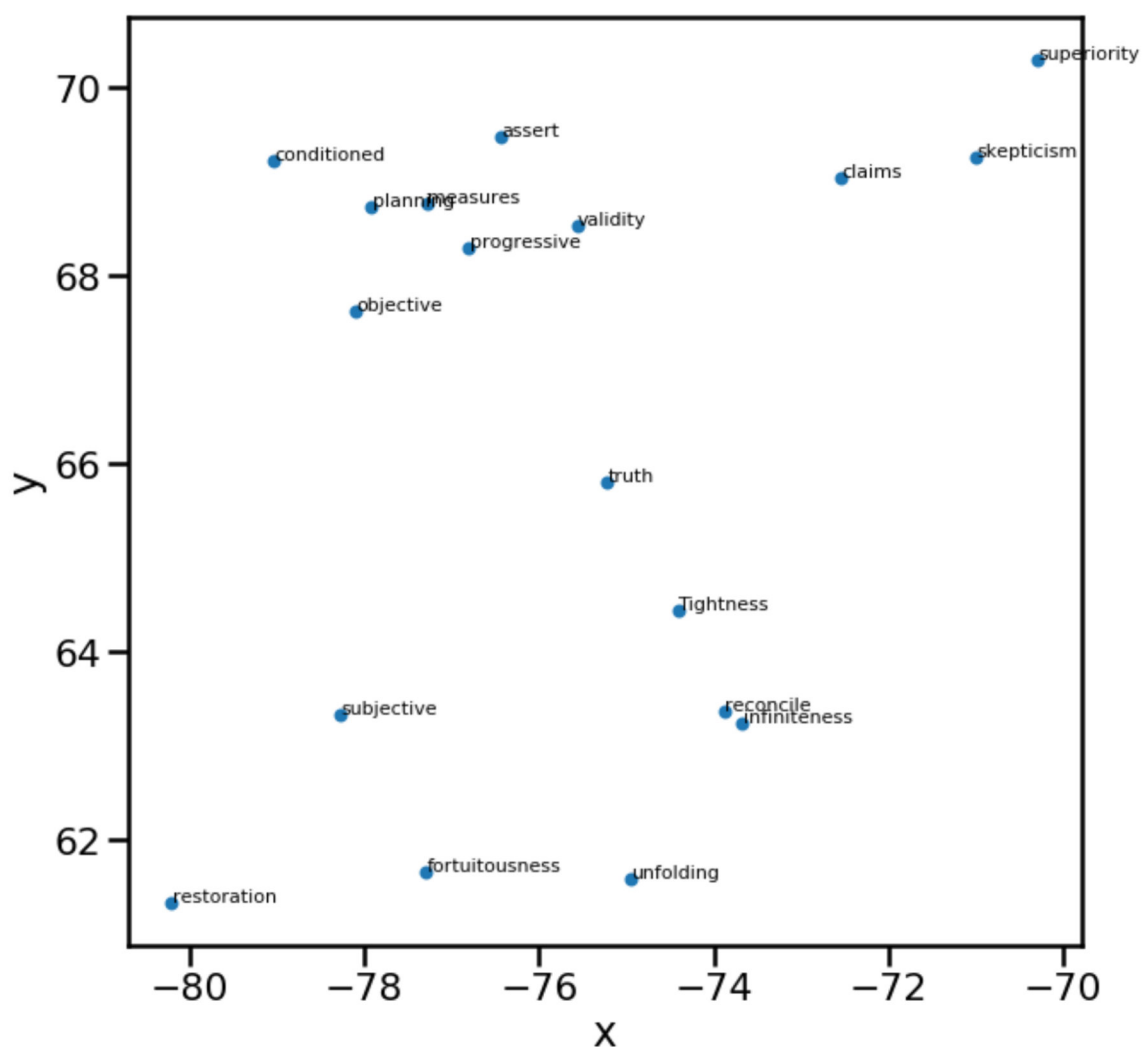
Word Clusters

In [49]:
```python
keys = ['language', 'state', 'philosophy', 'death', 'Hegel', 'technology', 'language', 'word']

embedding_clusters = []
word_clusters = []
for word in keys:
    embeddings = []
    words = []
    for similar_word, _ in word2vec.wv.most_similar(word, topn=30):
        words.append(similar_word)
        embeddings.append(word2vec[similar_word])
    embedding_clusters.append(embeddings)
    word_clusters.append(words)
```

```
D:\Anaconda3\lib\site-packages\ipykernel_launcher.py:10: DeprecationWarning: Cal
l to deprecated `__getitem__` (Method will be removed in 4.0.0, use self.wv.__ge
titem__() instead).
  # Remove the CWD from sys.path while we load stuff.
```

In [50]:
```python
embedding_clusters = np.array(embedding_clusters)
n, m, k = embedding_clusters.shape
tsne_model_en_2d = TSNE(perplexity=15, n_components=2, init='pca', n_iter=3500, random_state=32)
embeddings_en_2d = np.array(tsne_model_en_2d.fit_transform(embedding_clusters.reshape(n * m, k))).reshape(n, m, 2)
```

```
import matplotlib.pyplot as plt
import matplotlib.cm as cm

from matplotlib.axes._axes import _log as matplotlib_axes_logger
matplotlib_axes_logger.setLevel('ERROR')


def tsne_plot_similar_words(title, labels, embedding_clusters, word_clusters, a, fi
lename=None):
    plt.figure(figsize=(16, 9))
    colors = cm.rainbow(np.linspace(0, 1, len(labels)))
    for label, embeddings, words, color in zip(labels, embedding_clusters, word_clu
sters, colors):
        x = embeddings[:, 0]
        y = embeddings[:, 1]
        plt.scatter(x, y, c=color, alpha=a, label=label)
        for i, word in enumerate(words):
            plt.annotate(word, alpha=0.5, xy=(x[i], y[i]), xytext=(5, 2),
                         textcoords='offset points', ha='right', va='bottom', size=
8)
    plt.legend(loc=4)
    plt.title(title)
    plt.grid(True)
    if filename:
        plt.savefig(filename, format='png', dpi=150, bbox_inches='tight')
    plt.show()


tsne_plot_similar_words('Similar words in the Bible', keys, embeddings_en_2d, word_
clusters, 0.2,
                        'similar_words.png')
```
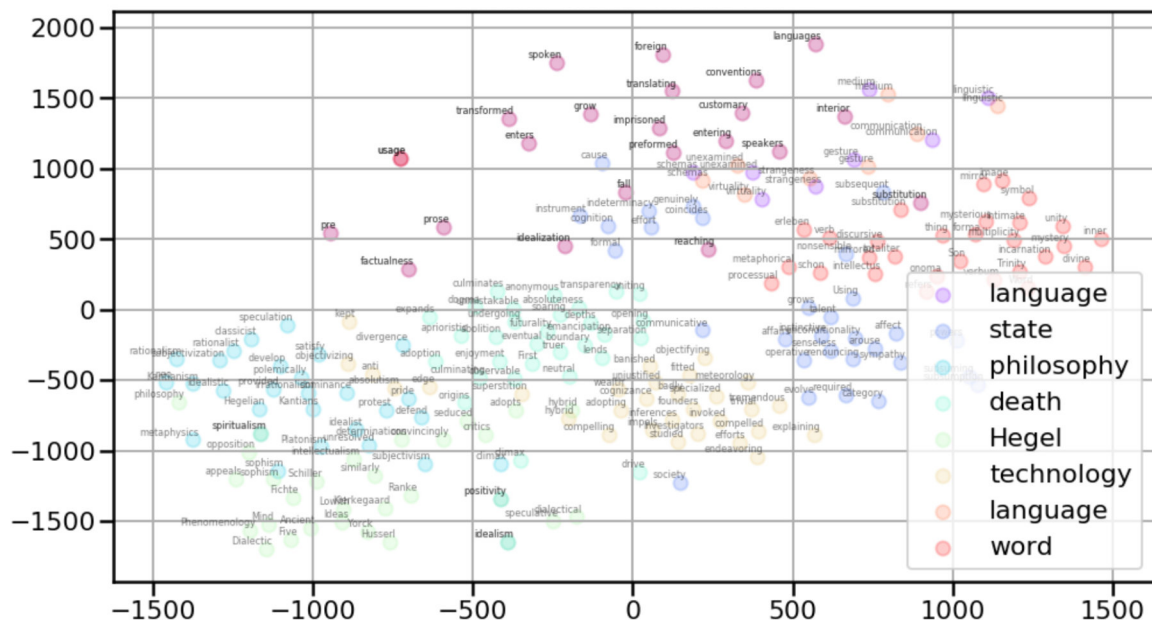
```
cluster_table = pd.DataFrame(word_clusters, keys)
cluster_table
```

Out[52]:

	0	1	2	3	4	5	6	
language	linguistic	medium	foreign	gesture	enters	entering	grow	langua
state	affairs	powers	sympathy	genuinely	coincides	evolve	operative	cate
philosophy	neo idealistic polemically		Kantianism	spiritualism	satisfy	subjectivization		soph
death	abolition	transparency	enjoyment	undergoing	adoption	eventual	neutral	soa
Hegel	dialectical	speculative	Phenomenology	opposition	Mind	idealism	Yorck	Ra
technology	investigators	explaining	badly	invoked	fitted	superstition	specialized	foun
language	linguistic	medium	foreign	gesture	enters	entering	grow	langua
word	verbum	mystery	mirror	incarnation	forma	Trinity	image	metapho

8 rows × 30 columns

Vector Space (Wikipedia)
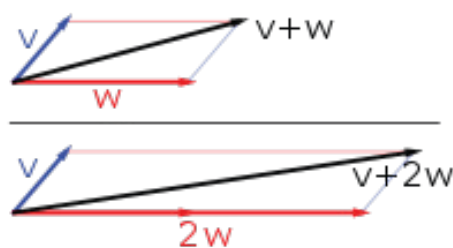
Vector addition and scalar multiplication: a vector v (blue) is added to another vector w (red, upper illustration). Below, w is stretched by a factor of 2, yielding the sum v + 2w.

A vector space (also called a linear space) is a collection of objects called vectors, which may be added together and multiplied ("scaled") by numbers, called scalars. Scalars are often taken to be real numbers, but there are also vector spaces with scalar multiplication by complex numbers, rational numbers, or generally any field. The operations of vector addition and scalar multiplication must satisfy certain requirements, called axioms, listed below, in § Definition. For specifying that the scalars are real or complex numbers, the terms real vector space and complex vector space are often used.

Euclidean vectors are an example of a vector space. They represent physical quantities such as forces: any two forces (of the same type) can be added to yield a third, and the multiplication of a force vector by a real multiplier is another force vector. In the same vein, but in a more geometric sense, vectors representing displacements in the plane or in three-dimensional space also form vector spaces. Vectors in vector spaces do not necessarily have to be arrow-like objects as they appear in the mentioned examples: vectors are regarded as abstract mathematical objects with particular properties, which in some cases can be visualized as arrows.

Vector spaces are the subject of linear algebra and are well characterized by their dimension, which, roughly speaking, specifies the number of independent directions in the space. Infinite-dimensional vector spaces arise naturally in mathematical analysis, as function spaces, whose vectors are functions. These vector spaces are generally endowed with additional structure, which may be a topology, allowing the consideration of issues of proximity and continuity. Among these topologies, those that are defined by a norm or inner product are more commonly used, as having a notion of distance between two vectors. This is particularly the case

of Banach spaces and Hilbert spaces, which are fundamental in mathematical analysis.

Natural Language Processing in action - Manning:

Word Tokenization

Tokenization is the first step in an NLP pipeline, so it can have a big impact on therest of your pipeline. A tokenizer breaks unstructured data, natural language text,into chunks of information that can be counted as discrete elements. These counts oftoken occurrences in a document can be used directly as a vector representing thatdocument. This immediately turns an unstructured string (text document) into anumerical data structure suitable for machine learning. These counts can be useddirectly by a computer to trigger useful actions and responses. Or they might also beused in a machine learning pipeline as features that trigger more complex decisionsor behavior. The most common use for bag-of-words vectors created this way is fordocument retrieval, or search. The simplest way to tokenize a sentence is to use whitespace within a string as the"delimiter" of words. In Python, this can be accomplished with the standard library method split, which is available on all str object instances as well as on the strbuilt-in class itself.

.

Word vectors

In 2012, Thomas Mikolov, an intern at Microsoft, found a way to encode the meaningof words in a modest number of vector dimensions.4 Mikolov trained a neural network5 to predict word occurrences near each target word. In 2013, once at Google,Mikolov and his teammates released the software for creating these word vectors andcalled it Word2vec.6 Word2vec learns the meaning of words merely by processing a large corpus of unlabeled text. No one has to label the words in the Word2vec vocabulary. No one has to tellthe Word2vec algorithm that Marie Curie is a scientist, that the Timbers are a soccerteam, that Seattle is a city, or that Portland is a city in both Oregon and Maine. And noone has to tell Word2vec that soccer is a sport, or that a team is a group of people, orthat cities are both places as well as communities. Word2vec can learn that and muchmore, all on its own! All you need is a corpus large enough to mention Marie Curie andTimbers and Portland near other words associated with science or soccer or cities. This unsupervised nature of Word2vec is what makes it so powerful. The world isfull of unlabeled, uncategorized, unstructured natural language text.

Supervised learning

In supervised learning, the training data must be labeled in some way. An exampleof a label is the spam categorical label on an SMS message. Another example is the quantitative value for the number of likes of a tweet. Supervised learning is what most people think of when they think of machine learning. A supervisedmodel can only get better if it can measure the difference between the expected output (the label) and its predictions. Instead of trying to train a neural network to learn the target word meanings directly(on the basis of labels for that meaning), you teach the network to predict words near the target word in your sentences. So in this sense, you do have labels: the nearby words you're trying to predict. But because the labels are coming from the dataset itself and require no hand-labeling, the Word2vec training algorithm is definitely anunsupervised learning algorithm. Another domain where this unsupervised training technique is used is in timeseries modeling. Time series models are often trained to predict the next value in asequence based on a window of previous values. Time series problems are remarkablysimilar to natural language problems in a lot of ways, because they deal with orderedsequences of values (words or numbers). And the prediction itself isn't what makes Word2vec work. The prediction is merely a means to an end. What you do care about is the internal representation, the vector that Word2vec gradually builds up to help it generate those predictions. This representation will capture much more of the meaning of the target word (its semantics) than the word-topic vectors..

Unsupervised learning

In unsupervised learning, you train the model to perform a task, but without any labels, only the raw data. Clustering algorithms such as k-means or DBSCAN are examples of unsupervised learning. Dimension reduction algorithms like principalcomponent analysis (PCA) and t-Distributed Stochastic Neighbor Embedding (t-SNE)are also unsupervised machine learning techniques. In unsupervised learning, themodel finds patterns in the relationships between the data points themselves. Anunsupervised model can get smarter (more accurate) just by throwing more data at it. NOTE Models that learn by trying to repredict the input using a lowerdimensional internal representation are called autoencoders. This may seem odd to you. It's like asking the machine to echo back what you just asked it,only it can't record the question as you're saying it. The machine has to compress your question into shorthand. And it has to use the same shorthandalgorithm (function) for all the questions you ask it. The machine learns anew shorthand (vector) representation of your statements. If you want to learn more about unsupervised deep learning models that create compressed representations of high-dimensional objects like words,search for the term "autoencoder." They're also a common way to get started with neural nets, because they can be applied to almost any dataset. Word2vec will learn about things you might not think to associate with all words. Did you know that every word has some

geography, sentiment (positivity), and gender associated with it? If any word in your corpus has some quality, like "placeness," "people-ness," "conceptness," or "femaleness," all the other words will also be given a scorefor these qualities in your word vectors. The mean-ing of a word "rubs off" on theneighboring words when Word2vec learns word vectors. All words in your corpus will be represented by numerical vectors. For Word2vec word vectors, the words must oc-cur near each other—typically fewer than five words apart and within the same sentence. And Word2vec wordvector topic weights can be added and subtracted to create new word vectors thatmean something! A mental model that may help you under-stand word vectors is to think of word vectors as a list of weights or scores. Each weight or score is associated with a specific dimension of meaning for that word.

tweet2vec
@Sirin_Unmanee

🏠 **Machine Learning**

🔍 **#sumaery2019**

🔔 **Bauhaus-Universität Weimar**

#Initial_Idea

At the beginning, I was curious in finding the linguistic construction in Quentin Taratino's films, since his manner of writing the dialogue for his characters is outstanding. I was using his movie script as a source but the result is not satisfactory. Supposedly, I cannot implement Word2Vec to find the aesthetic in his writing style, as the result is too simple and common.

#Developed_Idea

Therefore, I came up with another idea, which is to find the vision and characteristic behind "famous".

#Concept

To find out how they portray themselves to the world, and what message they want to tell.

According to twitter with the most number of followers, I have chosen six twitter accounts to experiment with, starting from collecting their tweet archive (until 3th July 19).

#Tool

I was using Word2Vec to analyze that data, finding the relation of words in their tweet in semetically way.

#Result

The result turns out interesting. They all have quite similar cloud shaped scatter plot, nothing totally unique. However, the relations between words reflect their personality in the public's opinion very well.

#Reflection

It shows that public figures are also able to apply this method in the opposite direction, searching for the best possible way to write their tweets conveying their image or their company's image. For most twitter's users, the analyzed data of the tweets are useful for the advertisement, since it can roughly predict individual's personality and interests.

© by Sirin Unmanee

Barack Obama ✔
@BarackObama
613.4K Following 106.9M Followers
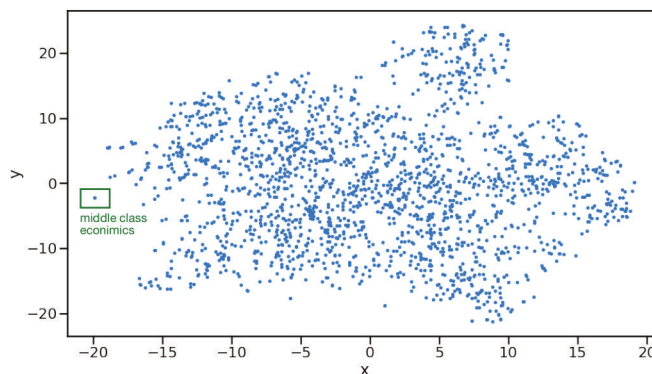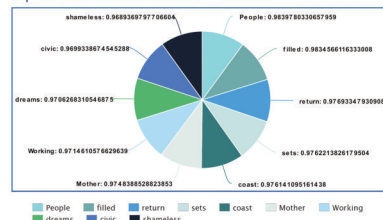
Top 10 Words : Most Similar to "Democrats"
Top 10 Words : Most Similar to "Republicans"
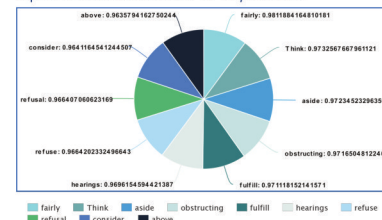
nearest_similarity_cosmul('equality', 'nation', 'America')

equality is related to nation, as lasting is related to America

nearest_similarity_cosmul('climate', 'pollution', 'health')

climate is related to pollution, as care is related to health

Kim Kardashian West ✔
@KimKardashian
146 Following 61.2M Followers
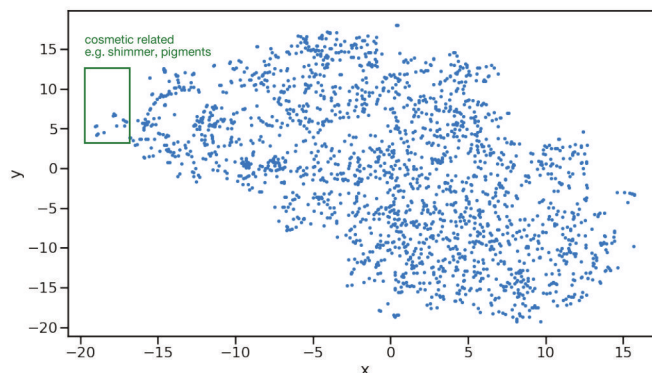
Top 10 Words : Most Similar to "body"
Top 10 Words : Most Similar to "beautiful"
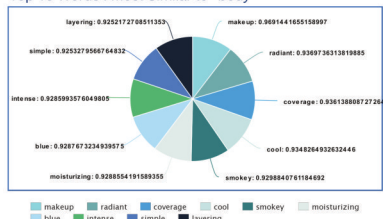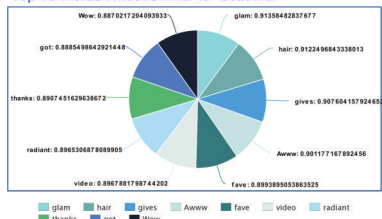
nearest_similarity_cosmul('beautiful', 'face', 'body')

beautiful is related to face, as gorgeous is related to body

nearest_similarity_cosmul('makeup', 'beauty', 'family')

makeup is related to beauty, as heart is related to family

Justin Bieb...
@justinbieber
298.2K Following 105.9M...
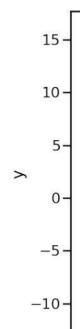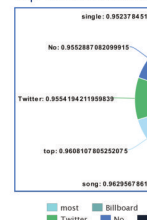
Elon Musk
@elonmusk
81 Following 27.2M Follo...
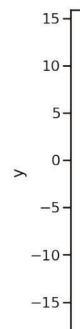
nearest_similarity_co...

love is relate...

nearest_similarity_co...

new is relate...

nearest_similarity_co...

Falcon is rela...

nearest_similarity_co...

autopilot is r...

Donald J. Trump ✓
@realDonaldTrump

47 Following **61.7M** Followers

working hard

white house

Tim Cook ✓
@tim_cook

64 Following **11.4M** Followers

external link
e.g. http

condolences word
e.g. RIP, heartbroken

music award related
e.g. VMAs, Billboard

space mission related
e.g. NASA, Dragon
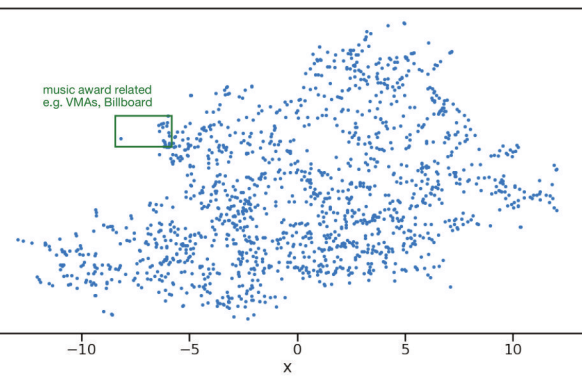
Top 10 Words : Most Similar to *"record"*

Top 10 Words : Most Similar to *"song"*

Top 10 Words : Most Similar to *"Democrats"*

Top 10 Words : Most Similar to *"Republicans"*

Top 10 Words : Most Similar to *"Tesla"*

Top 10 Words : Most Similar to *"SpaceX"*

Top 10 Words : Most Similar to *"Apple"*
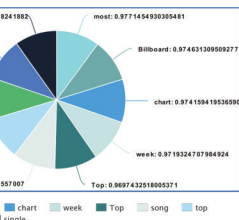
Top 10 Words : Most Similar to *"technology"*
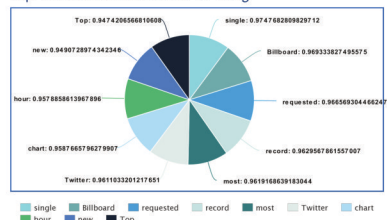
cosmul('love', 'fans', 'music')

ed to fans, as I is related to music

cosmul('new', 'album', 'video')

ed to album, as WhatDoYouMean is related to video
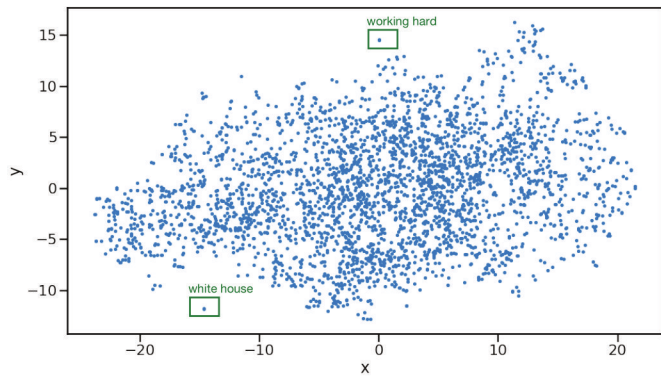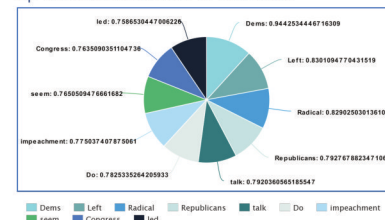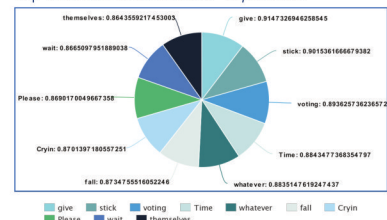
nearest_similarity_cosmul('Left', 'Democrats', 'Republicans')

Left is related to Democrats, as voting is related to Republicans
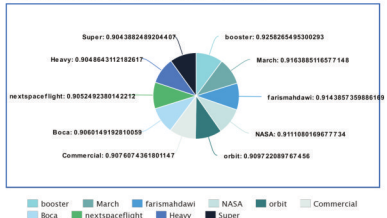
nearest_similarity_cosmul('people', 'USA', 'China')

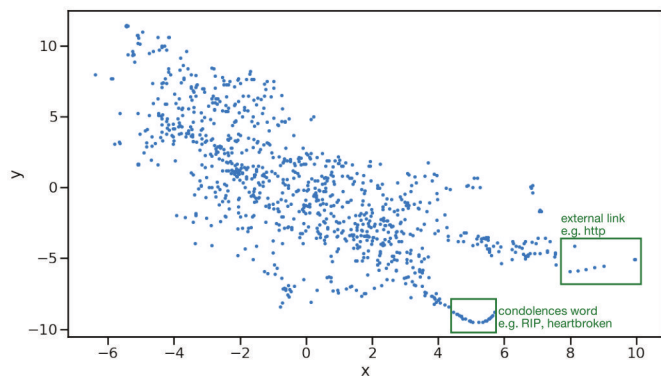people is related to USA, as foreign is related to China
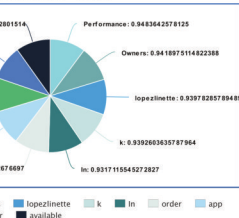
cosmul('Falcon', 'SpaceX', 'Tesla')

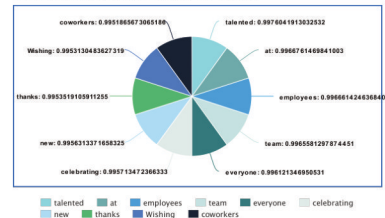ated to SpaceX, as Model is related to Tesla

cosmul('autopilot', 'safety', 'risk')

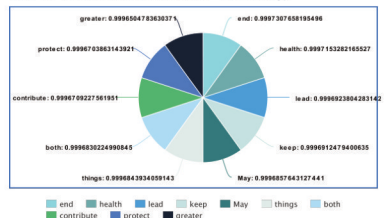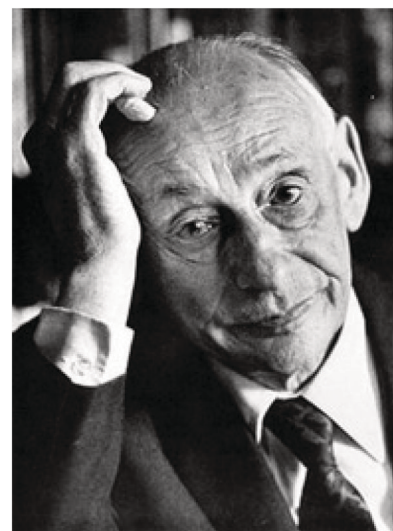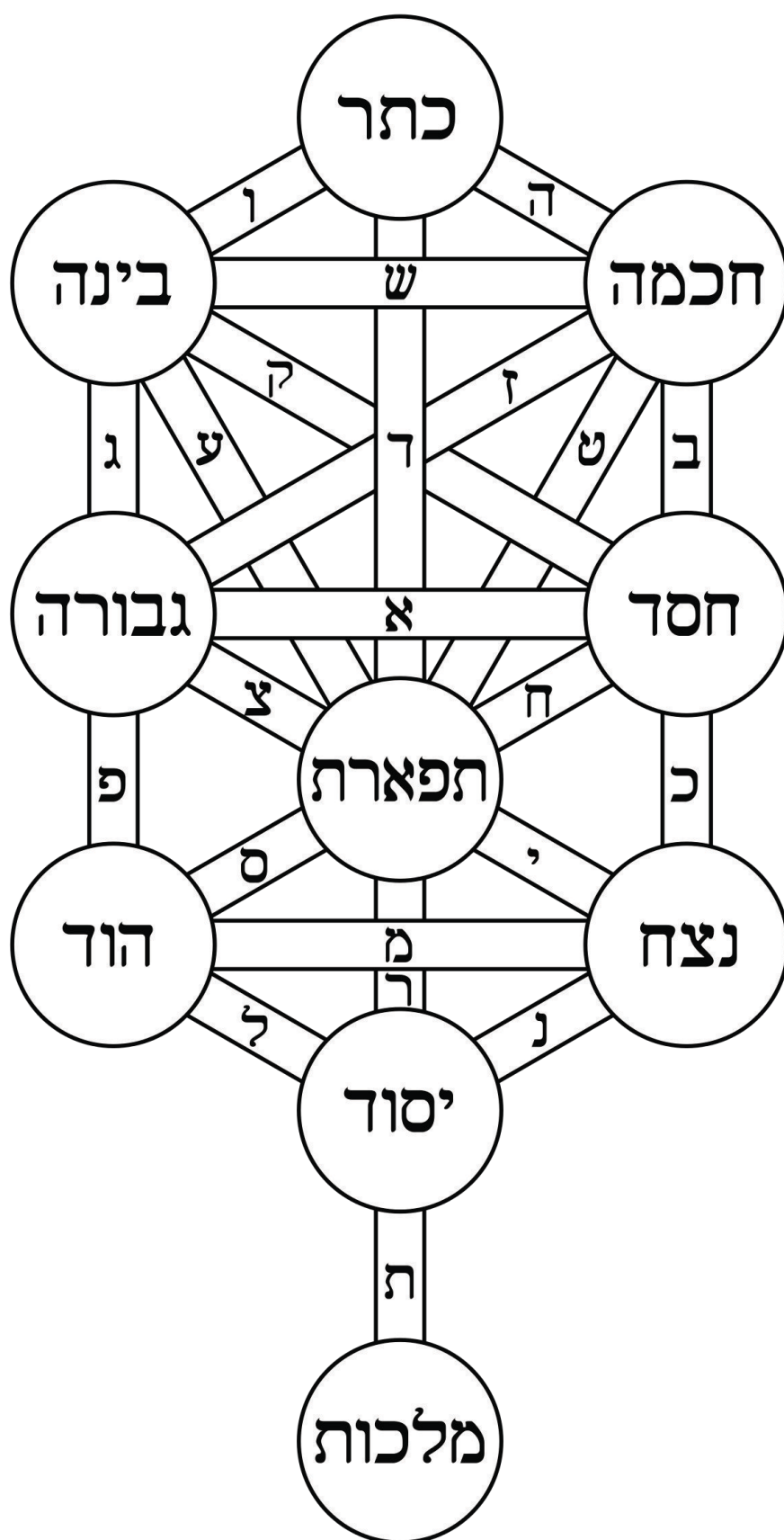elated to safety, as ship is related to risk

nearest_similarity_cosmul('Apple', 'innovation', 'creativity')

Apple is related to innovation, as employees is related to creativity

nearest_similarity_cosmul('future', 'products', 'iPhone')

future is related to products, as new is related to iPhone

Gerhard Scholem who, after his immigration from Germany to Israel, changed his name to Gershom Scholem (Hebrew: גרשם שלום) (December 5, 1897 – February 21, 1982), was a German-born Israeli philosopher and historian. He is widely regarded as the founder of the modern, academic study of Kabbalah, becoming the first Professor of Jewish Mysticism at the Hebrew University of Jerusalem.[1] His close friends included Walter Benjamin and Leo Strauss, and selected letters from his correspondence with those philosophers have been published.

Scholem is best known for his collection of lectures, Major Trends in Jewish Mysticism (1941) and for his biography Sabbatai Zevi, the Mystical Messiah (1973). His collected speeches and essays, published as On Kabbalah and its Symbolism (1965), helped to spread knowledge of Jewish mysticism among non-Jews.

Kabbalah

At the centre of the Jewish mystics' ideas is a symbolic tree diagram known as the "tree of life". This tree consists of a network of ten spheres and their connections. Its structure is not explained by a hierarchical sequence or linear legibility, but can only be fathomed by penetrating a complex reference system. It can, the Kabbalists believe, be understood as the grammar of God's language through which he enters into contact with the world.

This idea is not unproblematic: In Judaism, there is an absolute prohibition of images in relation to God, which was already included in the Ten Commandments. Through increasing philosophisation of the Jewish faith, God became more and more abstract in the Middle Ages and thereby lost liveliness and contour for the ordinary Jews. The archaic-mythic images were now completely banished and regarded as heresy, since in the opinion of the rabbis the infinity of God can never be recorded concretely. With the appearance of the cryptic book Bahir around 1150, however, explicit image content appeared for the first time in a Jewish Torah commentary.

The mythical symbols are hierarchically superimposed according to the notions of how they are parabolically represented in the Book of Bahir; hence the image of a tree. This approached the limit of what the Jewish religion could endure; the concretisation or division of God into sub-areas (primeval powers) could also be regarded as heresy. Some time later, a new concept emerged in Zohar, that of the En Sof. The fundamental relationship here is between the primordial ground, the En Sof and the tree; this primordial relationship itself is in turn represented by the first sphere of the tree, "Kether".

The apparent duality causes itself, does not exist by separation, but by the withdrawal of God within itself, which is generally called "Tzimzum", but the vacuum created by the Tzimzum gives the possibility of the existence of the the very Sephirot Kether (the first stage represents the entire divine conception of the tree). The heresy of dualism, the idea of another to God, is so skilfully circumvented: God is still everything, he rests only behind the image in voluntary exile, because in order to enable communication, he must withdraw into himself, he must dissolve his omnipresence in order to enable a sender-receiver relationship at all.

The logical principle of such an ontology can still be found in the pragmatist and semiotician Charles Sanders Peirce when he writes:

"If we want to think further in the sense of logic and science and explain the universe as a whole, we must assume that the whole universe did not exist, i.e. that there was State of absolute nothingness. (...) So we begin with nothing, with the pure zero point. But this is not the nothing of negation. There is no individual object, no external or internal compulsion to something, no law of nature: a primordial nothing, in which the whole universe is enclosed or presaged, and as such an absolutely unlimited - a boundless possibility. It is without all compulsion and without law: boundless freedom."

The Sephirot

The ten spheres of the tree, called "Sephirot", are regarded in the Kabbalah as archetypes of creation or the elemental forces of God. Sephirot (or sefirot) is the plural to the Hebrew word "Sephira," which means "number," embodying the different revelations of God through His creation, spirit, beauty, morality, sexuality, grace, etc. The sephirots lie on top of each other in a hierarchy, but are by no means completely separated from each other; in each sephirode the others are reflected as well. Seen this way, the number 10 also contains the number 5. The ten Sephirot are the fixed points of the kabbalistic system, they give it form, position and hold. The Hebrew word for text is "Sepher", which literally means "book" and is a masculine noun. Number is Sephar, from which the word "number" was derived; this noun forms the feminine form of the same root as "Sepher". Revelation or communication means in the original "Sippur", from "to tell". The paths between the sephirots represent the language, each path is assigned exactly one letter. They thus form a solid structure and embed the shape of the tree of life into a complex logical structure.

For the Jews there was traditionally a very close connection between creation and language. While the basic numbers are, so to speak, the coordinates of the hierarchy of the tree of life, the letters of the Hebrew alphabet serve as their links. The simple idea behind it is: The relationship between form and word, between sequence of letters and meaning, and ultimately between language and reality is God-given, since in Hebrew number and text are closely connected (with only different genus ...). For the Kabbalists, the hidden coding of the Torah now consisted of the close connection between the digits and their meaning: words with the same digit can, in their opinion, also be used to make connections with regard to their statement. This technique of interpretation leads to highly impressive results, since these connections result in a widely ramified network of correlations.

The structure on which the Kabbalah is based is thus comparable to a cryptogrammatic key which only enables the full understanding of the Torah. For the Kabbalists, the Torah itself conceals the essence of God, which can be deciphered with the insights and techniques gained from the Kabbalah; by understanding the ways of his communication, a way to God is possible.

The columns

Perhaps the most essential basic element of the structure of the Tree of Life, which owes its existence to a Neoplatonic conception of nature, is its division into three columns. These columns are divided into thesis (right), antithesis (left) and synthesis (center). The column of the synthesis in itself already contains the dissolution of the symmetry of the trinity, because on it there are four sephi red, on the left and right

The Triads

At the next structural level, the strict dialectic of the hierarchical column division is dissolved, with three triads appearing through a horizontal division. But since the ten Sephirot cannot be divided by three, an imbalance arises, just the tree form. Symmetry can no longer be achieved. The first triad is recursive, the synthesis precedes the other principles. From the possibility of existence as a result of the divine will(1) arise the thought/wisdom(2) and understanding(3), the active and the passive. The purity of the first, divine triad is unattainable for man, it is consequently separated from the "abyss", the lower seven Sephirot.

The second triad refers to moral concepts of grace(4) and justice(5); it is the only one with the conventional thesis antithesis synthesis structure. Morality oscillates between divine goodness and forgiveness and punishing and judging hardness and finds its balance in Scripture (6). This is equated with the Torah; true morality is therefore to be found in the Bible.

The third triad of human life consists of a heroic knightly symbol, "victory"(7), the feminine beauty of "splendour"(8) and the resulting "foundation"(9), sexuality and reproduction. Directly connected to the ninth Sephira is the material world, the "kingdom"(10). In this last instance, the number 10, a great mystery hides itself: this Sephirot is titled not only with the name "Malkuth" (kingdom), but also with the term "Shechina", the exiled female part of God, which at the same time embodies his only tangible secular character.

An interpretation of the Torah would not be necessary if the process of "knowledge" produced such clarity. Therefore there must be a break, a problem in creation, which only causes the discrepancy between meaning and significance.

The imperfection of creation and language, i.e. the possible departure from truth, now implies the necessity of human judgment (second triad). The right one has more proximity to the truth than the wrong one, so the judgement always has to do with the distance (from God).

In the middle there is a hole, the sphere Daath(4), because the grace of perfect communication "in the sense of the inventor" has split into Scripture(6), Language(10) and Sexuality(9). The second duality,(4) and (5), flows below the cross struts into the Torah(6), so the judgment(5) and grace(4) find their synthesis in Holy Scripture(6). The Torah is the law by which justice is enforced. The third duality, (7) and (8), flows into the phallus(9), which separates Scripture from language, but at the same time represents the method of its return to Daath(4); the radiant physical and noble flows into an idealized conception of sexuality.

At the lower end of the chain there is now that exiled "H", the Shechina, that is the feminine aspect of God(10), the spoken word

that can be experienced: the real world itself. It is the only visible part of the tree, the "behind" can only be experienced through the secret teachings of the Kabbalah. However, this imperfect, asymmetrical system is not the work of an evil demirurg, but the work of God and the guilt of man: by eating from the tree of knowledge the judgment was carried out: the separation. This caused his case, his spatial distancing from the truth.

But now this is not only to be understood negatively as with the Gnostics ("Fall of Man"), on the contrary, the essence of God is reflected here, who exiled himself before he created. Through this separation of the human from the divine and God from his world, also a reintegration is possible, the human gets a goal, a task. Born in sin, his goal from now on is this reintegration. The attainment of the highest consists in the reintroduction of Shechina into the entire structure of the tree of life: the spoken word is catapulted by the ecstatic element of the phallus (an empty vehicle) over the hurdle of physical perfection up to Scripture. Through the marriage of language and writing, the judgement is overcome and the original symbiosis is achieved, metric and balance can be restored. The whole system is thus based on a great potency: a possible (perfect) "becoming".

Accordingly, the phallic symbol(9), which Sephirot Yesod and Malkuth(10) have a tremendous power, which has resulted from the separation of Word and Scripture, must reign between the phallic symbol(9), Yesod, and Malkuth(10).the energy stored in the phallic is apparently able to reunite the two nuclei and bring the whole back to its ancestral place. This energy, which has a sexual connotation, is thus the core of the dynamic that enables the mystic to reunite with the omniscience of God.

Kabbalah and Modernity: Walter Benjamin(1892–1940)

"I can understand literature at all with poetic,prophetic,factual as far as the effect is concerned, but in any case only magically that means un-medium-bar. Every healing, yes, every not in the innermost devastating activity of Scripture is based on its (the word's, the language's) mystery. No matter in how many forms language may prove to be effective, it will do so not through the mediation of content, but through the purest exploration of its dignity and essence. [...] My concept of objective and at the same time highly political style and writing is: to lead to that which failed the word; only where this sphere of the wordless opens up in unspeakably pure power can the magic spark between word and moving act jump over, where the unity of these two is equally real. I do not believe that the word would be anywhere further from the divine than the "real" action, so it is not more capable of leading into the divine than through itself and its own purity. Taken as a remedy, it proliferates."44

In this quote from a letter by Benjamin to Martin Buber, the critic's high affinity for a mystical cabbalistic linguistic concept becomes clear. In his opinion, language is not primarily characterized by the conveyance of content, it is therefore not a medium in the sense of a container, which could only be understood as a functional utensil.

The linguistic-mystical tenor of the above work can also be heard in Benjamin's essay, written five years later, Über die Aufgabe des Übersetzers nach.die wahre Sprache,"in whose presentiment and description the only perfection lies [is] intensely hidden in translation. The true translation does not seek to reproduce the "meaning" of the original; rather, it seeks, in a literal sense which is "derivable from the interest of the preservation of meaning", to strike the "tone of feeling" which the words carry with them. If one subtracts the translated from the translated, there remains only a faint breath, an almost "immaterial something" that can be felt or guessed more than described. The translator's task is therefore not so much the transmission of a sense (which does not exist in this sense) as the sensitive tracing of the linguistic composition of the original, the finding of its essence, the "behind", which is now language, "pure language". The true translation is therefore characterized by a certain transparency, "it does not hide the original, does not stand in its light, but leaves pure language, as reinforced by its own medium, only to fall all the more fully on the original." The linguistic essence is never indivisible, because true language cannot be expressed through profane language, it is a purely spiritual entity, always in its afterlife. Here, the thinking inspired by the Kabbalah comes to full light.

"In all language and its formations there remains, apart from the communicable, a non communicable, a symbolizing or symbolized, depending on the context in which it is encountered. Symbolizing only, in the finite entities of language; but symbolized in the becoming of language itself." Thus the symbolic, which is not communicable and possesses a dynamic of "becoming", refers to the outside of finite language. The concept of God in kabbalistic terms is left out here, but the symbolising is found in the finite linguistic formations, the communicable things. But the metaphysical idea behind it remains the same: the symbolized has an infinite aspect, since in contrast to the symbolizing it has no demarcation and always has to be located beyond it. Thus, the symbolizing is mainly characterized by its limits, which allows us to presuppose a state that lies outside human experience. This concept thus has great parallels with the En Sof concept described above. Later, a similar idea appeared in French poststructuralism about the concept of ecrituré in a prominent role, for example in Barthes or in Derrida's Grammatology.

For Benjamin, however, the understanding of this true language, unlike the Kabbalah, is not a process of religious insight, but rather a psychological problem; thinking counteracts feeling when it tries to recognize meaning.

This dilemma is now defused by the introduction of the concept of "becoming," that is, without a religious twist; the "immediate" thus acquires a dynamic. The imperfection of the possibilities of expression is compensated by the movement, the possibility of repetition of the effort. The "becoming" contains the judgement in itself, since it always strives for perfection and completion; but actually it represents only a vector, which can lend coordinates to the judgement. The point of reference here is the distance to the true language, which one can guess or, better: feel.The process of critique ultimately makes it possible to locate every utterance somewhere between proximity and distance to pure language, to truth: "What in the development of language seeks to present itself, indeed to produce, is that core of pure language itself." In this conception of language there resonates a messianic thought of redemption; the power in language itself is obviously not sufficient to return it to the true language; therefore it can only be hoped for something that closes this gap: the way to it seems clear, it is "translation", aiming at something that in philosophy is called meta-language. "Is that last entity, which is pure language itself, bound in languages only to linguistics and its transformations?

To transform the symbolizing into the symbolized itself, to regain the pure linguistic form of the language movement, is the enormous and only capability of translation. In this pure language, which no longer means anything and no longer expresses anything, but as an expressionless and creative word that is meant in all languages, all communication, all meaning and all intention finally meets a layer in which they are destined to be extinguished. And it is from it that the freedom of translation to a new and higher right is confirmed."

Benjamin builds his metaphysical investigation entirely around a secular "profession" and completely renounces the concept of the divine. He thus concretizes Jewish mysticism and subjects it to a dialectical-materialistic method. Strangely enough, the matter gains clarity as a result. Benjamin's essay can therefore itself be regarded as a translation, a translation of Jewish Tradition considerations into the discourse of modernity. One can also read Benjamin's concept of the "translator" metaphorically, seeing it as an expression for a ferryman who constantly "translates" from one bank to the other. The task would therefore consist in bringing the two banks closer together; the enormous extent of this task is obvious.

About twenty years after his first language work, Benjamin devoted himself again to the subject, this time however under different aspects; God's creatorship was even more neglected and replaced by onto- and phylogenetic theories. But this is by no means an intellectual "further development"; there are two versions of this essay. One with the title Lehre vom Ähnlichen and a revised version with the title „Über das mimetischen Vermögen". In addition to the considerable shortening and consequently higher density of the explanations, the revised version differs mainly in its essentially materialistic-historical approach, whereby the metaphysical and mystical aspects are still sufficiently strong to be able to classify the text among Benjamin's metaphysical writings. The main features of the text can be reproduced as follows: The mimetic ability, the imitation of natural events, is given to man a priori. Benjamin even considers that there is "no higher function", "which is not decisively conditioned by mimetic ability". However, this property is now subject to an evolution, which is also the emergence of language. The initially pure imitation of nature led to the development of an awareness of immaterial connections.

The recognition of a context, be it in an image, in sounds or later in writing, always has its origin in the cult; therefore, even in times of highly developed religions, it retains its archaic relation to the occult and the magical. For example: the reading in the intestine, the interpretation of the flight of birds or the weather and the reading in the stars etc. presuppose the basic ability of a mimetic ability. Clairvoyance is based on the recognition of the similar. At the beginning of language was the deciphering of the connections of intestines, stars or other "signs" and the transfer of these references to the viewer, his fate.

The archaic world of the natural religion revealed its divinity everywhere, no gods were needed yet, since a separation of magic and world did not yet take place at all. Frazer coined the term "homeopathic magic", which is based on the fact that what is recognized as similar must also have effects on the actual. Lighting a fire in the morning is said to summon the sun, and piercing a doll similar to a person causes damage to that person. The original connection between mimesis and magic may be plausible; Benjamin, however, uses the term not in the context of sorcery, but in relation to the preceding moment of cognition that must occur before any notion of sorcery can arise: You have to recognize similarities in or-

der to believe you can gain an advantage by manipulating them; you have to be able to read before you "write".

According to Benjamin, magic later recedes in favour of greater differentiation and becomes a sign, which is now also used magically. Thus runes and hieroglyphs are created. These signs entail a semantic system that limits the rudimentary magic and the recognized similarity is transferred to them and becomes increasingly self-sufficient. From the archaic symbols emerges finally, the writing that erases magic for the sake of maximum significance. The recognition of the mimetic in language can, similar to a flame, "only appear on one type of carrier. [...] Thus the context of meaning of the words or sentences is the carrier on which the similarity first appears in a flash."

The original realization of consciousness takes place suddenly and purely instinctively, without logical derivation, but with the creation of such a derivation. Benjamin derives an ontological concept from this principle that comes very close to the idea described in Zohar. In a letter to Scholem, he expressly emphasizes this:

"Hopefully you will not be surprised to hear from me that this matter (Zohar) is still very close to me, even though you may not have understood the small program in which this circumstance found expression in Ibiza - About the Mimetic Capability - in this sense. Be that as it may, the concept of nonsensical similarity developed there finds multiple illustrations in the way the Zohar author perceives the formation of sounds, and even more so the characters, as deposits of world contexts.

However, according to Benjamin's theory, Scripture and Word originate from a historical development and are not God-given, and in contrast to his earlier linguophilosophical works, instead include evolutionary historical and psychological approaches. So he continues in his letter:

"Admittedly, he seems to think of an equivalent that does not trace back to any mimetic origin. This may be connected with his attachment to the doctrine of emanation, to which indeed my mimesis theory represents the strongest antagonism." - Walter Benjamin: Walter Benjamin letters. Frankfurt/M. 1978, Volume 1, p. 126, p. 694 ibid.

The doctrine of emanation is abandoned and the theological exegesis about creation is transformed into a kind of mystical materialism, through this surrender the whole is given much analytical depth. A dialectical chain of argumentation becomes possible through the anthropological concretisation, i.e. the location of the language mystery in the realm of history.

Derridas Babel

In his essay „Babylonische Türme, Wege, Umwege, Abwege", Jacques Derrida devotes himself to Benjamin's philosophy of language and emphasizes in it the direct references to his own thought building of „deconstruction" that he had begun with grammatology at the end of the sixties. Derrida refers Benjamin's translator's essay to the Old Testament: the confusion of languages; at the concept of Babel he demonstrates the close connections between language and power, but also between ideal and imperfection. Language, shows structure and order, but is not a closed system. The architecture of the language shows cracks and weaknesses and almost forces deconstruction, as does the tower of babel.

"The 'Tower of Babel' not only shapes the irreducible diversity of languages, it also exhibits an unfinished, the impossibility of completion, of totalisation, of saturation, the impossibility of completing something, of accomplishing something that could be assigned to the field of construction, to the field of constructions that architects provide, to the field of systems and architectonics. The diversity of idioms is not only the limit of a 'true' translation, of a transparent and appropriate communication, but also limits the order of a structure, the context and the coherence of the construct. At this point (when we translate) we encounter a boundary that permeates the formal tearing open of the interior, we encounter the unfinished and incomplete construct. It would be simple and, to a certain extent, even justified to see in it the translation that a system of deconstruction carries - the translation of a system that is conceived in deconstruction."

Deconstruction in Derrida's sense, is reading a text "against its grain" with a special focus on the unsaid, on its interweaving into other texts. Recognizing the shortcomings, the cracks in the text (in language), gives insight into this susceptibility presupposes an

awareness of the elements of its inherent structure. Through the crack, the break in the structure of language, the individual elements become recognizable in their actuality. The Tower of Babel was the biblical image of such an (impossible) undertaking, since such perfection beyond God can never exist. The punishment of god takes place for the attempt to "seize a single, unique and all-encompassing genealogy". Derrida emphasizes the epochal aspect of this "break": from this moment on, language splits into languages because of the sin of an attempted unification. The "unification" is only possible in a metaphysical entity, hereafter dominated by God. Unity" belongs to God, is/were God.

"We come across the problematic at the moment when we pronounce the name Babel and learn that it is impossible to decide whether this word simply belongs to a language. It is important that this distinctiveness is expressed in a struggle for the proper name, within a scene of genealogical indebtedness, trying to 'make a name' for themselves by creating an all-encompassing, universal language and at the same time creating a single, unique genealogy.

The sin of building a tower is perhaps the first historical reference to the problem of the "secularization of metaphysics". The great human unifying being is no longer sought in the transcendent, but in the monument and language of the people of Babylon, modernly spoken: in the people, thus subordinated to its worldly leaders, etc. A monotheistic faith (thus the priesthood representing it) cannot permit this. By the trick of the postulate of the necessity of a translation of the divine will, the point of reference, the "behind" no longer becomes addressable, it moves into the outside of human communication that only priests can understand. True language has its origin in the beyond, the invisible and only affects reality indirectly. Just as God stands behind things as their creator, so true language stands behind languages. The priest's task now is to interpret things in relation to God; he therefore plays the role of translator of the interpretation of languages in relation to the language of God; he is the scribe.

"The guilt does not commit or (re-)bind living subjects, but names on the edge of language; strictly speaking, this guilt is about the train that creates a bringing together and contractual relationship between the said living subject and his name, which is on the edge of language. This move is that of translating, from one language to another, from this edge or shore of one's own name to another. The language contract between the languages is unique."66

According to Derrida's interpretation, the proper name functions as a boundary which, so to speak, encloses the language of the subject and represents it externally. The name is, the motor of becoming, through its "train" the dynamic of constant growth and re-statuation takes place within the infinity of true language. Human striving, however, is usually not aimed at achieving a higher or the highest order, but rather at the expansion of the individual parts to one another and thus at growing as a whole. The above-

mentioned urge, which the Kabbalists causally attached to the division of language (the separation from the true language of God), is recognized as an end in itself, and Benjamin's knowledge and further development of Jewish linguistic mysticism is thus further specified by Derrida. The difference between the positions of Benjamin and those of the Kabbalists can perhaps be summed up in the following picture: While the referring vector of the argumentation with the Kabbalists leads throughout into God, in spite of strong curvature thus still needs a placeholder for the concept of "infinity", Benjamin returns that vector to himself. He thus creates an ellipse and locates his God in the totality of the particles (of the languages ...) and not in a lost "original language".

"If the translator neither reproduces an image nor restores an original, it is because it lives on and changes. Translation is in fact a moment in the growth of the original: the original completes itself by enlarging itself."67

Under the reign of religion, the law was considered to have been communicated from God to the chosen, as Moses was supposed to have received and proclaimed the law directly from God.The interpretation was always correctly decided by priests who, by virtue of their faith, were led by God.This system, in which legislative and executive branches coincide in a caste of priests, is extremely hierarchically shaped and derives its legitimacy from the (presumed) different proximity of individuals to God. The prophet receives the law, because he is simply closer to it than the others.any rationalism, all conceivable arguments are thus taken away from the outset, the critic is a heretic, sins himself against God.

But if one now gives up the transcendental reference, the cause of the law now lies in itself. This is what Derrida calls the mystical in justice. It reveals the looping of a constantly self-constituting Reason; the dynamics of this "justice" is thus squeezed into an infinite reference to itself. The law now lacks the actual original instance, but it also obviously has no natural statehood (otherwise a legal dispute would be not necessary), therefore a force is needed that speaks and enforces the law. From this point of view, too, the sense of justice is not an innate quality, it must still be laboriously instilled. Sensing justice is thus constituted, if at all, by communication.

It is precisely in jurisprudence that attempts are made to achieve the greatest possible precision of language, and yet a whole profession deals with the interpretation and deconstruction of these texts. The law does not form a rigid set of rules, it needs the judge to apply it differently in each case. The law demands a discourse and a discussion, it is always in a state of flux, a becoming (which is also **expressed in a constant change in its textual substance).**

The lack of absolute truth (and, correspondingly, often also of insight ...) must be compensated by the power of order. A delinquency is only accepted by threat of punishment, it is not tied to innate, natural recognition of the right meaning of the text.

"Representation becomes entangled with what it represents; this goes so far as to speak as one writes, to think as if the represented were merely the shadow or reflex of the representative. Dangerous promiscuity, ominous complicity between reflex and reflected, which can be seduced narcissistically. In this game the point of origin becomes intangible. There are things, water levels and images, endless references to each other - but there is no source anymore. Not a simple origin. For what is reflected is divided into two in itself, it is not only its image that is added to it." -   Jacques Derrida: Law, Frankfurt/M. 1991, p. 142

"They aim at a language that is neither a universal language in the Leibnizian sense, nor even the natural language of a single, separate language taken for itself; they aim at that unity without self-identity that causes or implies that there are languages and that what exists exists is a diversity of languages."71

For Benjamin and now also for Derrida, the decisive break exists between language and the languages themselves: the virtuality of an exact language must be an ideal that can only be approached asymptotically by expanding one's own language apparatus. The true language therefore consists less of grammar and word, but of a movement, it creates a kind of gravity between the existing languages. This in turn contains the sexual element that is also found in the Kabbalah between the true language and the exiled language, Shechina.

"It's what I called the translation contract: Hymen or marriage contract that contains the promise of creating a child whose seed will bring history and growth. Marriage contract as seminar - Benjamin says it: in translation the original grows, it grows and does not simply reproduce itself - I would add that it grows like a child, like the child of the original, but like a child who has the gift of speaking for himself, all alone: this gift, this ability, this power makes of a child something other than merely a product which is subject to the law of reproduction."

"The sacred text draws the boundaries, the pure archetype of pure translatability. Even if one has no access to it, it is nevertheless the ideal from which we can think, appreciate and appreciate the essential, i.e. poetic translation. As sacred growth of languages, translation announces the messianic goal, the messianic end; the sign of this end, however, is 'present' in it only as 'knowledge of distance', of the distance that establishes the reference to the end. This Distance is a knowledgeable thing; one can know about it, one can anticipate it, one cannot cope with it. But it allows us to enter into a relationship with the 'language of truth', which is the 'true language'. This stepping into a relationship happens in the form of a hunch, a 'prefeeling' that is an 'intense' mode, a way of visualizing the absent, and of spending distance as distance, on: da."

In Derrida, translation, the aspiration of the other bank, is extended to the central concept, which ultimately stands for the process of communication itself, communication as translation, constant expansion, as an ongoing process that follows an urge.

"So we can say that translation is experience, which can be translated or experienced to say that experience is translation."75

In his grammatology Derrida wrote down his quintessence of what language is to him:

"The general structure of the unmotivated trace lies within the same possibility, and without one being able to separate it other than by abstraction, the structure of the relationship to the other, the movement of temporalization and language as writing correspond with each other. In truth, however, there is no unmotivated trace: the trace is indefinitely its own unmotivated becoming. In the language of Saussures one would have to say (which he does not do): there are neither symbols nor signs, but only a sign becoming of the symbol."76

The "trace" of deconstruction itself, of which Derrida writes here, has no motivation, its reason is non-existent. The assumption of a causal relationship, a cause, a reason why it existed, merely led to a false concept of truth. However, if one dissolves the causal relationships in oneself, the view becomes free for the sign becoming of the symbol.

Conversely, by turning the symbol into a sign, by depriving it of its effect in favour of difference, Derrida makes the external redeemer superfluous in this respect. Derrida is not trying to repair and perfect the destroyed construct, but to dismantle it. By denying an existence of symbol and sign and emphasizing the state of development of the one, Derrida makes the movement in itself, without direction, the actual one of contemplation, no longer to bring the particulate to a whole and to overcome breaks, but to analyze and cultivate the particulate in its development between the breaks in which it exists. The kabbalistic tree construction collapses because it no longer emanates from any invisible supports, thereby losing its rigidity and beginning to live itself. The deconstructed construct thus regains its liveliness precisely through deconstruction, and the aforementioned trace of deconstructive recognition results from the temporally changing proximity between the words: language in time.