Tools for degrowth? Ivan Illich's critique of technology revisited

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ABSTRACT

This article revisits Ivan Illich's call for limiting the use of tools and elaborates its implications for degrowth. Illich analyzed growth not as an economic ideology, but - more radically - as the result of a historically unique mindset that turns tools from means into ends. Unlike many advocates of degrowth, he did not propose alternative modes of resource consumption and distribution, but instead tried to defend vernacular subsistence and conviviality against the industrialized satisfaction of needs. Any meaningful limit to growth, Illich insisted, has to be rooted in the defense of a sphere beyond production and consumption. Yet, as he himself realized, in an advanced technological society this distinction between autonomous action and heteronomous need satisfaction is blurred. Modern tools — and especially the computer - not only paralyze innate capabilities, but shape self-perception and subjectivities so as to increase dependencies on technological systems. On the basis of Illich's works, this article will argue first that degrowth requires limits to material as well as immaterial technologies, including political management and professional services; second that these limits have to be based on the appropriate balance between vernacular subsistence and engineered instrumentalities: and, third, that political decisions demand the cultivation of a critical awareness of the symbolic power of modern technologies.

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The need to limit the consumption of resources and to refuse the "religion" (Latouche, 2009, 7) of economic growth are two assumptions generally agreed on by proponents of degrowth. No matter if 'green' or 'qualitative', economic growth inevitably exacerbates social inequality and ecological exploitation. Yet, when it comes to the question of what to limit, and how and why, fundamental differences open up. No degrowth proponent doubts that energy intensive technologies such as air and car traffic have to be heavily restricted for ecological reasons, as well as nuclear power and oil consumption. But what about the computer and its derivatives or the professional service industry, e.g. the educational system and the health system? Strikingly, in most degrowth discussions, these fast growing markets, namely health care, education and digital technologies, are either appreciated as desirable public goods that only need some democratic restructuring or are not mentioned at all (u.a. Borowy, 2013, Cattaneo, et al., 2012, D'Alisa et al., 2015, Paech, 2012, www.degrowth.org). Apparently, most degrowth authors understand growth as an economic ideology and criticize it in the light of its ecological impacts and its distributive injustice (a.o. Paech, 2012; D'Alisa et al., 2015, Muraca, 2012; Trainer, 2012; www.degrowth.org; as an exception see

Scheidler and Vetter, 2015). Discussions about technology and degrowth, even when they draw on Illich's concept of convivial tools, exclusively focus on material devices (Best and Vetter, 2015; Deriu, 2015). In doing so, degrowth discussants overlook or even perpetuate the fundamental intellectual topology of growth, namely the underlying certainties and assumptions that have led to the contemporary expansion of industrialized products and technologies.

Based on the works of Ivan Illich, this article reformulates growth not as the result of a certain economic imperative or ideology, but as a question of technology — namely as a historically unique relation of humans to their instruments. This sheds new light on a key question of degrowth, namely what to limit, and how and why. First, it emphasizes not the ecological, but the social harms of growth, namely the paralyzing and disembodying effects of modern technologies, be they high speed trains, smartphones or health care services. For this purpose, it draws on Illich's basic distinction between autonomous action and heteronomous need satisfaction, between vernacular subsistence and industrial production, between convivial and manipulative tools. Second, it argues that degrowth, if it does not want to degenerate into an alternative strategy with which to manage scarce resources, has to seek limits to all manipulative tools, be they digital technologies or social technologies. These limits, if they

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are to be meaningful, cannot be defined by experts or determined by ecological indices, but have to be rooted in the common will to defend a vernacular and convivial sphere against industrial and technological encroachment. Thirdly, based on Ivan Illich's later work on the way contemporary technologies shape bodily experience, it calls for the cultivation of a technological *ascesis*, that is a critical distancing from the symbolic effects of mind-boggling tools such as the computer that increasingly shape self-perception and subjectivity.

1. Ivan Illich's critique of tools

With his books on "Energy and Equity" (1974), "Tools for Conviviality" (Illich, 1971/75)[1], "Deschooling society" (1971) and "Limits to Medicine" (1976/1995), Illich remains one of the most radical critics of industrial society. Though most influential during the 1970s, his thinking has remained topical: "Deschooling Society" is still a key work for alternative pedagogues, homeschoolers and unschoolers; critical physicians consider "Medical Nemesis" as lucid today as it was in the 1970s (Smith, 2003); and his questioning of the premises of modern life is as surprising and provocative as it was 40 years ago (Samuel, 2013). Social movements disenchanted by the promises of technological progress and economic growth are recovering his ideas on the commons and conviviality. These include the Commons-movement (Bollier, 2013), the Convivialists (Convivialistes, 2014), the Zapatistas in Southern Mexico (Zaldivar, 2009) and intellectuals in Belarus (Illich, 2013). The degrowth-movement, too, is rediscovering Illich's writings of the 1970s and recognizing him as one of their guiding intellectual forefathers (Cattaneo et al., 2012, Demaria et al., 2013; Latouche, 2009; Paech, 2012). Yet, a closer reading of Illich affords surprises: it reveals him as a radical critic not only of industrial society but also of some undisputed assumptions of degrowth. The degrowth movement generally accepts goals such as health, mobility, and education, and their appertaining institutions; it thinks that a reformulation of economics will open a path towards social justice; and it relies on digital technologies to foster conviviality and a revived commons. But, as early as the 1970s, Illich exposed the idea of equity through economic growth as a dangerous illusion. And he also unmasked the illusion that there can be justice without a limit to tools. Illich forces us to consider degrowth in the technological sphere before we think of degrowth in the economic sphere.

Industrial growth will inevitably lead to greater inequity — this was a vexing and provocative thesis in the 1970s. And even more provoking, especially to other social critics and activists of the time, was Illich's thesis that the destructive effects industrial production did not depend on the class that controls the means of production. No matter who the owner or what the economic context, he argued, beyond a certain threshold productive tools invert the relation between people and their instruments. Thus, as Illich states clearly in Tools for Conviviality, the main subject of his criticism is not capitalism or political ideologies, but the overpowering of man by his tools: "I want to offer a methodology by which to recognize means which have turned to ends. My subject is tools not intentions" (Illich, 1975, p.14).[2]

1.1. The age of tools

Throughout this book, Illich uses the term "tools" in a very broad and, at the same time, very specific way. Tools are all means or instruments with which modern humans try to realize their goals; thus, he includes simple devices such as knives or plows as well as complex systems and institutions such as universities or medical systems.

I use the term 'tool' broadly enough to include not only simple hardware such as drills, pots, syringes, brooms, building elements, or motors, and not just large machines like cars or power stations; I also include among tools productive institutions such as factories that produce tangible commodities like corn flakes or electric current, and productive systems for intangible commodities such as those which produce 'education', 'health', 'knowledge,' or 'decisions'. I use this term because it allows me to subsume under one category all rationally designed devices, be they artifacts or rules, codes or operators, and to distinguish all these planned and engineered instrumentalities from other things such as basic food or implements, which in a given culture are not deemed to be subject to rationalization. School curricula or marriage laws are no less purposely shaped social devices than road networks (Illich, 1975, 34).

According to Illich, modern humans have a peculiar relation to their environment, or more specifically to their tools. In his historical studies on technology he shows that it is only in the 12th century that scholars started to conceptualize the plow or the hammer as "instruments" separate from the human body. The Greeks, he argued, knew no fundamental distinction between the hammer and the hand that holds it — both were a *organon*. "The word *organon* means both, this pencil which I am holding in my hand, and the hand which holds it. My hand without the pencil, and my hand armed with the pencil are both *organa*. There was no way of distinguishing the pencil from my hand" (Illich in Cayley, 2005, 73). But in the 12th century, the classical *organon* was redefined as *instrumentum*, an instrument or tool, which was endowed with a new kind of causality, namely *causa instrumentalis*. What makes the instrument different from *organon,* which knows no difference between hand and hammer Illich calls distality. Unlike the *organon*, the *instrumentum* is conceptually and ontically separate from the body. "In the Middle Ages, at the beginning of the technological era, Hugh of St. Victor and Theophilus Presbyter were the first to think of the implements proper to the various arts as something separable from the hands of the artisans who used them. But they did not realize the full novelty of what they were doing in creating, for the first time, a general ideal of tools as means of production" (Illich in Cayley, 2005, 157).

Accordingly, the use of the instrument reflects the intention of the user—though such intentions are already designed into the form of the instrument. You can pick up a pen or leave it in its box. But if you want to write you must pick up a writing instrument. The written page is the result of both the human intention to write and the capacity of the writing instrument, the *causa instrumentalis*, a cause separate from human intentions. For Illich, the technological age understood as the age of man separated from technology, began when tools started to be conceptualized as instruments; from then on, tools were to be seen as the inert means to human ends, as instruments to realize human intentions (Cayley, 2005).

This sketchy excursion to the philosophy and history of the tool as instrument is important to understand Illich's use of the term "tools" and, in his later work, his diagnosis of the age of tools passing over into an age of systems. In the technological age, the category of instruments includes all means that are designed to achieve human ends, be these factories or schools or hospitals or chairs. But what goes unnoticed in thinking about instruments as

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means to human ends is the scale beyond which means necessarily turn into ends. Instruments become self-serving, Illich argues, when their scale, size, or structure requires people to adapt to them. "Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is passively acted upon. To the degree that he masters his tools, he can invest the world with his meaning; to the degree that he is mastered by his tools, the shape of the tool determines his own self-image" (Illich, 1975, 34).

In the contemporary educational system, for example, schools are not instruments for learning that can be used according to personal intentions. Rather, schools enroll children to adapt themselves to the rules and goals of the institution. The medical system does not support and complement people's activities to heal and to care for each other, but programs its clients to pursue "health" as defined and enforced by the medical establishment. In both cases, the institution has come to define the purpose, and those who refuse the expert's salvation programs might even be pursued by state authorities. In many countries, midwives find it increasingly difficult to practice their traditional art of midwifery, because deviating from medical guidelines might bring them to court (Schindele, 2016). In Germany, compulsory schooling threatens parents of homeschooled children with the loss of custody. Oftentimes, institutions work hand in hand to establish their monopoly: Children who cannot endure the passive consumption of ready made knowledge packages are diagnosed as defective and receive strong drugs to make them function in the system — as in the case of ADHS.

Illich clearly saw that growth inevitably leads to ecological destruction through growth. But he also insisted that dominant service tools have an equally destructive effect on social life. According to Illich, there are thresholds or tipping points beyond which the use of instruments — to which he includes the educational and medical system — becomes counterproductive, destroying what it promises to enhance. Schools stupefy, medicine makes sick. The aim of his writing in the 1970s was to initiate discussions on this counterproductivity, in the hope that they could lead to political decisions for limiting the growth of tools.

Despite Illich's great popularity in the 1970s, his ideas and considerations about technological degrowth have not been seriously discussed in the academic world. "… the only body of literature that has accorded *Tools for Conviviality* any substantial attention is that associated with the alternative technology movement" (Mitcham, 1991, p. 42). Most critics of industrial society as well as proponents of degrowth criticize growth as a socio-economic phenomenon, but not as a special relation of man to his tools — with the exception of very few and rather marginalized scholars such as Jacques Ellul (1964) and Ernst Fritz Schumacher (1973). Thus, most degrowth scholars focus their criticism of growth on material technologies and their ecological impacts as well as on questions of property structure and distributive justice (D'Alisa et al., 2015; Paech, 2012). In doing so, they only scratch at the surface of growth: what they ignore is the social and symbolic power of institutions and techniques that produce values such as health or security and that today are a main driver in the growth of tools. Illich, in contrast, subsumes "all rationally designed devices" under the category of tools and analyzes industrial growth as the consequence of their unlimited expansion. Thus, in his call for limits he equally includes institutions and professional services as well as political management and social services. In fact, after having written "Tools for conviviality", he explicitly turned his criticism to institutions such as the health and educational system and their destructive effects. This approach to degrowth makes him unique and unsettling. Jacques Ellul comes closest to Illich's thinking with his powerful and daunting social diagnosis of a

technological regime that encroaches on human thinking and acting. In fact, in his later writings and presentations, Illich used Ellul's terms "technological milieu" and "la technique" to draw attention to the frontier at which products intended for consumption emphasize the frontier across which the products of consumption — be they educational, medical, scientific or whatever — begin to consume their consumers. Those inhabiting a milieu of technique are entrapped in it; the technological system reveals the conversion of means into ends (Illich, 1993).

Illich's philosophy of tools has been widely recognized, but was not seriously taken up by philosophers or sociologists of technology (Mitcham, 1991). In fact, Ellul's and Illich's diagnoses of a technological milieu that overpowers the human runs counter to most contemporary discussions on technology. At the limit, after the practice turn in Science, Technology and Society Studies (Knorr-Cetina et al., 2001), their analyses are discredited as outdated technological determinism (u.a. Degele, 2002). Practice theorists consider social practices, that is arrays of activities, the key entities of the social and make it the focus of their analysis. In their view, it is practices that form what before have been the main objects of social research, namely structures and individuals. Aiming at overcoming the "humanist dichotomy between human and non-human entities" (Schatzki, 2001, 2), today's STS-studies mostly understand technology as a social construct made up of contingent social practices. Yet, to debunk Illich as a technological determinist is far-fetched. He himself studied the social construction of scientific facts (in Ludwik Fleck's sense) and technological artifacts, be it the alphabet, the text, the computer, or later in collaboration with Barbara Duden such entities as "fetal development", "human life" or the "gene" (Duden, 2002b). He certainly did not understand the technological society as an inevitable product of an autonomous technological evolution, but rather as a historically and culturally shaped relation of man to his tools. Yet, like Jacques Ellul and Langdon Winner (1986, 2001), Illich ascertains that modern technology has grown out of human control (Illich, 1993), that today's institutions, machines and technogenic structures form a technological system that colonizes our imagination, reshapes self-perception, patterns human activity and damages social relations. When he wrote *Tools for Conviviality* or *Energy and Equity*, however, he still believed in the possibility of political decisions that would avert the takeover of la technique by limiting the growth of tools. Only in the 1990s, when he diagnosed a second watershed in the history of technology as the transition from tools (instruments) to systems (see section "from tools to systems"), did he consciously abandon political interventions as futile.

1.2. Convivial vs. manipulative tools

In contrast to today's STS-conceptions of technology (Latour, 1993; Knorr-Cetina et al., 2001), Ivan Illich stays with the traditional distinctions between man and his tools, between subjects and objects, and thus between human activities and technological processes. This allows him to scrutinize the social consequences resulting from the properties of technology, regardless of their social contexts and the goals with which they were developed and deployed. It was Langdon Winner who first incited an intense discussion on the political implications of technology; he convincingly showed that technological artifacts have inherent properties that shape social relations (Winner, 1980). Nuclear power plants, for example, require centralized and technocratic control for their implementation (Winner, 1986) and impinge on society accordingly. Illich examines the effects of tools on society along the same lines. He is interested in the social consequences that different tools have by their very nature. Yet, and this makes him unique, he suggests a distinction that is crucial for democratic

societies aiming at the protection of individual freedom: he differentiates between tools that foster and expand the natural abilities of their user, and tools that reduce men to programmed machine operators or clients. Convivial tools can be adapted and modified by the user; manipulative tools, in contrast, command the user to adapt.

This heterogeneity between convivial and manipulative tools, and, correspondingly, between autonomous and heteronomous human activities, between vernacular ways of doing and programmed shadow work[3] is key to grasping Illich's criticism of technology and industrial growth. Fundamental to this distinctions is the simple truth that

> people have a native capacity for healing, consoling, moving, learning, building their houses, and burying their dead. Each of these capacities meet a need. The means for the satisfaction of these needs are abundant so long as they depend primarily on what people can do for themselves, with only marginal dependence on commodities (Illich, 1975, 68).

Someone who walks uses her innate capability to move autonomously; and she is free to run, stroll or hike. As soon as she gets into a car, however, her locomotion becomes heteronomous. She is passively transported on her behind as a package and consumes passenger miles. She cannot express her intentions or express personal meaning, but has to adapt to the demands of the traffic system.

In his later works, Illich termed the various culturally bound performances of native capacities "vernacular" (Illich, 1981). In giving it some of its original Latin sense of home-grown and home-bred, he was able to speak of all those diverse ways of eating, dwelling, studying and praying that were neither commodified nor dependent on disabling technologies. People have abundant capacities to meet their needs — as long as their environment still has use-value and is not ravaged by industrial outputs (on the vernacular in the 21st century, see Samuel, 2016).

Whereas convivial tools foster vernacular practices, manipulative tools paralyze, suppress or replace them. This effect is independent of political or social context in which the tool is used as well as independent of ownership and social power. The distinction between manipulative and convivial refers to their structural properties:

> Certain tools are destructive no matter who owns them, whether it be the Mafia, stockholders, a foreign company, the state, or even a workers' commune. Networks of multilane highways, long-range, wide-band-width transmitters, strip mines, or compulsory school systems are such tools. Destructive tools must inevitably increase regimentation, dependence, exploitation, or impotence, and rob not only the rich but also the poor of conviviality, which is the primary treasure in many so-called "underdeveloped" areas. (Illich, 1975, 39)

Though there is not a fixed criterion by which convivial tools can be unambiguously distinguished from manipulative tools, Illich repeatedly formulates clear conditions or criteria by which tools can be analyzed for their counterproductive effects. These conditions can be summarized in three points: (1) Convivial tools are easily used or require learning by doing. As soon as usage demands preparatory education or certification by specialists, these tools program their users and cannot be kept under democratic control; (2) they are at the discretion of the user as when and whether she uses them. As soon as technocratic elites or societal structures make certain tools indispensable or obligatory, as in the case of compulsory schooling, they become manipulative; (3) Convivial tools serve the purpose of the user and not vice versa; they allow the expression of personal meaning (Illich, 1975).

As an example of a convivial tool is the bicycle; it does not replace, but extends the human capability to move by feet. It does not contribute to the "compulsory auto-disempowerment produced by transportation", but increases the "freedom of movement" (Illich and Robert, 1992). As another example of a convivial tool, Illich picks up the telephone: It can be easily used by everyone, even by children, and by using it one does not prevent others from doing the same; it allows people to use it for their personal purposes: they can call whomever they want and say whatever they want to say. Be aware that Illich talks about the phone of the 1970s. Despite its user friendly applications, Illich would certainly not add the smart phone. In contrast to the conventional phone, it cannot be understood as a means for the realization of human ends. Instead, it swallows the user up and dissolves any distance between herself and the technique. Not only does it program her desires, habits and sense of self to the degree that she might literally become addicted, but through feed back loops she is turned into a productive and integral parts of the technological system.

1.3. Tools for degrowth?

This distinction between autonomous and heteronomous activities, between convivial and manipulative tools, between native abundance and economic scarcity is key for further reflections on degrowth and the transformations it will require. Autonomous activities meet a need that people can satisfy themselves. Native competencies like walking are abundant. Industrial transport, in contrast, turns mobility into a scarce product for which people have to compete at increasing costs. Although this distinction is key for any society that wants to free itself from the scourge of economic scarcity[4] and industrial dependency, it has not yet been taken up in the degrowth discussions. If degrowth does not translate into defending vernacular subsistence by limiting manipulative tools, Illich's analysis implies, even in a degrowth-society technologies that are mainly cherished as public goods such as high-speed trains or healthcare will inevitably unfold their destructive effects. When Kallis, for example, reflects on the social limits to growth, he sees the striving for positional goods as a main driver for growth and the generation of scarcity. Degrowth, he assumes, would limit conspicuous consumption and thereby release collective resources for health, education and public infrastructure. Other authors, too, aim to redistribute resources from private consumption to "common goods" such as the health or educational system (a.o. Borowy, 2013). Thereby, they overlook the fact that it is not only the striving for luxury or positional goods that creates dependence on disabling technology, but the logic of production and consumption itself. Thus, no matter how the health system is organized, be it corporatist or neoliberal, "a professionally engineered commodity has succeeded in replacing a culturally shaped use-value" (Illich, 1995, p.viii). The same for education: People have the abundant

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[3] Illich titled one of his books „Shadow work", an analytical concept with which he tried to grasp the mounting daily activities enforced by industrial production, from driving one's own manpower to work to drilling one's children for school. Illich understands "Shadow Work" as "a necessary complement to expanding wage labor" and further that this "is a constitutive element of the industrial mode of production" (Illich, 1981, 15).

[4] Economic scarcity does not mean dearth, but is a fundamental axiom of economics. Thus, economic development claiming to overcome scarcity in fact produces it, see Paul Dumouchel 1979, Achterhuis 1993.

capacity to learn, but schools, universities and the imperative of lifelong learning makes them compete for packaged and pre-programmed teaching units. Education, as Illich clarifies, is the name for learning produced under the assumption of the scarcity of knowledge, a basic commodity. Thus, transferring resources from the production of SUVs to the production of knowledge and health would only change growth patterns, but would not lead to degrowth.

Sufficiency, too, as a key strategy for degrowth reflects the need for limits, but is not rooted in the recognition of the heterogeneity between the vernacular and the technogenic system. Wolfgang Sachs rightly criticizes the efficiency revolution, the rationalization of the means of production, for being blind to the needed trans-formation and restriction of goals (Sachs, 1993). An ecology not of the means, but of the goals, is a necessary complement to efficiency strategies. For that purpose, sufficiency aims at an alternative resource policy that includes social goals beyond economic growth, such as health, leisure or social commitments (Sachs, 2009). In a sufficient society, "resource policies are designed to improve the conditions for the satisfaction of these needs" (Schneidewind and Zahrnt, 2013). Yet, unless grounded in autonomous capacities, sufficiency can become fodder for the technocratic management of people, and thus again for the growth of experts and their tech-nologies. For example, according to the World Bank, a certain number of BTU's of energy is sufficient for a family of four – if a family in Bangladesh gets by on less it is defined as poor and in need of assistance. Behavioral economics is already developing in-centives and default options that will facilitate sufficient decision-making. They design "choice architectures" that suggest freedom of choice but underhand nudge people into showering with less water or eating sustainable food - and thereby intensify the pro-gramming of choice and autonomy (Samerski, 2015). "In terms of the outcomes for promoting sustainable behaviours, nudges are well worth the effort", two scientists from the *Institute for Sus-tainable Energy, Environment, and Economy (University of Calgary)* write in the *Guardian*.

Illich, however, not only warns against abstract social goals such as health or, sustainability, but also calls for radical limits to polit-ical management. As a kakatopian alternative to a convivial society that limits tools, he foresaw a world not only dominated by ma-chines, but also turned into an educational prison. Regardless of the goal of social engineering, be it health, growth or maybe degrowth, a society that builds itself on the „psychogenetic tooling of man" (Illich, 1975, 116) cannot but be a nightmare. As long as politics does not recognize this dimension of public choice, Illich argues, namely the difference between "doing" (walking or cycling) and "having" (a car or a train ticket), it will inevitably lead to "the replacement of wide-spread, unquestioned competence at subsistence activities by the use and consumption of commodities; the monopoly of wage labor over all other kinds of work; redefinition of needs in terms of goods and services mass-produced according to expert design; finally, the rearrangement of the environment in such fashion that space, time, material and design favor production and consumption while they degrade or paralyze use-value oriented activities that satisfy needs directly" (Illich, 1981, p.15). Strikingly, however, the need to downscale institutions and services for a convivial society is a bind spot in the degrowth literature. The Degrowth movement clearly does not support nudging towards sustainability and suffi-ciency – nevertheless, it does not problematize professional ser-vices and social technologies. This discussion, however, is inevitable. Otherwise, an intensifying ecological crisis might easily prompt policies that engineer sufficiency and degrowth. "Either the natural boundaries of human endeavor are estimated, recognized, and translated into politically determined limits or compulsory survival in a planned and engineered Hell is accepted as an alternative to extinction" (Illich, 1995, p. 271).

The next section of this article will discuss the characteristics of the natural boundaries Illich call for. His examples of convivial tools illustrate that he did not oppose industrial production as such: neither the telephone nor the bicycle can be handcrafted. Illich was a realist and not a romantic, he did not envisage a society without modern technology; he clearly stated that there is no reason to generally exclude „large tools" or centralized production" from a convivial society (Illich, 1975, 39). Rather, it is necessary to discuss and recognize the tipping points at which an increase in the supply of industrial commodities destroys independence and conviviality in a socially intolerable way. These tipping points are not identical with the limits that are discussed in the degrowth literature so far. Illich is not deriving limits from ecological indices, and he is not just calling for individual austerity. Rather, he is urging the recognition of sensible thresholds beyond which tools inevitably program behavior and restrict freedom.

1.4. Natural balances and proportional limits

Many degrowth authors propose a downscaling guided by so-cial and ecological indices such as the carbon footprint (Paech, 2012; Sorman and Giampietro, 2013). Most of these proposals for downscaling focus on a reduced and alternative mode of resource consumption. Ecological economists, for example, see it as a main challenge of degrowth to develop economic models for alternative resource management (Daly, 2005; Kerschner, 2010; Kallis et al., 2012) as well as measurable indicators to evaluate outcomes (Daily and Matson, 2008; Domenèch et al., 2013). Herman Daly explicitly calls for limiting the scale of the monetary economy to protect the environment, arguing that the unchecked growth of the economy has made scarce such ecological values as bio-diversity (Daly, 2005). Yet, by focusing on quantities and path-ways of resource consumption and including ecological values in their economic calculations, they inevitably reinforce a mindframe that demands the calculated management of values. Thereby they reaffirm Illich's analysis that modern society is built on the assumption of scarce values, regardless of whether these values are monetary or abstractions such as "biodiversity", "health" or "ecological footprint". Illich, on the contrary, invited his listeners and readers to see through the peculiarities of a disembedded economic rationality: "Who, for example, considers air as a resource, easily indulges in the idea of bacteria competing for scarce oxygen. Thereby he imputes the altogether modern and originally middle-class experience of scarcity to unicellular or-ganisms and succumbs to an illusion that can only be grasped by religious studies: A grotesque form of capitalist animism of whose claws individuals have hardly freed themselves" (Illich in Weizäcker, 202, own translation). Degrowth largely succumbs to this temptation to turn the world into a field of resources and scarce values. As long as degrowth is mainly understood as downscaling and thus bases its actions and reflections on alter-native economic models, measurable indicators, energy flows and statistical evaluations (e.g. van den Bergh, 2011; Sorman and Giampietro, 2013), it will not be able to "create a different sys-tem where expansion will no longer be a necessity and where economic rationality and goals of efficiency and maximization will not dominate all other social rationalities and goals" (Kallis, 2011, 875).

Any real alternative or "remedy" to economic growth, Illich argues, needs to acknowledge something that in his earlier work he called "natural boundaries" and "natural balances" and later elaborated under the rubric of "proportionality". These boundaries are not simply conventional limit values on a continuous scale, such as a sustainable carbon footprint, but rather thresholds

between complementary, but heterogeneous spheres, function rather as the skin does in separating inside and outside. A convivial society recognizes this threshold and balances the two different spheres, namely the heteronomous satisfaction of needs and autonomous activities; production and subsistence; resources and the commons; technocratic management and (communal) self-government; educated techno-babble and vernacular language; the iatrogenic body and the experienced soma. The thresholds that Illich is pondering cannot be arbitrary or conventional, but they are out there. Therefore, he calls them natural: "To formulate a theory about a future society both very modern and not dominated by industry, it will be necessary to recognize natural scales and limits" (Illich, 1975, 12). Thus, these limits are the object of insight: Beyond a certain speed, for example, motorized transport threatens autonomous transit, that is walking or riding a bike. Illich even quantified the paralyzing effects of the transport system by calculating all the costs of cars — from the hours spent in traffic jams, to the price of the vehicle, to the expense of maintenance, both of cars and streets. Jean Pierre Dupuy who collaborated with Illich called this master calculation to idea of generalized speed. What ought to be subject to social negotiation and decision is the amount of inequity and dependency on commodities that seems socially tolerable: "each community has to identify the levels of inequity, harrying, and operant conditioning that its members are willing to accept in exchange for the satisfaction that comes of idolizing powerful devices and joining in rituals directed by professionals who control their operation" (Illich, 1978, 116). In his Schumacher lecture in Massachusetts in 1994, Illich reformulates this quest for natural balances as an invitation to what generally is discussed as a "cultural change", namely to see and perceive differently: Illich suggests that one should order "oneself and one's world through proportion". He explicitly postulated the retrieval of the sense for proportion as a necessary foundation for a society beyond adaptive utilitarianism and technical administration. With a kind of tour de force through Western history, he argues that until modernity, the sense for the appropriate, fitting, and harmonious has guided ethical deliberation on the (common) good. Its loss is constitutive of modernity, fueled by the "growing mathematization of science and the desire to quantify justice" ending in the contemporary desiccation of such "common sense" in the course of Enlightenment (Illich, 1994). This loss of proportionality is reflected in medical conceptions of health, illness and the body: Until the 19th century, (popular) medicine was deeply influenced by the traditional Galenic idea of harmonious humoral relations; until the late 18th century, physiology had been the "knowledge of proportions in interior flowings" (Illich, 1994). Today, however, the body is "assessed by the reading of positive and negative values proceeding from an assumed zero point. It is *evaluated*" (Illich in Cayley, 2005, 167). A society that wants to detach itself from the assumptions that underlie the contemporary religion of growth, Illich states, has to build common welfare on a proportion between humans and nature. "The principal guide for social policy would be appropriateness and not percentages" (Illich, 1994). Only then does policy acknowledge and foster the "human social condition as that ever unique and boundary making limit within which each community can engage in discussion about what ought to be allowed and what ought to be excluded" (Illich, 1994). In contrast, a society that is untethered from the perception of natural thresholds is condemned to "transform the human condition rather than debate the nature of the human good" (Illich, 1994).[5]

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[5] For his work of the 1990s, see the Website http://illich.org/.

2. Engineering the human condition and the need for technological ascesis

The increasing permeation of our language and mentality by technology tends to blind us to the position Illich tried to take in the 1970s. In the time of Big Data and Digitalization, the call for a social policy that is guided by appropriateness and not percentages sounds romantic — or rather unthinkable. When "tools for conviviality" was reissued in Germany, almost 30 years after its initial release, Illich himself saw his former concepts and arguments as having been dissolved by the new disembodying abstractions that have been spread by systems theory and communication technologies. Today, it is increasingly difficult to recognize and grasp what Illich wanted to protect from the encroachment of industrial production and technological management: the vernacular, a sphere in which people govern themselves, a sphere without encroachment of professionals, their technologies and their rationales. When patients perceive themselves as manageable immune systems, they lose their capacity to feel well and trust their senses. They literally *embody* the need for medical checkups. When people confuse knowledge with the bits and bytes stored on a disk, then they hand over to machines their capacity to know and decide. Thus, from the 1980's on, Illich's main concern was to question those certainties and abstract goals that chain us to the medical system, the educational system or the communication system. Therefore, as he formulated it on various occasions, he would no longer ask what tools *do*, but emphasize what they *say*: "to understand society today, it seems more important to begin with an examination of the effects of 'la technique' on my flesh and senses than to study current and future damages to the environment" (Illich, 1993). This second part of the article will summarize and discuss Illich's analysis of the disembodying effects of modern technologies and calls for technological *ascesis* as a prerequisite for meaningful political discussion and action.

"Limits To Medicine" (1995), his hotly disputed book on the "expropriation of health", is the first book in which Illich explicitly grants the cultural implications of overgrown tools an explicit section. Illich divided his book in three parts that reflect the three dimensions of medicine's counterproductivity: Clinical iatrogenesis - medicine causes illness; social iatrogenesis - medicine prevents healing; and cultural iatrogenesis - medicine destroys the art of suffering and living. The third part on cultural iatrogenesis, rings a new tone. Here, Illich describes how medical management replaces what he later calls the vernacular, in this case culturally diverse ways of suffering, living, and dying. Instead of culturally ingrained ways of "making pain tolerable, sickness or impairment understandable, and the shadow of death meaningful" through vernacular ways of "eating, drinking, working, breathing, loving, politicking, exercising, singing, dreaming, warring, and suffering" (Illich, 1995, 130), medicine promises to liberate us from the human condition. Twenty years later, when writing a new foreword for the German republication of Nemesis, Illich moved this concern about the transformation of human self-understanding, the effects of 'la technique' on flesh and senses, to the forefront. In the first edition of Nemesis, he criticized the medical system for discouraging and paralyzing patients. Later, he blames it for transforming them: "I want to indict health care not as a demoralizing but as a nihilist agency. The decisive result of every brush with the health care system is epistemic–a recasting of the ego" (Illich, 1995; viii).

2.1. Disembodiment

It could be said that this recasting of the ego is the main topic of Illich's later work - a field of study that academically has been

developed and popularized under the rubric of "subjectivization" by scholars like Michel Foucault (1926–1984), Pierre Bourdieu (1930–2002) and their followers. Illich did not doubt that tools have always shaped human self-perception and self-understanding. However, the inversion of the relation between man and tools, and means and ends, in modernity gives this old condition a new urgency and pertinence. In contrast to most other scholars, Illich has identified one key characteristic of the contemporary recasting of the ego: Disembodiment. When in 1986 he looked back on "Medical Nemesis", he felt that, at the time he wrote the book, he had been blind to a profound iatrogenic effect: the iatrogenesis of the body itself (Illich, 1986, 1325). The medical reconstruction of the body through measurable values, charts and graphs erodes the soma, the lived and experienced flesh. In collaboration with body historian Barbara Duden, Illich analyzed how Medicine „took possession of the subject by recreating and redefining one's body from something felt to something self-ascribed", (Duden, 2002a, 221).

Anthropologists like Emily Martin have examined how modern certainties and social relationships are mirrored in our understanding of the body, and how this particularly affects the manner in which women experience themselves (Martin, 1987; 1994). Whereas industrial society has shaped the solid, machine-like, and hierarchically controlled body, systems society now transforms persons into immune systems, that is dynamic systems that must continually adapt to their environments. An immune system is never fixed and stable, but always open and in a state of flux. Thus the immune system requires constant monitoring and optimizing—in the same way that modern workers must always manage and optimize themselves to satisfy the demands of the new corporate world (Martin, 1994). Illich considered the immune system to be a techno-genic product that shapes people's self-perception; yet, in contrast to Emily Martin, Illich called attention to the disembodying effects of perceiving oneself through the medical graphs, indicators and test results. The ego recast by medicine is a discarnate ego: "You can obliterate the experienced sensual body of the past by conceiving of yourself as a self-regulatory, self-constructed system in need of responsible management" (Illich, 1995; iii).

At first glance, the issue of disembodiment might seem remote from the concerns of the degrowth movement. Yet a closer look will show that it is the heart of the matter. Like the growing economy or the expanding technological system, this iatrogenic body is, so to say, out of proportion. It has no relation to the natural world around it; it does not correspond to the plants, to the soil or to the stars. It is, at the same time, the symbolic fallout of technological systems and the driver of their growth. The iatrogenic body, defined by values and in need of management, matches the demands of the technological system: "You need such a body to take the car, jumping kangaroo-like from place to place, without touching the earth, engaging in hours of windshield view, where you are always looking at somewhere where you are not and where reality, insofar as it still exists, is passing you by. You need it to live in a world where knowledge is always the revelation of an educational agency, whether it's the school or the help program built into your coffee maker. All these things assume the kind of body the doctor tells you have" (Illich in Cayley, 2005, 131).

2.2. From tools to systems

Studying the history of the body and its technologization, Illich went back as far as the Middle Ages. He contrasted, for example, the ethics of the gaze, a cultivated carefulness regarding what to touch with the eye that was practiced in earlier times, with the modern age of the show and its unfettered consumption of images. Yet,

despite the longer history of disembodiment, Illich considered our times unique. For the second half of the 20th century, he diagnosed a new watershed in the history of technology and one that exacerbates technology's disembodying effects: the shift from tools to systems. This shift, for which Illich chose "Windows 95" as the emblem, is hardly recognized by other scholars. For most philosophers and sociologists of technology, the computer is only another technological device, either as a result of technological evolution or of new social practices. For Illich, in contrast, "Windows" or "Word", as he used to phrase it, demarcates a historical chasm. "Word 7 is not a tool in the sense that goes back to the 12th century: a device that enhances my ability to imagine and shape my own dreams and desires. (…) I type on the keyboard and the thing acts overwhelmingly as a symbol. It promises unlimited options and suggests freedom. You can make it turn any trick you want, as long as you are satisfied with the options it offers."(Illich, 1998). Illich explored the intellectual history of the computer, that is Alan Turing's work and the formation of cybernetics and system's theory as new scientific epistemologies. After doing so, he named the new technical milieu we are living in "the system". "It appears to me," he said, "that the age of tools has now given way to the age of systems, exemplified in the conception of the earth as a ecosystem, and the human being as an immune system. … Thinking about the world, not in terms of causality, but in terms of systems analysis has brought us into a very new era" (Illich in Cayley, 2005, 76).[6] Unlike instruments that are conceptually and experientially separate from the user, the system physically and conceptually sucks her up. The user is incorporated as one of the system's elements. An example is the communication system where the "interface" between user and machine is conceptualized and designed as reciprocal and interactive. The smart phone, for example, directly adapts to the user's input and behavior via feed back loops. This optimization of the interface between humans and technology demands adaptation on both sides: systems aim directly at shaping behavior and self-perception, as for example, Facebook and Google maps. The same is true for contemporary institutions, they have changed from tools into systems, too. In the medical system, patients become active members of the "bio-team" that manages human life from sperm to worm; in the educational system, self-organized and self-determined learners become their own teachers. Furthermore, institutional boundaries vanish. One of the main tasks of today's medical system has become patient education and the promotion of health literacy. With tools there was a distance and a difference between human intentions and the technical means for their realization. This distality, as Illich called it, was the main characteristic of the instrumental age. It has now dissolved.

In order to study the somato-genic effects of systems thinking, Illich went back to the 12th century, to the beginning of the age of literacy, the time when the book, the alphabet and the text became tools that have shaped our educational institutions and our sense of self. In "ABC- the Alphabetization of the Popular Mind" (1988), coauthored with Barry Sanders, Illich scrutinizes the watershed between the traditional textual and the new informational understanding of the word. He compares this watershed to 12th century revolution in the techniques of reading and writing that he thinks first gave rise to the modern "self." The invention of bookish reading in the Middle Ages initiated a new worldview based on the

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text and its components or techniques, namely words gaps, punctuations, indices etc. This literate mind — that is the mind shaped not necessarily by the capacity to read and write, but by an alphabetized and bookish culture — gave rise to basic elements of our self-understanding such as memory, lie, conscience and language. "In the society that has come into existence since the Middle Ages, one can always avoid picking up a pen, but one cannot avoid being described, identified, certified and handled–like a text. Even in reaching out to become one's own self–one reaches out for a text" (Illich and Sanders, 1988, x). Five years after having published "ABC", Illich wrote "In the Vineyard of the Text" where he intensifies his argument that the modern self is the result of 800 years of bookish reading and a literate culture which began in the 12th century and now comes to an end: The computer, Illich states, is a machine that materializes a fundamentally new understanding of the world. Literate certainties vanish: language is degraded to a code, knowledge to storable information, letters to information bits.

Ivan Illich used the computer extensively and was often distressed that he could not re-program modern software like Windows for his personal purposes. At the same time, he was keenly aware of its enormous power and its devastating effects on the senses. According to Illich, the computer is mainly a symbolic, a "mind-boggling device" (Illich, 1992, 203): It tells us who we are and what we do to each other. It turns speech into the exchange of information between two elements of a cybernetic system. People are asked not to trust their senses anymore, but to rely only on the technological devices that surround them — a vision that has become an observable everyday reality with people hooked to the smartphone. "Existence in a society which has become a system finds the senses useless precisely because of the very instruments designed for their extension. One is prevented from touching and embracing reality. Further, one is programmed for interactive communication, one's whole being is sucked into the system. It is this radical subversion of sensation which humiliates and then replaces perception" (Illich, 1993). When the word has no echo in the flesh anymore, literate language dissolves into something that Illich, following Orwell, calls Newspeak: "Newspeak is more than the proliferation of technical terms. "We see Newspeak as a cipher for something that is now called 'interpersonal communication,' for the belief that the terms by which we describe the operations of computers are fit to tell what is going on between you and me" (Illich, 1992, 112).

2.3. Degrowth in the age of systems

Strikingly, digital technologies as well as cybernetic concepts are highly attractive to social critics and social movements such as the degrowth movement. Apparently, for people who have lived under the regime of instrumentality, the emergence of systems analysis sometimes promises the release from instrumental thinking and offers new opportunities for strengthening autonomy. Illich himself had used cybernetic concepts in the 1970s in order to describe vernacular practices of healing and suffering as autonomous "coping" and to contrast them with medical management. Later, he regretted this choice and realized "the need to disengage self-perception from the subtle traps tended by cybernetic notions masquerading as bearers of sense and meaning" (Duden, 2002a, 222). Yet, despite the widespread concession to the need for cultural change (Latouche, 2009; Kallis, 2011; Schneider et al., 2010), the effects of the technological system on human self-image and self-perception have not been taken up in degrowth discussions so far. On the contrary: Cybernetic conceptions of self-organization and self-regulation are sometimes even understood as the return of the vernacular or the commons. Just as many critical pedagogues

understand the call for "autonomous learning" as a liberation of from the disabling teacher's authority, many eco-activists celebrate communication systems as powerful democratic tools and open access and open source as digital commons, a revival of the lost commons. Marco Deriu, for example, discussing Illich's concept of conviviality, suggests that the internet remains in a grey zone oscillating between use value and exchange value, depending on the context of its usage (Deriu, 2015). Other activists and experts even embrace digital technologies as a means for democratic engagement, participation and political action (e.g. Bollier, 2016; Fuster Morell, 2015). One such is David Bollier, who has been an intellectual guide and advocate in the movement to revive the commons. He sees digital civic networks as a way of bringing "more people into the process of city management and enhancing civic deliberation, transparency and democracy" (Bollier, 2016).

There is no doubt that self-motivated learning is more pleasurable and more effective for children than crammed-in instructions; and there is no doubt that Linux, Firefox or Wikipedia are the better choice because it is not big companies who profit and control the software, but users themselves. Yet, when technologies are assessed only according to their ecological impact or structure of ownership, the key dimension which Illich considered crucial for a convivial society is ignored: The difference between doing and having, between embodied knowing and storable information, between human action and planned and engineered production, between vernacular subsistence and the technological system. Thus, in the same way as alternative schools transform pupils into self-organized subsystems of the educational system, digital commons presume disembodied operators who do not face each other, but communicate. The traditional commons is a vernacular place whose boundaries and practices are shaped by a community. Illich could not have thought of a commons — or a community — composed of disembodied system operators. No matter which software programs them, computers "ape people," as Illich phrased it (Illich, 1992, 47), force us to communicate with machines and intensify the programming of our environment.

Illich was not a Luddite. Instead, he first and foremost aimed at to freeing his listeners from their techno-genic certainties and expectations - certainties that make us blind and numb to the abundance of vernacular arts of living, and destroy our sensual openness to be touched by the incarnate presence of another person. His criticism of the computer does not necessarily require that one remain offline. But, if a degrowth-society is to foster conviviality and freedom, and not slide into a techno-intensive programming of people, it does require the recognition of a fundamental difference between vernacular commons and digital commons, between knowing and information, between facing each other and communicating through machines. This kind of technological ascesis starts in the mind, but is also an indispensable matrix for the recognition of tipping points and the political determination of limits to growth.

3. Conclusions: technology and degrowth

Be it "Tools for Conviviality" or his later work on the somato-genic efficacy of modern technology, Illich's arguments and formulations remain topical. Looking back, his analysis of the 1970s is almost prophetic: inequity has been growing ever since, nationally as well as globally. Its contemporary scale has no historic precedents: some wealthy individuals own more money and property than whole countries (Piketty, 2004; Oxfam, 2016). Billions are unemployed or underemployed. "Full employment" has proved an illusion, and no one seriously considers this achievable anymore. More and more people live in inhospitable or even poisoned environments that have no use value, be it slums, refugee camps or

wastelands, and untold numbers are miserably depend on the economic market and its wastes. "Technological determinism" may have become an obscenity in the STS world, but a growing body of literature concerning digitalization, nanotechnology and genetic technology concedes the perception that we are overwhelmed by an unstoppable technological change.

As Latouche clarifies, Degrowth cannot be reduced to downscaling, but postulates a radical transformation of our priorities and habits, which will be painful and uncomfortable for many. This article has clarified what this radical transformation implies and that, following Illich and his criticism of technology, we not only have to change what we want, but also who we are. In an advanced technological society where not only practices, but also self-perception and imagination are permeated by technological constructs, we must question the self-image that dovetails with this form of society. This means our trust in designed and engineered processes and devices, and our conceptions of health, learning, body, knowledge etc. All of these have been institutionally reshaped in a way that generates endless needs for scientific information, technological control and professional management, thereby promoting the growth of ever more experts and technological devices. The current trend to self-tracking epitomizes the correlation of disembodiment and growth. An increasing number of people are literally unable to trust their senses and have their bodily functions and daily habits measured and controlled by digital devices. No matter who owns the data and controls the software: the growing need for personal data and digital governance is a driver for ever more technology: with the "quantified self", the IT industry celebrates and opens up new growth markets.

On the basis of Ivan Illich's work, this article has introduced a radically new understanding of growth — growth as the result of a historically unique mindset that inverts means into ends. Against this background, it has identified two blind spots in current degrowth discussions. These discussions overlook immaterial technologies such as professional services and political management as drivers of growth, and they disregard technology's power to propagate a techno-genetic and disembodied human self-image. Thus, this articles concludes that the degrowth movement cannot restrict its quest for limits to resource consumption, but must, with the same urgency, seek deliberate limits to manipulative technologies in general, including digital devices and professional services. For this purpose, cultivated common sense and prudent judgment which goes beyond scientific management are indispensable. Today, it is more important than ever to give space to those concepts and practices that relate to a sensually experienced, embodied reality — first in the mind, and then in the world around us. As Marco Polo in Italo Calvino's *Invisible Cities* explains, "The hell of the living is not something to come; if there is a hell, it's the one that is already here, the hell we live through and create every day by coming together. There are two ways of resisting this condition. The first comes easily to many: you accept hell and become part of it, to the point that you no longer see it. The second is dangerous and requires constant attention and learning: to look for and to recognize who and what, within that hell, is not hell; and to make it last, and to give it space" (Calvino, 1985).

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